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The Impact of Corruption on Some Aspects of the Economy

Basem Elmukhtar Ertimi¹ & Mohamed Ali Saeh²

¹ School of Business, University of New England, Armidale, Australia

² School of Law, University of New England, Armidale, Australia

Correspondence: Basem E. Ertimi, Department of Ac Economics, School of Business, University of New England, Australia. Tel: 61-46-689-7930. E-mail:beatimi@myune.edu.au

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Abstract

Theoretical and empirical debate on the impact of corruption on the economy remains unclear. Many studies on corruption seem that the world is occupied by two kinds of people, "sanders" and "greasers". It depends on what the meaning of "corruption" is for them. Some scholars argue that corruption is an obstacle to economic growth, whereas others believe that corruption can (in some circumstances) endorse growth. Corruption also has a negative impact on investment, Foreign Direct Investment, and economic development as a whole. Measuring corruption is still an issue for most economists due to the difficulties of defining it, and also different forms of corruption require different objective measures. Nevertheless, recently, some measures of corruption have been widely accepted and recognised by researchers. This paper is a critical review at these positions by reviewing the theoretical literature on the impact of corruption on an economy as a whole. It is concluded that there is not enough evidence to support the "greasing the wheels" hypothesis. Instead, this document reviews different measurements of corruption to reveal that corruption is harmful for the economy.

Keywords: corruption, economic growth, economic development, measurement

1. Brief Introduction

Corruption is not a new issue, but has continuously existed in many societies. The level of corruption grows and shrinks over time. Corruption is legally wrong, morally wrong and economically indecent. The most common definition used in literature addressing the economic impacts of corruption is "the abuse of public power for private benefit" (Tanzi, 1998, p. 552). Notwithstanding, corruption as an academic concept largely appeared in the 1960s. The theoretical model that forms the basis of much of the current economic analysis surrounding corruption is the principal-agent (PA) model. The PA model assumes that there is a divergence between the interests of the principal and those of the agent. Corruption happens when an agent deceives the principal's interest in pursuit of his or her own (Kurer, 2005). This model has been modified to include third parties and is known as the principal-agent-client (PAS) model. This model has added another dimension to the model, as he or she provides another window of opportunity for the agent to engage in corrupt practices. A "queue model" suggested by Lui (1985) describes the situation where bureaucrats allocate business licences to companies and give preferential treatment to those who bribe the bureaucrats into speeding up procedures. Another model called the "auction model", developed by Lien (1986), states that bribes in a bidding process might stimulate efficiency since the most efficient firms are habitually those who can bear the highest bribes.

2. Measurements

An exact measure of corruption is not easy to come by. Some organisations consider corruption as unobservable and variable; therefore, corruption is usually measured by proxies. There are four types of proxies to measure corruption, defined by World Bank, namely:

- i) Macroeconomic empirical studies
- ii) Survey methodology
- iii) Arrests and convictions
- iv) Net Asset Evaluation

Corruption cannot be measured in the same way as other economic variables. Yet, the number of indices that measure corruption has grown rapidly over the past decade. It is vital to keep in mind that there has not been an international agreement on the precise meaning of corruption, which in turn results in an ambiguity that has

direct implications on international rankings. It is almost impossible to get an objective and precise measure for corruption due to the different faces and nature of corruption. There is difficulty in obtaining objective data on corruption, and there is still no measurement system that accounts precisely for actual levels of corruption within a certain nation and, by extension, at the international level. This is because exact measures of corruption are not well connected with the general level of corruption. However, the indicators are very beneficial in raising awareness, making statistical comparisons between countries and establishing correlations between corruption and a wide range of variables.

Empirical studies that are conducted to examine corruption rely heavily on the measures used to determine levels of corruption in a nation. Such measures are crucial in determining the value of the main explanatory variable of the study, which is the corruption level. Corruption is a term that presents a set of variables acknowledged as corrupt practices. This implies that there may be some variation in the different approaches used to measure corruption that have been established from the types of variables encompassed in the basic data for this measure. In addition, there is no agreement on how data can be collected and how is it weighted in order to form the measure. In fact, the differences in the methods for measuring corruption can influence a replication of the findings of study, due to the potential for considerably different values allocated to the explanatory variable of corruption.

Early corruption indicators were derived from either pure objective measurements or subjective measurements. Due to the criticisms surrounding these indicators by the mid-1990s, a new generation of corruption indicators appeared. This new generation of indicators was constructed by combining several primary measures together and has therefore been termed 'composite indicators', or 'aggregate indicators' (Kaufmann, and Zoido, 1999). Kaufmann et al (2007) classify four main advantages of aggregate indicators. First, aggregate indicators have broader country coverage than individual ones. Second, they provide a functional summary of a large array of individual indicators. Third, by averaging out these indicators, measurement errors have been reduced and the influences of bias from individual sources eliminated. Lastly, aggregate indicators take into account explicit margins of error. This ensures that readers do not over-interpret small differences in the data between countries that are usually insignificant. The two most popular indicators used among anti-corruption practitioners are the CPI and the ICRG.

The most well-known global index that exists as a measure of corruption and gives complete data in a unified way is the index published by Transparency International. Established in 1993, the goal of the organisation is to shrink worldwide corruption by reporting on corrupt practices. The Corruption Perceptions Index (CPI) has been published by the organisation since 1997, ranking countries by the degree that business, politicians, public officials, and outside observers perceive corruption. Founded on surveys in a number of countries, the CPI seeks information on the frequency of bribes, the perception of corruption in public administration, and the amount of corruption that bureaucracy (Lambsdorff, 2002). Other additional sources are also used, including the Economic Intelligence Unit Data and the World Bank Business Environment Survey. The inconsistency in the nature of the compound sources in subsequent years is due to the deficiency in the methodology in developing the index, which weakens the comparison. Moreover, the number of sources used in the compound index for each nation varies. In spite of its weaknesses, the CPI is presently considered to be the best instrument available to measure the variability of corruption. Black market activity is another index that can also be used as a measurement of corruption. It is widely known as the sub-index of Economic Freedom Index (EFI). The EFI comprises a component which determines the "irregular payments" levels that occur in the economy of a country on a scale ranging from 0 to 10, with 10 representing a high level of irregular payments. The component of the EFI is measuring the activity level of the black market, which acts as an indirect measure of corruption. The component of irregular payments from the EFI, however, is not available for all countries. The Global Competitiveness Report of the World Economic Forum is the only source of data for irregular payments.

An annual report issue by the Political Risk Services, International Country Risk Guide (ICRG) contains a corruption index. Tanzi and Davood (1998) have employed this in their empirical study. ICRG Governance Indicators generate comparable measures of the quality of institutions' in various countries, including perceptions of the extent to which public authority is exercised for personal benefit (including both grand and petty types of corruption). The new data have created vital macro-level estimates of the harmful effect of perceptions of corruption on investment and growth (Mauro, 1995; Kaufmann et al., 1999; and Wei, 2000).

In investigating corruption, researchers have also used other proxies for measuring corruption, Derived from the indices published by the Economist Intelligence Unit (EIU). The EIU generates a compound index for the overall risk characterised by the nation and generates indices on 56 risk factors available in various countries. Furthermore, these risk factors contain a set of specific risks such as political instability, as well as the threat of

terrorism. Corruption is among the risk factors measured, where the level of corruption in a country is based on the analyst's perception. All are classified risk factors including corruption which has a ranking between 0 and 10.

Analysis of the deviation that occurs between the measurements is problematic because of the considerable differences in the way corruption information is collected and counted in different indices of corruption or measures. The only index where the information on corruption is presented in a unified and coherent manner is the CPI index. The data of the EIU on corruption is embedded in reports on risk factors in different nations, are relative ranking of the nations is not provided by this data. Consequently, the data must be extracted manually from the reports. Moreover, the data has not been presented in a form suitable for comparison. Likewise, the CMS does not offer cohesive data that allow exact comparisons to the EPI.

Generally, research on corruption is increasingly dependent on using the CPI as the key measure of the presence of corruption a particular country. Depending on the measures used by the researchers, this raises the question of comparison and replication in results of the study when other measurement systems are used. Despite the EIU being frequently used as the basis for gaining combined measures of corruption of the past, the development of the CPI has limited the difficulties inherent in the scattered corruption data of the EIU. This is obvious from the multifaceted technique used by Mauro in his study in 1995, which was based on the EIU as a key source of information for quantifying corruption. Accordingly, the CPI seems to be currently the most accurate measure of corruption. The use of the CPI enhances the capability of other researchers to reproduce the results of a study.

3. The Impact of Corruption

There is a consensus in the literature that corruption is harmful for a society. It distorts income distribution, discourages investments, causes inefficiencies and the waste of resources and harms democracy and ethics. Interestingly, there are a number of studies arguing that there might be some benefits of corruption (Leys, 1970; Leff 1964; Lui, 1985). In these studies, the argument is that corruption can serve as an incentive payment to remove government imposed inefficient rules, speeding up bureaucracy, and providing a chance to get permissions faster by paying for them. However, these studies miss a point; usually heavy bureaucracy is created by the bureaucrats to be able to gain more bribes. Conversely, the literature on the harmful effects of corruption is much broader. Many studies have shown that development negatively correlated with the level of corruption (Mauro, 1995; Le & Rishi, 2006. Rijckeghem and Weder (2001) used panel data from 31 countries in the years between 1982 and 1994, and found a statistically significant negative relationship in the long term between corruption and the ratio of public sector employees' wage levels to the wage levels of the employees in the private productive sectors. On the other hand, authors cannot find a relationship between either corruption and education, or Gross Domestic Product per capita and corruption. In the article by Ades and Di Tella (1997) a number of panel and cross-section regressions analyses were conducted to illustrate that more active industrial policies of government were considerably associated with higher levels of corruption.

3.1 Corruption and Economic Development

A country's variation in economic development has been correlated with its level of corruption by most scholars who measure economic growth using Gross Domestic Product per capita, Paldam (2002), Treisman (2002) and Montinola and Jackman (2002). Consequently, these researchers discovered evidence of corruption levels declining considerably with increasing economic development. However, Kaufmann and Kraay (2003) refute the argument that higher income per capita results in lower levels of corruption and stress that economic development is a result of low corruption levels. Efforts have been made in the literature to ascertain how corruption affects the growth of the economy. With a cross section of about 97 countries, Tanzi and Davoodi (1998) obtained evidence showing that corruption lowers growth. Similar findings were reported by Leite and Weidmann (2001). Additionally, corruption could act as a tax on investment income hence creating a hostile environment for investors (Bardhan, 1997, p. 1328). It further reduces the quality of investment with the diversion of resources from their intended use into payoffs (Tanzi & Davoodi, 1997), therefore hampering the economic development of a country. In spite of these views, some researchers argue that its impacts might not inevitably be entirely unfavorable. For example, the 'grease the wheels' hypothesis suggests that corruption can be useful for economic growth in a non-ideal world where alterations are caused by imperfect institutions (Huntington, 1968; Leff, 1964; Leys, 1965).

Corruption can evade bureaucratic rules and act as a trouble-saving device that increases efficiency and hence growth. This is because corruption becomes increasingly costly to eliminate as it decreases, and therefore there comes a point where eliminating it will be more costly to the economy. This is evident in an empirical study by Colombatto (2003), which shows that corruption does contribute to efficiency in both developed and totalitarian

countries.

3.2 Corruption and Aid

Evidence suggests that corruption is capable of reducing the effectiveness of foreign aid programs as corrupt officials often pocket the money for private purposes (Boone, 1996). Burnside and Dollar (2000) revealed that the effectiveness of foreign aid in positively affecting economic growth depends on the existence of effective institutions to implement good policies in the recipient country. Their argument rests on the fact that corrupt governments “is not going to use aid wisely and outside donors are not going to be able to force it to change its habits” (Burnside & Dollar, 2004). This view of Burnside and Dollar (2004) has received support in the literature (Collier & Dehn 2001; Collier & Dollar 2002). Kaufmann et al (2006) also finds evidence that the likelihood of project success, long-term sustainability of investment and economic growth is much higher in aid-recipient countries that are less corrupt than those with high levels of corruption.

Regardless of the argument made by many international donors that their foreign aid policies favor honest governments with good policies, analyses of past aid have revealed that the intentions of this nature have not translated into actions. Alesina and Weder (2002) disagree with the statement of donors who say that they extend more aid to countries where governments are effective and honest, because the reverse was true in their findings. Similar findings were reported by Svensson (2000). However, studies also found variations in donors’ willingness to reward well-governed countries with more aid. Although the level of corruption in recipient countries is not taken into account by most donor countries (Svensson, 2000; Alesina & Weder, 2002), Australia and Scandinavia were reported to have rewarded countries for their good governance (Alesina & Weder, 2002).

An investigation was undertaken by Alesina and Weder (1999) on whether aid from OECD countries is influenced by corrupt governments. A number of different measures of corruption were utilised in the investigation of different samples of countries. The study showed that there was not enough evidence that foreign donors discriminate against corrupt nations. Surprisingly, it is suggested that corrupt countries attract aid from OECD countries. Further investigation by Alesina and Weder (1999) on the flow of bilateral aid revealed that the provision of aid to corrupted countries is significantly avoided by Australia and the Scandinavian countries. However, the investigation showed that the US favours aid to corrupt nations. This is concluded from the significant negative coefficient in the investigation of the corruption variable. The limitation of this study is that the authors have not compared their findings with other indices, leaving room for doubt.

3.3 Corruption and Foreign Direct Investments (FDI)

The foreign capital in a country might be undermined by corruption. A study was conducted by Hines (1995), showing that the investors from the US varied from other countries in choosing to locate their FDI to less corrupt countries since 1978. He attributes this to the Foreign Corrupt Practices Act (FCPA). Another study was conducted by Wei (1997) to examine whether Japan has a propensity to put more money into corrupt countries. There have been other studies conducted to test the correlation between corruption and the capital inflows. Early, Wheeler and Mody (1992) have not found a strong relationship between the host countries and the size of FDI. Recently, however, studies have shown a negative correlation between them. A study undertaken by Wei (1997) revealed a significant negative effect focusing on bilateral flows between 45 host countries and 14 sources in 1990 and 1991. The study found that increasing the level of corruption from that of Mexico to that of Singapore is equal to increasing the tax rate by roughly 20 percent. Weder and Alesina (1999) used a regression of corruption on FDIs in a cross section of countries. The study concluded that the effect of corruption is significant by testing many explanatory variables and different specifications.

3.4 The Impact of Corruption on Economic Growth (GDP)

Regardless of the common perception that corruption is growth reducing, one of the first studies done by Leff (1964) disputed that corruption might grease the wheels of the activities of public officials in countries in which bureaucratic regulations are ponderous. This is the reason why Leff emphasises that corruption increases the social welfare. Other studies done by Huntington (1968) and Leys (1965) agree with the argument that corruption has a positive influence on economic growth. The reason is that corruption increases efficiency, particularly in the public sector. Lui, (1985) developed an equilibrium queuing model of bribery where the decision on bribe payments is decentralised to customers. Likewise, Lui demonstrated that under certain circumstances the model of bribing is capable of optimal solution to society. The author argued that the optimal speed for the private sector of the service selected by the server can be quicker than the speed without bribery. In line with this argument, Acemoglu and Verdier (1998) support the idea that corruption positively affects economic growth, and found that in an economy where contracts to boost investments are necessary, it might be best to allow certain levels of corruption and not fully implement the property rights. They also found that in

developing countries one of the ways to encourage development is for these economies to choose more corruption and lower levels of property rights.

On the other hand, most of the studies argue that corruption leads to lower efficiency, which in turn leads to lower growth. Myrdal (1968) first investigated deliberate delays by bureaucrats in solving problems in order to attract more bribers. This argument has been sustained in recent years by a large number of experimental studies, mainly on the basis of indicators of corruption as a personal assessment of corruption levels, showing that corruption reduces economic growth and negatively affects social development.

The majority of empirical studies have explored the implications of corruption on investment, allocation of foreign direct investment, and on composition of the expenditure of the government.

The theoretical literature on the impact of corruption on the rate of economic growth indicates that the engine of growth is generally identified in the form of human capital. In the public sector, public officials create opportunities for bribery via discretionary changes of the incentive regime framed by public policies. In general, bribes are taken to avoid rent destruction or in rent seeking instead of increasing human capital. The accumulation of human capital is adversely affected as a result of this and, accordingly, there are lower the growth rates (Pecorino, 1992).

Given the perspective above, and supposing that the accumulation of human capital continuously brings a positive return, it is implied that corruption diminishes growth, and the ideal level of corruption would be zero.

Acemoglu and Verdier (1998), Huntington (1968) and Leff (1964) have disputed that corruption might increase the efficiency of the economy. They argue that this takes place through the use of speed money, which permits firms to evade bureaucratic delay by giving bribes. In 1993 Shleifer and Vishny developed a model of corruption called a principle-agent model of corruption, in which the government is the principal and the bureaucrats are agents. According to this model, the bribes are sometimes extorted at the expense of serving the interests of government when bureaucrats act in their own self-interest. As such, and by extension, it is predicted from the model that corruption would drop the efficiency in an economy. Another model constructed by Blackburn and Forgues-puccio (2009) predicted that corruption can increase (or decrease) efficiency in an economy.

Lui (1985) also argues that corruption may support market performances; good firms have the chance to avoid the heaviness of bureaucracy and take part in the market. Another view taken by Graziano (1980) and Huntington (2002) is that large-scale corruption may indirectly strengthen the links between people. People will tend to be more linked because they feel they are in the same camp, thus reducing the risk of conflict within the population. As such, the economy will grow because of this stability.

On the other hand, many studies conclude that corruption is growth reducing (Mauro (1995), Mo (2001) and Adit (2009). Shleifer and Vishney (1992) dispute that those countries in which individuals who are qualified and talented dedicate themselves to opportunist behaviours or bribing, have a relatively slower growth. Moreover, taxes remain a means by which corruption can act on economic growth. As such, tax evasion is supported by corruption, which consequently negatively affects services, the allocation of public goods and economic growth Loayza (1996). At the same time with the higher levels of corruption, the shadow economy becomes a substantial proportion of the economy and the inefficient bureaucracy increases.

Other studies have extensively investigated corruption from the perspective of the behaviour of rent seeking, where individuals or a group have the opportunity to get revenue that overdo the revenue typically available in a perfect competitive market. Antwi and Adams (2003) found that when resources from outside sources designed for the projects of urban renewal are diverted by government agencies via privileges and high salaries for administrators, few funds accomplish their intended use. Another study done by Mbaku (1999) reported that politics and the structure of the institutions in African countries enhance rent-seeking behaviour by assigning a large number of restrictions on regular economic activities. Bureaucrats take advantage of their positions by seeking gratuities for the performance of routine services which results in institutionalised and endemic corruption. A vast number of imperial studies targeted at establishing a link between the rate of economic growth and corruption have been produced as a consequence of the theoretical debate on the impact of corruption upon an economy.

4. Conclusion

Reviewing the recent literature regarding the relationship between corruption and economic growth, corruption appears that it can influence economic growth through several channels. Many models have been applied to measure this relationship. The most popular method is a regression model. It also appears that there are difficulties in measuring corruption which is mainly attributed to the difficulties in defining it. Using measures

for corruption help to establish the relationship between the level of corruption and economic growth. The above literature review theory and empirical studies has presented on a particular aspect of corruption. It can be seen from the empirical studies outlined above that corruption in general is harmful to economic growth both directly and indirectly, throughout many channels such as investment, trade and foreign direct investment.

The discussion in this paper reviews the relationship between corruption and economic growth. The present study is based on the varied findings contained in the review. The review indicates that it can be theoretically and empirically proven that economic growth is undoubtedly influenced by corruption through the variables of investment, trade and FDI.

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Investor Pessimism and Post-Issue Outperformance: Evidence from Privatized Firms

Lobna Bouslimi¹

¹HEC Montreal, 3000 Sainte Catherine Street, Montreal, H3T 2A7, Canada

Correspondence: Lobna Bouslimi, HEC Montreal, 3000 Sainte Catherine Street, Montreal, H3T 2A7, Canada.
Tel: 1-450-510-0735. E-mail: lobna.bouslimi@hec.ca

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Abstract

Using a unique sample of privatized firms over the period 1980 and 2002, we explore how the policy risk which is a distinctive feature of privatization is perceived by investors and whether the post issue outperformance of these firms is associated to investor pessimism. We find evidence that market-adjusted abnormal returns are negatively related to analysts forecast errors used as a proxy for investor expectations. This result suggests that contrary to traditional private firms investors seem to be pessimistic in their forecasts of privatized firms' earnings projections in the beginning of the privatization procedure. However, they are more confident in the prospects of these firms over time consistent with the positive performance we find after privatization.

Keywords: analyst forecasts, privatization, policy risk, long run performance, investor pessimism

1. Introduction

Numerous studies argued that the long run underperformance of equity issuance is evidence of systematic overoptimism in investors' expectations using analysts' forecasts as a measure of investors' expectations (e.g. Rajan & Servaes, 1997; Derrien, 2005; Bradshaw, Richardson & Sloan, 2006; Yi, El Badawi & Lin, 2008 among others). In a nutshell, this evidence shows that financial analysts play a significant role in the valuation of firms by providing forecasts about earnings and long term growth forecasts, as financial analysts' forecasts are considered to be highly guided by investors' perceptions (Note1). However, no prior studies have tested directly the relationship between investor sentiment and aftermarket performance of newly privatized firms (NPFs) (hereafter). Our interest in privatized firms is motivated by two main considerations. First, compared to private IPOs, newly privatized firms are exposed to particular uncertainties related to (1) the change of ownership from government to private and the ability of new owners to make a successful transition, and (2) the governments' commitment towards the privatization process. Second, Perotti (1995) and Perotti and Guney (1993) argue that NPFs is exposed to a policy risk that is related to postprivatization policies that the government may undertake (e.g., deregulation). Thus, it is unclear how policy risk is perceived by investors, or financial analysts.

We investigate in this paper, first, how policy risk is taken into account in investors' expectations of NPFs that access the market through a share issue privatization (i.e., an IPO by the former State owned enterprise). Second, we assess the aftermarket performance of these firms and relate it to investor sentiment (by way of financial analysts' forecasts).

Our paper contributes to the literature on several grounds. First, we extend the studies on the long run performance of privatized firms, by providing further evidence on whether NPFs outperform in the long run, using different benchmarks and an international database of privatization transactions. Second, we also document how policy risk, which is a distinctive feature of privatization, contributes to our understanding of the behavior of privatized firms' returns over time. To the best of our knowledge, no prior study has directly tested the relationship between investor sentiment and post-issue performance of privatized firms.

In this paper, we use a sample of 302 privatized firms from 43 countries over the period 1980 to 2002. The context of privatization provides us with an opportune setting to explore the link between policy risk and the aftermarket performance.

Using different measures of market (investor) expectations of future earnings, we find evidence consistent with the fact that at the beginning of the privatization procedure investors are relatively pessimistic, however they

become more confident over time. This finding contrasts with the findings for private IPO's. Jain and Kini (1994) find that investors are over-optimistic about private IPO's and grow more pessimistic over time

Furthermore, we find also that post issuance abnormal returns (CARs and BHARs) of privatized firms are negatively related to analysts forecast errors. One interpretation of this is while investors in private IPO's are optimistic but grow disappointed as time advances, investors in NPFs are pessimistic at the time of the privatization (when policy risk is higher) but grow more confident with time, when policies become credible.

The remainder of the article is as follows. Section 2 provides our motivations and hypothesis. Section 3 describes data. Section 4 presents financial analyst behavior towards privatized Firms. Section 5 provides evidence on market expectations and earnings performance. Section 6 and 7 present empirical results related to aftermarket performance of privatized firms. Section 8 concludes.

2. Background and Hypothesis Development

A rich literature attempts to explain the long term underperformance of private initial public offerings (IPOs). According to Ritter (1991) and Loughran and Ritter (1995), the firms take advantage of windows of opportunity to issue stocks. Other explanation is related to earnings management (Teoh, Welch & Wong, 1998). Another view posits that firms issue new stocks when they are temporarily overvalued by the market (e.g., Bayless & Chaplinski, 1996). Interestingly, some studies have tested the link between the long run performance to investors' expectations, typically based on financial analyst data, suggesting that brokerage houses analysts reflect-or drive-investors' beliefs.

For instance, Rajan and Servaes (1997) find evidence that, for a sample of private IPOs, analysts' forecasts about earnings per share are optimistic. In a more comprehensive study of the relation between external financing activities and future stock returns, Bradshaw et al.(2006) find that external financing is positively related to overoptimism in analysts' forecasts which holds for different measures of financial forecast (short term earnings per share forecast, long term earnings per share forecasts). However, evidence also suggests that the basis of investors' expectations differs for private IPO's and privatized firms for several reasons.

First, the information asymmetry theory is one important explanation behind the underperformance of Private IPO's. However, it can be argued that privatized firms are generally large, well known firms, thus information asymmetry does not seem important in this context. Second, literature on privatization (Megginson, Nash & van Randenborgh, 1994; Boubakri & Cosset, 1998; Megginson & Netter, 2001; Djankov & Murrell, 2002) shows that privatized firms exhibit significant increases in profitability among other performance indicators. This evidence is in contrast with the findings for private IPOs which have been shown (Jain and Kini (1994) to exhibit a decline in their post-issue operating performance, leading to more negative perceptions by investors. Third, privatized firms may be exposed to additional uncertainties related to policy risk associated with governments' commitment to the privatization process. Policy risk is the cash flow risk associated with policy reversals or regulatory changes. Therefore, Jones, Megginson, Nash and Netter (1999) argue that political considerations are important in the pricing of privatized (IPO's). In addition, Lam, Tan and Wee (2007) find that policy risk rather than information asymmetry explains the underpricing of privatized firms. Thus, in the light of this evidence, policy risk may play an important role in markets' expectations of future earnings of privatized firms. Therefore, as privatized firms exhibit a transformation in their ownership structure, objectives and management, released information about their superior performance in the after-privatization time could help in building confidence among investors who will in return price the firm accordingly.

Based on these arguments and assuming that financial analysts' forecasts reflect those of investors, we expect that investors seem to be pessimistic about the future earnings of newly privatized firms in the beginning of the process and we should observe that investors confidence in the future earnings of privatized firms increases as the time advances.

Therefore, we draw the following hypothesis:

Hypothesis H1: *Investors are pessimistic about future earnings of privatized firms at the time of the issue and they become more optimistic as time passes.*

Hypothesis H2: *There is a negative relation between investor pessimism and the outperformance of privatized firms.*

3. Data

To run our investigation, we rely on a unique data of 302 privatized firms from 43 countries that covers the period 1980 through 2002. The initial data is provided by Boubakri, Cosset and Guedhami (2005). The list of

privatized firms is collected from different sources such as the *World Bank* privatization database for DCs, the *Privatization Barometer* for OECD countries, and Megginson's (2003) list of privatized firms in developing and developed countries. Ownership structure is collected from numerous data sources including annual reports, Asian, Brazilian, and Mexican Company Handbooks, the Guide to Asian Companies, and Kompass Egypt Financial Year Book. The firms' financial statements, their web sites, and databases such as *Moody's International*, *Mergent Online*, *Worldscope Disclosure*, and *Bankscope* are used to calculate the financial informations. Data about Egyptian firms comes from Omran (2005).

We then match this original database with Institutional Brokers Estimate System (I/B/E/S hereafter). About 150 privatized firms are covered in the I/B/E/S database at some point after privatization (more specifically within three years after privatization). For this set of firms, we obtain the number of analysts, annual earnings per share forecasts, analyst earnings revisions, as well as actual annual earnings per share and long term earnings growth forecasts from the I/B/E/S international files summary.

We include in the final sample firms that have only available data on stock returns. The return data for individual and national indices come from Datastream International. Firms must have at least one year of available post-issue price data. After excluding observations with missing information on returns data, we end up with 134 firms. The geographical pattern of our sample is detailed in Table 1.

Table 1. Summary statistics

Distribution of Privatization					
By year					
Year	Number	Percentage	By legal origin	Number	Percentage
1980	1	0.33	Civil law	114	75.50
1981	1	0.33	Common law	37	24.5
1984	1	0.33	Total	151	100
1985	4	1.32	By industry		
1986	5	1.66	Energy	31	20.5%
1987	3	0.99	Financials	31	20.50%
1990	20	6.62	Telecommunication	16	10.5%
1991	36	11.92	Transport	20	13.24%
1992	32	10.6	Utility	23	15.23
1993	14	4.64	Others	30	20%
1994	21	6.95	Total	151	100
1995	24	7.95	By region (Note2)		
1996	38	12.58	North Africa and the Middle East	2	1.33%
1997	33	10.93	East and south Asia and the Pacific	34	22.5%
1998	12	3.97	Europe and central Asia	76	50.33%
1999	10	3.64	Latin America and the Caribbean	38	25%
2000	9	2.98	Sub-Saharan Africa	1	0.6%
2001	4	1.32	Total	151	100
By analyst coverage over time					
Followed within one year				123	81.5
Followed within two and three year				28	18.5
Total				151	100

Table 1 provides descriptive statistics for the 151 privatized firms followed by analysts.

4. Analysts' Behavior toward Privatized Firms

4.1 Earnings Forecast Errors

In this section, we explore analysts' forecasts accuracy made over time (through the three years after privatization). Time refers to the time period after privatization when the forecast is made. Financial analysts provide forecasts each month and are available for periods up to three years in the future.

We focus only on firms listed on I/B/E/S within one year of their issue. As argued by Rajan and Servaes (1997) "including firms after one year will obscure some of results, because forecast errors would be influenced both by the addition of the new firms as well as revisions in forecasts of firms already listed" (page 515). Forecast errors are measured as (Earnings forecast - Actual Earnings) / stock price at the end of the fiscal year, as in Doukas, Kim and Pantzalis (2002). We use median values of earnings forecasts instead of means to ensure the robustness of results to extreme observations.

Table 2. Analyst earnings forecast errors

Time	Forecast Error	Number
3 months	0.028 (0.000)	234
6 months	0.0285 (0.000)	256
9 months	0.0387(0.000)	282
12 months	0.045(0.000)	300
15months	0.0444 (0.000)	320
18 months	0.0483 (0.000)	319
21 months	0.0558(0.000)	323
24 months	0.0577 (0.000)	322
27 months	0.0523 (0.000)	325
30 months	0.0562 (0.000)	313
33 months	0.0656 (0.000)	318
36 months	0.0737 (0.000)	313

The sample in Table 2 represents all earnings forecasts made by analysts in the three years period after the privatization. Only forecasts made for firms listed on I/B/E/S within one year of privatization are included. The forecast error is computed as the value of analyst forecast error deflated by stock price: forecast error = (Earnings forecast - Actual Earnings) / stock price. Time refers to the time period after the privatization that the forecast is computed. We report forecast errors for time after privatization of three through 36 months using intervals of three-month. P-values are in parentheses.

Table 2 reports forecasts errors calculated between the first and third year after privatization. The results indicate that forecast errors in earnings expectations for privatized firms are small at the beginning of the process, and tend to increase by the third year after privatization, which is consistent with the hypothesis that investors' expectations are negative (i.e., investors are pessimistic), but become positive over time (i.e., investors become optimistic).

4.2 Long Term Earnings Growth Projection

Financial analysts provide also forecasts about long term earnings growth projections (LTG). The long term considered by I/B/E/S is a five year horizon. Existing research (e.g., Rajan & Servaes, 1997; Sloan, Hutton & Dechow, 2000) argue that LTG earnings projection is a good measure of market expectations.

Table 3. Long term earnings growth forecasts

Time	Long Term Growth forecast (in %)	Number	Industry-Adjusted Long Term growth forecast (in %)	Number
3 months	16.82 (0.000)	22	1.64(0.72)	20
6 months	17.51(0.002)	32	3.28(0.43)	30
9 months	17.41(0.000)	36	3.45(0.39)	32
12 months	17.034 (0.0000)	42	3.68(0.30)	34
15months	16.49(0.000)	44	1.05(0.72)	38
18 months	20.474 (0.000)	50	-0.24(0.920)	42
21 months	21.66(0.000)	58	-1.12(0.630)	49
24 months	15(0.000)	58	-0.84(0.62)	50
27 months	12.10(0.000)	60	-2.039(0.17)	55
30 months	14.19(0.000)	60	-1.09(0.45)	55
33 months	16.144(0.000)	59	-1.66(0.370)	52
36 months	14.095(0.000)	66	-2.36(0.22)	57

In Table 3, time refers to the time period after the privatization date that the forecast is computed. Industry-adjusted long term growth rates are calculated by subtracting the average of all companies in the same industry and country for the listed firms in I/B/E/S. Number is the number of firm that has forecasts. P-values are in parentheses.

Results in table 3 show that the initial long term earnings growth forecasts start with a level of (16.82%) for three months after the privatizations and reach 17.42% for 9 months and 20.47% for 18 months. However, this pattern is not sustained, as we note a considerable decrease in the two years after the issue. It seems that analysts are pessimist about the prospects of privatized firms in the beginning but become more optimistic over time. This result contrasts with the evidence for IPOs reported by Rajan and Servaes (1997). The authors indeed document an inverse pattern in the long term growth forecasts for private IPOs. Specifically, the long term earnings projections are high, however they drop by the third year after the IPO.

4.3 Analysts Earnings Revisions

Analysts also make upward and downward revisions. Upward revisions by time and window are reported in Tables 4 and 5. If investors' earnings expectations are initially too pessimistic, then subsequent forecasts are expected to be revised upward.

Table 4. Analyst earnings revisions

Time	Number of analysts	Upward forecast revision	Number
3 months	7.97(0.000)	0.729(0.000)	248
6 months	8.39(0.000)	0.825(0.000)	286
9 months	8.42(0.000)	0.858(0.000)	317
12 months	8.79(0.000)	0.973(0.000)	344
15months	8.88(0.000)	0.978(0.000)	370
18 months	9.15(0.000)	0.992(0.000)	382
21 months	9.29(0.000)	1.09(0.000)	402
24 months	9.22(0.000)	1.012(0.000)	407
27 months	9.35(0.000)	1.14(0.000)	434
30 months	9.24(0.000)	1.17(0.000)	433
33 months	8.95(0.000)	1.06(0.000)	445
36 months	9.10(0.000)	1.20(0.000)	446

The sample in Table 4 consists of all the number of revisions (upward and downward) provided by analysts in the three year period after the privatization. Only forecasts made for firms listed on (I/B/E/S) within one year of privatization are included. Time refers to the time period after the privatization that the forecast is made. P-values are in parentheses.

Table 5. Analyst earnings revisions

Window	Upward forecast revision	Downward forecast revisions	Number
Panel A: Forecasts Made Within one Year of The Privatization			
3 months	1.13 (0.000)	1.815 (0.000)	92
6 months	1.431 (0.000)	1.697(0.000)	109
9 months	1.5 (0.000)	1.358(0.000)	92
12 months	0.895 (0.000)	1.40(0.000)	96
15months	1.16 (0.000)	1.66(0.000)	84
18 months	1.09 (0.000)	1.44(0.000)	99
21 months	1.02 (0.000)	0.91(0.000)	78
24 months	0.657(0.000)	0.43(0.000)	70
27 months	0.58(0.000)	0.68(0.000)	58
30 months	0.31(0.000)	0.38(0.000)	70
33 months	0.30(0.0032)	0.21(0.006)	46
36 months	0.15(0.05)	0.09(0.08)	32
Panel B: Forecasts Made Within Two Year of The Privatization			
3 months	1.49(0.000)	1.914(0.000)	211
6 months	1.47(0.000)	1.726(0.000)	238
9 months	1.49(0.000)	1.616(0.000)	214
12 months	1.12(0.000)	1.488(0.000)	215
15months	1.48(0.000)	1.82(0.000)	189
18 months	1.26(0.000)	1.51(0.000)	209
21 months	1.13(0.000)	1.11(0.000)	172
24 months	0.69(0.000)	0.74(0.000)	154
27 months	0.61(0.000)	0.68(0.000)	140
30 months	0.47(0.000)	0.5(0.000)	144
33 months	0.33(0.000)	0.227(0.000)	101
36 months	0.16(0.000)	0.18(0.000)	77

The sample in Table 5 consists of all the number of revisions (upward and downward) made by analysts in the two year period after the privatization. Only forecasts made for firms listed on (I/B/E/S) within one year of privatization are included. We report revisions forecasts for forecast windows of three through 21 months in three-month intervals. Window is the number of months between the time the forecast is made and the fiscal end for which the forecast is made. P-values are in parentheses.

The results in Table 4 and 5 indicate that analysts indeed make upward forecast revisions in the months following privatization offerings. In addition, we note that the number of analysts that follow privatized firms increase over time, which suggests that these firms become more interesting to analysts over time. Consistent with our previous results, this evidence suggests that analysts become more optimistic about the future prospects of privatized firms over time which may explain their upward forecasts' revisions.

5. Market Expectations and Earnings' Performance of Privatized Firms

Following Jain and Kini (1994), we examine different measures of investor expectations of post-issue earnings growth of privatized firms. In particular, we examine the post issue market to book (M/B), price to earnings (P/E) and earnings per share (EPS) ratios for both NPFs and their matching firms. All the changes in these ratios are reported relative to the year of the privatization (year 0) and we analyze their yearly progression compared to the matching firms over the five year-period after divestiture.

Table 6. Market expectations and earnings performance

	Year 0 to 1	Year 0 to 2	Year 0 to 3	Year 0 to 4	Year 0 to 5
Panel A: M/B ratio					
Median change	-0.22 (0.0066)***	-0.23 (0.0352)**	-0.20 (0.066)*	-0.17 (0.368)	-0.25 (0.0822)*
Median matching adjusted change	-0.16 (0.25)	0.17 (0.49)	0.31 (0.07)*	0.21 (0.0855)*	0.20 (0.0625)*
Number of observations	102	102	102	102	98
Panel B: EPS ratio					
Median change	0 (0.0067)***	0.06 (0.0002)***	0.08 (0.0007)***	0.12 (0.000)***	0.195 (0.000)***
Median matching adjusted change	0.01 (0.24)	0 (0.911)	0.03 (0.073)*	0.08 (0.36)	0.03 (0.2564)
Number of observations	116	115	115	115	110

*, **, *** refer to 10%, 5% and 1% significance levels. P-values are in parentheses.

Table 6 presents the values of median change of market to book ratio (M/B), and earnings per share (EPS) for privatized firms and as adjusted to matching firms. The data on (M/B) and (EPS) are available from Datastream. Year 0 is the year of the issue. The matching adjusted change for each firm is the difference from matching firm value. We use the wilcoxon signed rank test for the significance tests.

The median raw and adjusted changes in levels of these ratios in years +1 to +5 are reported in Table 6. Panel A of Table 6 shows an increase in the median raw and matched adjusted (M/B) and (EPS) ratios in the post issue years relative to year 0, although the coefficients are not usually significant for all horizons. This result implies that investors' expectations are low at the time of privatization, but are adjusted upward over time. In other words, it seems that investors appear pessimistic about the earnings' growth potential of firms in the beginning of the privatization process, but tend to become more optimistic over time. These findings for privatized firms are in sharp contrast with those for private IPOs. Indeed, a similar analysis for IPOs, conducted by Jain and Kini (1994), shows a significant decline in the M/B, P/E and EPS ratios in the post-issue years relative to the issue year. The authors conclude that investors seem to value IPO firms based on expectations that earnings growth will continue to increase, but they are soon to realize that the levels of pre-IPO earnings growth are not sustained in the future.

We also examine the year by year levels of our proxies of investors' expectations for both NPFs and their matching firms in Figure 1.

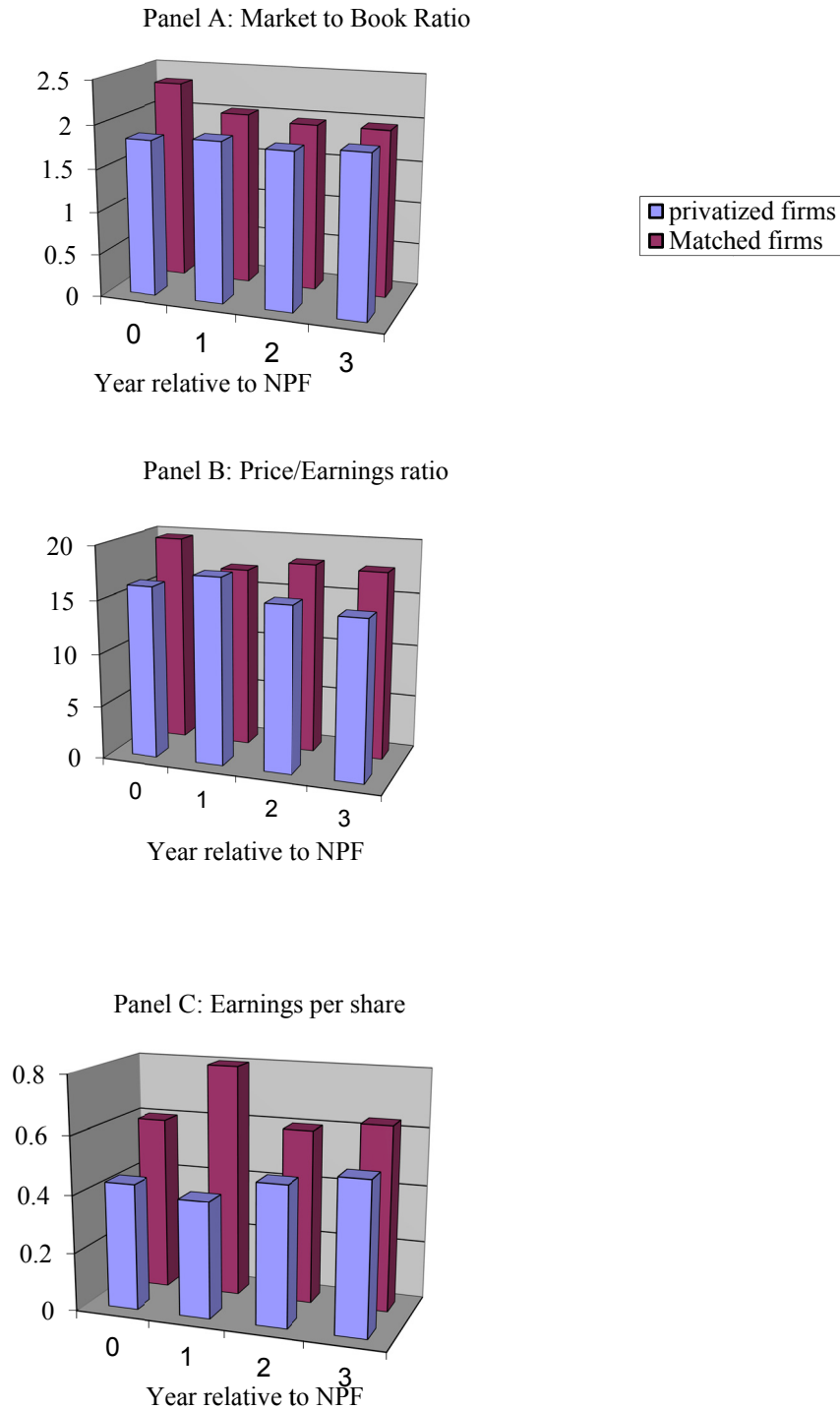


Figure 1. Market expectation and earnings performance

The figure1 illustrates the median levels of market to book ratio (M/B), earnings per share (EPS) and price to earnings (P/E) for fiscal years 0 to 3 relative to privatization.

From Panel A, we can see that in the year 0, NPFs start with low M/B ratios compared to their matching firms. However, we note an improvement in the M/B over time which is relatively close to the pattern of matching firms. From Panel B, we note that the median levels of P/E ratios of NPFs increase over time. However, for EPS ratios in Panel C, the increase is not maintained. There is a decrease in the second year but the pattern of increase

picks up again afterwards.

Overall, we can conclude that NPFs start with low M/B and P/E ratios, which soon increase over time. Thus, it appears that investors are pessimistic and cautious in valuing NPFs firms at the beginning, but their confidence towards these firms starts building over time. This result is consistent with the view that investors appear to have pessimistic expectations about earnings growth, and revise these expectations upwards as these firms realize an unexpected positive earnings growth.

6. The Long Run Performance of Privatized Firms

While there is a rich literature on performance changes for privatized firms, relatively some studies look at these firms' aftermarket stock price performance. Most studies are limited to single countries (e.g., Levis, 1993, (UK); Aggrawal, Leal & Hernandez, 1993, (Chile), among others) (Note 3). These studies generally indicate that privatization IPOs outperform in the long-run which is in contrast to the finding for private initial public offerings (IPOs).

In the long run performance literature, there is still an important debate on how to measure the long-run abnormal stock returns. Barber and Lyon (1997) argue that the buy-and-hold abnormal returns (BHAR) are the appropriate estimator, because they measure "investors' experience". However, the authors show that abnormal returns using benchmark portfolios are biased. These biases arise from new listing, rebalancing and positive skewed long-run abnormal returns. The authors then suggest that the control firm approach can eliminate these biases. However, Mitchell and Stafford (2000) argue that the BHAR approach is not a measure of long-term abnormal returns because it assumes the independence of multi-year event-firm abnormal returns. Therefore, measuring adequately the long-run performance remains an open question. To ensure robust results, we therefore consider, in this study, different techniques, and more than one reference index to determine the long-run abnormal performance.

For three holding periods, we compute for each firm the CARs (cumulated abnormal returns), and BHARs (buy-and-hold abnormal returns) using the local market index, size and size-and-book-to-market matching firms as follows:

$$CAR_{i,s,e} = \sum r_{i,t} - r_{benchmark,t} \quad (1)$$

$$BHAR_{i,T} = \left[\prod_{t=1}^{min(T, delisting)} (1+r_{i,t}) - 1 \right] - \left[\prod_{t=1}^{min(T, delisting)} (1+r_{benchmark,t}) - 1 \right], T=12, 24 \text{ or } 36 \text{ months} \quad (2)$$

Where $CAR_{i,s,e}$ is the cumulative abnormal return using the market index, size and size-and-book-to-market matching firm as a benchmark for stock i from the first trading of the privatization issue to the anniversary date (12, 24 or 36 months), or until the date of delisting.

$r_{i,t}$, $r_{benchmark,t}$ are the monthly returns for security and the corresponding benchmark in period t , respectively;

$BHAR_{i,T}$ is the buy-and-hold abnormal return for stock i in period T , where T represents the aftermarket trading period (12, 24 or 36 months), respectively; $t=1$ is the first aftermarket trading month, and $min(T, delisting)$ is the earliest last month before the delisting of the privatized firm.

The market index for each country is collected from Datastream. In particular, we use the value weighted Datastream Total Market Index.

Following Barber and Lyon (1997), we identify matching firms in each local market using the following criteria. The matching firm must not be a privatized firm. We begin by identifying all domestic firms that have a market capitalization between 70 and 130 percent of that of our sample privatized firms. Then, we choose the firm that has the closest book-to-market (B/M) to that of our sample firm. In addition, we control also for firms that did issue during the three years before the event date to avoid the bias induced by the underperformance in the long run of new issuers. A similar approach is used to select a size matching firm. If a privatized company is delisted prior to its anniversary date (third year), we truncate its total return on that date.

Table 7. CAR of privatized firms over time using alternative benchmarks

Benchmark	Local market-matched		Size matched		Size –B/M matched	
	N	CAR	N	CAR	N	CAR
One-year	135	9% (0.06)*	125	10% (0.050)**	74	19.65% (0.0053)***
Mean		5.75 % (0.15)		4.13% (0.23)		6.95% (0.5614)
Median						
Two-year	134	24.33%(0.000)***	125	12.12% (0.0811)*	74	24.54 (0.0077)***
Mean		14.24% (0.034)**		6% (0.18)		19%(0.39)
Median						
Three-year	129	30.30%(0.000)***	120	11.62% (0.1266)	74	25.87% (0.0247)**
Mean		15.56%(0.003)***		7.9% (0.2615)		7.23% (0.2954)
Median						

*, **, *** refer to 10%, 5% and 1% significance levels. P-values are in parentheses.

From Table 7, we can see that NPFs exhibit significant positive cumulative abnormal returns (CARs) over one, two and three years (9%, 24.335% and 30.30%, respectively) when the local market index is used as a benchmark. This evidence supports the results find by Megginson, Nash, Netter and Schwartz (1999), Boardman and Laurin (2000), and Dewenter and Malatesta (2001). However, when size or size-and-B/M are used as a benchmark, we note that firms continue to have a positive long term performance over one, two and three years, although we lose significance. These results are consistent with the finding of Megginson, Lee and Choi (2010) who show that privatized firms outperform their market benchmark, but over three or five years the size and B/M adjusted returns become non significant.

We acknowledge the fact that it is difficult, in some cases, to find a matching firm in the same industry as the privatized firm, especially when this latter is particularly large or operates in strategic industries. It should be noted that very few studies tried to find matching firms for privatized firms (Note 4).

Table 8. BHARs of Privatized firms over time using alternative benchmarks

Benchmark	Local-Market matched		Size matched		Size –B/M matched	
	N	BHAR	N	BHAR	N	BHAR
One-year	132	7.57% (0.0671)*	119	8.79% (0.0549)*	71	13.38% (0.06)*
Mean Median		2% (0.3318%)		2% (0.357)		0.84% (0.5)
Two-year	131	38.35% (0.0076)***	119	24.32% (0.059)*	71	29.23% (0.0478)**
Mean Median		-0.055 (0.5693)		4.05% (0.1356)		5.24% (0.317)
Three-year	126	58.29% (0.0033)***	114	38.81% 0.0488)**	71	31.68% (0.1173)
Mean Median		7.69% (0.10)*		3.2% (0.4627)		8.85% (0.4)

*, **, *** refer to 10%, 5% and 1% significance levels. P-values are in parentheses.

For buy and hold abnormal returns (BHARs) in Table 8, NPFs provide significantly higher average returns ranging from 7.57% for one year to 38.35% and 58.29% for two and three years, respectively, relative to the local index market. In fact, the matching firm-adjusted BHARs tend to increase after privatization (8.79% for one year, to 24.32% and 38.81% for two and three years), when size is used for matching. Moreover, when size-and- B/M is used for matching, the BHARs average 13.38%, 29.23% and 31.68%, respectively. However, the coefficients for the matched firms benchmark are not all the time significantly different from zero.

This result may reflect the lower precision of the matching firms' sample, in particular, the book-to market matching firms' sample, which is half smaller. In addition, privatized IPO's are unique, because those state companies are typically the largest firms in each domestic market, thus it is difficult to find the appropriate matching firms. Therefore, our evidence is consistent with the empirical challenges involved in calculating long-term excess stock returns (Lyon, Barber & Tsai, 1999; Fama, 1998 and Mitchell & Stafford, 2000).

7. Explaining the Long-Term Performance of Privatized Firms

Overall, our previous findings suggest that investor seem to be pessimistic in their valuation of newly privatized firms, at the time of the issue. However, as time passes by, investor becomes more optimistic about the future earnings prospects of these firms. Therefore, we expect that it is investors' pessimism about future earnings of privatized firms that will explain the outperformance of privatized firms. In this section, we conduct cross sectional regressions of post issuance abnormal returns to examine the determinants of the long-term performance of NPF's (one, two and three years). We consider four categories of variables: factors related to the firm, those associated to the institutional environment, those related to privatization characteristics and finally those related to analysts forecast factors. The definitions of these variables are described in Table 9.

Table 9. Description of variables and sources

Variable	Definition	Source
Institutional Environment		
<i>RIGHT</i>	An index of minority shareholder protection based on the anti-director right index	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998)
<i>DEVELOPED</i>	A dummy variable equals to unity if the country was not treated as developed country and zero otherwise.	World Bank
<i>LIABILITY</i>	An index of regulation of securities markets	La Porta, Lopez and Shleifer. (2006)
<i>BUREAUCRACY</i>	The Bureaucracy Quality index is scored by analysts on a scale of 0-4 with discrete Intervals of 0.5. It is an indicator of a country's institutional strength and its ability to handle Transitional changes when government changes.	International Country Risk Guide (ICRG)
<i>POLRISK</i>	An assessment of the country's political stability	International Country Risk Guide (ICRG)
Privatization Characteristics		
<i>STATE</i>	The percentage of share held by the government	Boubakri et al. (2005)
<i>FOR</i>	A dummy variable which equals to 1 when foreign investors are involved for the first time in the ownership structure. and zero otherwise.	Company prospectus and annual reports
<i>RECENTP</i>	A dummy variable that capture the timing of privatization equals to 1 if recent privatization in the country and zero otherwise.	Boubakri et al. (2005)
<i>UNDERPRICING</i>	Underpricing is calculated as: (First aftermarket price-offer price) / offer price	Meggison (2001) Appendix and Datastream
Country and Firm Characteristics		
<i>GDPG</i>	Real GDP growth one year before privatization	World development indicators
<i>STRATEGIC</i>	Equal to 1 if the firm belongs to strategic industry (utilities, telecommunications, financials, and transportations) and zero otherwise.	World Bank group's privatization transaction Database
<i>LOGSALES</i>	The logarithm of the total sales at the time of privatization in (\$)	Company prospectus and annual reports

7.1 Firm Specific Variables

According to asymmetric information theories, firm size can affect long term stock price performance. Larger firms should be less asymmetry than small firms, because uncertainty about larger firms is small. For IPOs, Ritter (1991) and Loughran and Ritter (1995) report that size is negatively related to long-run returns. Furthermore, we expect small firms to outperform large firms. We use *LOGSALES* as proxy for size. In addition, we consider the industry classification (*STRATEGIC*) which is a dummy variable that equal one if the firm belongs to strategic industry and zero otherwise.

7.2 Institutional Environment Variables

In this article, the institutional environment includes legal institutions and securities laws. A good functioning legal system favors the protection of investors. In addition, as documented by La Porta et al. (2006) laws mandating disclosure and facilitating private enforcement through liability rules benefit stock market. We include the variables RIGHT, POLRISK and LIABILITY respectively as proxies for investor protection, political risk and for laws mandating disclosure.

As shown in the above sections, a well developed market may affect information disseminations and the long term allocation of resources. Thus, we include GDP growth (GDPG) and a dummy variable (DEVELOPED) to test the impact of market conditions on returns.

7.3 Privatization Characteristics Variables

Perotti and Van Oijen (2001) argue that the progressive resolution of political risk as the privatization program evolves, leads to more positive returns. In the same vein, Perotti (1995) documents that governments use gradual sales as a signal of their commitment. Thus, the higher is the percentage retained by the government, the higher is the risk that the government intervenes in the future activities of the firm. Therefore, the portion of retained government ownership (STAT) is likely to be positively related to the aftermarket performance. In addition, following Lam et al. (2007), we use the bureaucracy quality index (BUREAUCRACY) as a direct measure of policy risk. The authors find that underpricing is negatively related to policy risk measured by bureaucracy. In addition, the prior literature on private IPOs (Ritter, 1991) suggests that we include underpricing as an explanatory variable of the aftermarket performance. However, in our study we are unable to include this variable due to the limited observations we have about underpricing. If as documented by Lam et al. (2007), policy risk explains the underpricing of privatized initial public offerings, bureaucracy our proxy for policy risk will also capture underpricing.

In early privatizations, the government reputation is not built yet and investors do not have a previous track record. In addition, privatization at its early stages is more uncertain and represents an uncommon event, thus the risk is more important compared to those that are scheduled later, and we should expect higher compensation for risk for privatizations in early stage in our database. On the other hand, Boubakri and Cosset (1998) document that as privatization becomes a more common event, the industries classified as “strategic” were also included in the program. Privatized firms in the strategic industries are considered more risky firms. Thus, one could expect more returns for the most recent privatizations. Consequently, we construct a dummy variable, called RECENTP to capture the timing of privatization.

7.4 Analysts' Forecast Factors

Financial analysts' forecasts are of substantial interest to investors and to researchers. Thus, we assume that financial analysts' expectations could represent or influence investors' expectations.

If analysts are too pessimistic about the prospects of privatized firms in the beginning of the process, and there are substantial upward revisions in their expectations as documented in the previous sections, then we should expect a negative relationship between the long term performance of firms and analysts' predictions. In particular, following Doukas, Kim and Pantzalis (2002) Yi et al. (2008), we use analysts' forecast errors to measure investor optimism.

The forecast error (FE) is defined as the mean of the median consensus forecast made at the time of privatization for (one, two and three years after privatization) minus actual earnings standardized by the stock price at the end of the fiscal year. We use median values instead of means to avoid the influence of means values by extreme observations.

We test the following model to explain the aftermarket-performance of privatized firms:

$$\text{Aftermarket } i, T = \alpha_0 + \alpha_1 \text{ AnalystsForecast Error} + \alpha_2 \text{ Institutional Environment} + \alpha_3 \text{ Privatization} \\ \text{Characteristics}_i + \alpha_4 \text{ Firms}_i + \varepsilon_i \quad (3)$$

The heteroskedasticity-corrected regression estimates are reported in Table 10. The model is estimated for aftermarket returns over periods of one, two and three years following the privatization. The regressions are reported for both CARs and BHARs.

Table 10. Cross-sectional regressions of post-issuance return performance (CAR)

Regression models	INTERCEPT	LOGSALES	STRATEGIC	FE	RIGHT	LIABILITY	DEVELOPED	BUREAUCRACY	POLRISK	GDPG	RECENTP	STAT	R ²	N
Panel A:														
CAR Local index benchmark														
12-Months														
1	0.372 (0.303)	-0.022 (0.673)	-0.39 (0.011)**	-0.88 (0.08)*				0.006 (0.901)				0.31 (0.17)	16%	69
2	0.603 (0.138)	-0.026 (0.611)	-0.424 (0.009)***	-0.949 (0.069)*	-0.059 (0.176)							0.379 (0.10)*	17.5%	69
3	0.56 (0.237)	-0.05 (0.428)	-0.411 (0.002)***	-0.976 (0.032)**		0.316 (0.207)	0.28 (0.017)**				-0.067 (0.565)		28%	69
4	-0.23 (0.60)	-0.05 (0.372)	-0.386 (0.015)**	-0.95 (0.011)**					0.009 (0.09)*	0.034 (0.073)*		0.257 (0.277)	24%	69
24-Months														
1	0.444 (0.334)	-0.041 (0.587)	-0.118 (0.495)	-0.76 (0.004)**				0.0002 (0.997)				0.15 (0.548)	7%	72
2	0.77 (0.16)	-0.053 (0.477)	-0.167 (0.356)	-0.77 (0.003)***	-0.078 (0.12)							0.228 (0.394)	9%	72
3	0.427 (0.405)	-0.0003 (0.997)	-0.206 (0.176)	-0.77 (0.026)**		-0.063 (0.858)	0.202 (0.228)				-0.293 (0.134)		16%	72
4	-0.038 (0.935)	-0.068 (0.397)	-0.11 (0.524)	-0.87 (0.001)***					0.007 (0.123)	0.03 (0.159)		0.153 (0.56)	10.5%	72
36-Months														
1	0.151 (0.833)	0.015 (0.905)	-0.24 (0.298)	-1.42 (0.005)***				0.021 (0.76)				0.258 (0.478)	13%	67
2	0.85 (0.282)	0.011 (0.918)	-0.33 (0.16)	-1.44 (0.003)***	-0.19 (0.01)***							0.439 (0.241)	19.6%	67
3	0.10 (0.89)	0.082 (0.528)	-0.225 (0.274)	-1.29 (0.036)**		-0.285 (0.55)	0.326 (0.154)				-0.30 (0.317)		16.3%	68
4	-0.59 (0.385)	-0.04 (0.75)	-0.265 (0.235)	-1.55 (0.003)***					0.0133 (0.032)**	0.045 (0.12)		0.298 (0.411)	19%	67

*, **, *** refer to 10%, 5% and 1% significance levels. P-values are in parentheses

Table 10. (Continued): Cross-sectional regressions of post-issuance return performance (BHAR)

Regression models	INTERCEPT	LOGSALES	STRATEGIC	FE	RIGHT	LIABILITY	DEVELOPED	BUREAUCRACY	POLRISK	GDPG	RECENTP	STAT	R ²	N
Panel A:														
BHAR Local index benchmark														
12-Months														
1	0.537 (0.239)	-0.065 (0.35)	-0.382 (0.017)**	-1.13 (0.10)*				0.039 (0.569)				0.36 (0.132)	13%	68
2	0.775 (0.14)	-0.058 (0.402)	-0.401 (0.018)**	-1.13 (0.09)*	-0.052 (0.338)							0.41 (0.09)*		68
3	0.86 (0.09)*	-0.095 (0.175)	-0.39 (0.01)***	-1.09 (0.10)*		0.232 (0.473)	0.247 (0.096)*				-0.126 (0.40)		24%	68
4	-0.21 (0.73)	-0.08 (0.177)	-0.367 (0.02)**	-1.172 (0.035)**					0.11 (0.11)*	0.044 (0.063)*		0.292 (0.201)	21.5%	68
24-Months														
1	0.868 (0.20)	-0.133 (0.29)	-0.051 (0.779)	-1.3 (0.000)***				0.042 (0.609)				0.057 (0.872)	9%	71
2	1.27 (0.177)	-0.133 (0.297)	-0.096 (0.612)	-1.29 (0.000)***	-0.085 (0.335)							0.14 (0.72)	10.5%	71
3	1.05 (0.139)	-0.081 (0.41)	-0.18 (0.307)	-1.10 (0.000)***		-0.46 (0.354)	0.098 (0.593)				-0.243 (0.339)		15%	71
4	0.098 (0.888)	-0.155 (0.171)	-0.031 (0.861)	-1.46 (0.000)***					0.01 (0.083)*	0.065 (0.123)		0.065 (0.854)	14.28%	71
36-Months														
1	0.604 (0.545)	-0.081 (0.697)	-0.235 (0.389)	-2.48 (0.006)***				0.043 (0.746)				0.419 (0.487)	15.6%	66
2	1.45 (0.28)	-0.076 (0.661)	-0.345 (0.24)	-2.5 (0.006)***	-0.233 (0.132)							0.64 (0.341)	19.7%	66
3	0.035 (0.977)	0.118 (0.459)	-0.004 (0.99)	-2.37 (0.04)**		-0.71 (0.43)	0.456 (0.303)				-0.353 (0.467)		10%	67
4	0.739 (0.35)	-0.142 (0.407)	-0.26 (0.288)	-2.69 (0.002)***					0.02 (0.014)**	0.093 (0.064)*		0.468 (0.415)	23.7%	66

The coefficient for LOGSALES is insignificant. Therefore, it seems that the size of NPFs is not related to abnormal returns. This result is not consistent with the finding that smaller firms should outperform large firms based to asymmetric information theories. However, this result is not surprising because privatized firms are generally large and mature firms, operating in stable industries. However, the coefficient for STRATEGIC is consistently negative though it is significant for 12 months horizon, suggesting that firms belonging to non strategic sectors yield higher long run returns than those in strategic sectors.

For institutional variables, the coefficients for RIGHT and LIABILITY are not significant for all horizons, suggesting that good protection of investors and good laws mandating disclosure and facilitating private enforcement have no impact on the long term performance of privatized firms. The coefficient for political risk (POLRISK) is positive and significant suggesting that a progressive resolution of political risk leads to higher returns. We find also that GDPG and DEVELOPED have the expected sign (positive coefficients) for all horizons, but significant for only the 12 months horizons.

Moreover, it seems that the percentage of shares retained by the government has no impact on the post privatization performance. Nevertheless, the coefficient is consistently positive over all horizons, but it is relatively significant just for one year. This result is not supporting Perotti's (1995) signaling model.

The timing of the privatization offering (RECENTLP) does not have a statistically significant effect on long-run

market-adjusted returns, but the coefficient is negative. This suggests that investors do make a difference in assessing the value of later privatizations compared to earlier ones.

The key finding is that the forecast error variable (FE) is consistently negative and statistically significantly different from zero (at 1%, 5% and 10%) for all horizons and for both measures of performance CARs and BHARs (Note 5). Thus, the long term performance of privatized firms is significantly and negatively related to analyst forecast errors. This finding is consistent with the fact that investors are pessimistic about the earnings potential of privatized firms, but grow more optimistic afterwards, causing positive abnormal returns over time. This result is in contrast to the evidence reported for IPOs (Rajan & Servaes, 1997). In the same vein, Dechow, Hutton and Sloan (2000) document that analysts are overoptimistic about firm future prospects around equity offerings. Their results imply that investors overestimate the price of firms when analysts expect high growth prospects, and fall down the prices of firms when analysts expect low growth prospects.

Taken together, the evidence from market expectations, earnings performance and analyst forecast errors, rules out the behavioral explanation that the outperformance of privatized firms reflects the tendency of investors to underweight the recent performance of privatized firms, and tend to pay more attention to uncertainties related to the extent of government commitment to the privatization process. Thus, investors tend to assess the behavior of privatizing governments after IPOs, and slowly incorporate prospective performance improvements into stock prices as policy uncertainties disappear.

8. Conclusion

Since the early 1980s, privatization has become an important and interesting economic phenomenon across the world. Different studies attempt to study the financial and operating performance of privatized firms, however little studies focused on how policy risk is perceived by investors.

Using a sample of 302 privatized firms across 43 countries over the period 1980 to 2002, we provide further evidence on investor behavior and expectations around equity issue by privatized firms. In addition, we explore how the change in market expectations and earnings performance can provide an explanation of the aftermarket performance of privatized firms.

Using different measures for the investor expectations of future earnings, we document several interesting results. First, we find that investors are relatively pessimistic at the beginning of the privatization process because there are concerned about government policy uncertainties after privatization and hesitate to fully incorporate potential profitability gains into their expectations for quite some time thereafter. This finding contrasts with the behavioral explanation that sustains that the poor long run performance results from the tendency of investors to overweight recent experience when forming expectations for private firms. Second, we show that post issuance abnormal returns (CARs and BHARs) are negatively related to analysts forecast errors. This finding reinforces our conclusion that the market is pessimistic regarding future earnings and grows more confident as firms exhibit increased earnings following privatization. Overall, our results suggest that the long run performance is due, in part, to the fact that investors underestimate the future earnings potential of privatized firms at the time of privatization, because of the additional uncertainties related to the governments' commitment to the privatization process. Thus, this explanation is based on the human behavioral characteristic that makes investors tend to underweight the recent experience of privatized firms and overweight the political risk.

Our results may have interest implications for academics, practitioners as well as policy makers. They help us to better understand how analysts assess the information, and their role in the price formation of privatized firms. In addition, policy makers have to realize that investing in reputation building to boost investors' confidence is important to reap the highest benefits from the privatization process, and help to achieve local stock market, and overall economic growth.

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Notes

Note 1. Hong, Lim and Stein (2000) report that more than 63 % of traded firms receive analyst coverage.

Note 2. World Bank classification.

Note 3. Megginson and Netter (2001) provide a survey of important national studies. In addition, Megginson, Lee and Choi (2010) provide a summary of the key results from the existing privatization IPO long-run return studies.

Note 4. In addition, we tried to find matching firms from private IPO, but since privatization IPO firms are typically the largest firms in each domestic market; it is difficult to find suitable private IPO matching firms within the domestic market.

Note 5. We conduct also additional tests using the return on equity (ROE) and the return on sales (ROS) as proxies for performance. Similar patterns for forecast errors (FE) are observed. We find also that the coefficient for BUREAUCRACY is negative and significant in all regressions.

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Corporate Profit Growth, Macroeconomic Expectations and Fiscal Policy Volatility

Rexford Abaidoo¹ & Daisy Ofosuhene Kwenin²

¹ School of Business and Technology, University of Maryland Eastern Shore, USA

² University of Cape Coast, USA

Correspondence: Rexford Abaidoo, School of Business and Technology, University of Maryland Eastern Shore, Maryland, USA. E-mail: rabaidoo@umes.edu

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Abstract

This study examines how specific macroeconomic conditions influence US Corporate Profit Growth in a dynamic trend framework. Using Autoregressive Distributed Lag (ARDL) co-integration approach, this study evaluates short and long-run dynamics of corporate profit growth in an environment characterized by specific macroeconomic conditions. Our results show that trends in corporate profit growth are not entirely immune to macroeconomic perturbations or constrained economic conditions as recent corporate profit growth conditions seem to suggest. We find that although modeled macroeconomic conditions (Note 1) have no statically significant impact on corporate profit growth in the short run; in the long run, conditions such as macroeconomic uncertainty, inflation expectation and fiscal policy volatility depresses or have significant constraining effect on corporate profit growth.

Keywords: corporate profit growth, macroeconomic conditions, ARDL co-integration

1. Introduction

Is corporate profits growth among US firms counter-cyclical? Have most US corporations evolved into resilient business entities significantly insulated from effects of macroeconomic perturbations and adverse economic expectations? These questions among others drive this study's analysis of recent US corporate profit growth dynamics; and form the basis for empirical inquiry made. A review of quarterly economic data provided by Federal Reserve Economic Data (FRED) a division of St Louis Fed, shows the US economy continue to make significant albeit constrained gains towards optimal GDP growth after economic decimation brought about by the recession of 2008. In the midst of this sub-par economic performance evidenced by recent GDP growth trend, reviewed data from Bureau of Economic Analysis (BEA) and FRED indicates most US corporations continue to post significant growth in profits seemingly against prevailing macroeconomic conditions. Recent time series data for instance, show that profitability trend characterizing most US corporations have been very impressive, often exceeding analysts' expectations. This significant growth in corporate profits in the midst of persistently depressed economic performance since the 2008 recession continues to generate significant interest on the need to understand underlying factors explaining the phenomenon. Unlike some existing studies on corporate profitability which focus on industry or firm specific factors as in Andreas Stierwald (2010); ongoing discussions on dynamics of recent corporate profit growth have focused predominantly on macroeconomic conditions occasioning such significant growth. To some financial analysts, recent corporate profit growth dynamics cannot be explained fully by prevailing macroeconomic conditions; or lack the necessary macroeconomic underpinnings needed to occasion such performance. In other words, to these analysts, recent US corporate profit growth trends can only be viewed as occasional bubble which should not inform any major policy measure among investors; because such the trend is destined to cool off ultimately, unless the economy experience significant upward adjustment.

Another key feature of recent corporate profit growth trend is the emerging view that the phenomenon seem to diverge from projections of traditional macroeconomic theory which deems corporate profitability as a product of conducive macroeconomic environment. This extensively verified macroeconomic theory projects that periods of significant economic growth enhances the likelihood of sustain growth in corporate profits and vice versa (Note 2). However, recent (post 2008 economic recession) US corporate performance dynamics (profitability

growth) seem to be at variance with this projection. For instance, available data on corporate profitability in the past two years appear to suggest that corporate profit growth is disconnected or insulated from prevailing macroeconomic conditions. Supporters of this diverging relationship argue that if this were not the case, recent corporate profit growth trend would have, to large extent, reflected prevailing constrained macroeconomic conditions. Unlike ongoing discussions in business and financial periodicals such as Forbes, Bloomberg Business week, etc. on corporate profit growth in recent times, this study does not seek to ascertain fundamental conditions or factors explaining recent growth trends; rather, this study verifies how corporate profit growth dynamics responds to specific macroeconomic conditions such as recession expectations, macroeconomic volatility, inflation expectations etc.

Additionally, in contrast to significant number of existing studies which focuses on how industry specific factors such as size, ownership structure, concentration, market share etc. impact corporate profitability, (Slade (2004), Yoon (2004), Goddard et al (2005)), this study concentrate on how factors external to firms and corporations influence profitability. The goal is to ascertain how economy-wide or anticipated economy-wide conditions instead of firm specific factors, influence corporate profit growth. Specifically, the approach adopted in this study seeks to determine how expectation of major macroeconomic condition, as well as specific macroeconomic conditions impact corporate behavior and ultimately profit growth. The focus on external factors or conditions (to be review in sub-sequent sections) has been informed largely by our belief that such factors or conditions might pose significant threat to corporate performance than industry or sector specific factors which could be mitigated in most instance through internal measures. This external focus is meant to ultimately answer the following questions: Do macroeconomic induced conditions such as inflation expectations, recession expectations etc. constrain or enhance US corporate profit growth? How significant are such conditions in corporate profit growth in the short and the long run? Answers to these questions will help in addressing growing perception that most US corporations have now evolve into highly adaptive institutions relatively insulated from macroeconomic perturbations.

The rest of this study is structured as follows: the first section examines structure and persistence of recent corporate profit growth phenomenon; this examination will seek to highlight trend dynamics of recent corporate profit growth. This will be followed by analytical assessments of how US corporate profit growth dynamics relates to modeled macroeconomic conditions or variables employed in this study. Section three reviews empirical literature relevant to relationships being examined in this study; as well as a sub-section stating the type and sources of data employed in our study. Section four develops econometric model to be used in verifying study projections. The section also performs pre-estimation diagnostic tests; estimates short and long run effects of modeled explanatory on corporate profit growth; and discusses empirical results. The final section captures post-estimation diagnostic tests performed and a summary of our findings.

2. The Corporate Profit Growth Phenomenon

Corporate profit growth data published by Bureau of Economic Analysis (BEA), St. Louis Fed (FRED) and US Department of Commerce have been at the center of recent discussions on corporate profitability. This data show that US corporate profits continue to witness appreciable growth in post-2008 recessionary macroeconomic environment despite persistently constrained GDP growth conditions. A review of the historical data spanning the period 1960 and 2011, suggest that significant growth in US corporate profits in post-recession macroeconomic environment, somehow deviates from macroeconomic models projecting positive correlation between corporate profitability and macroeconomic performance. In the following sub-section, we analyze the structure of recent US corporate profit growth and how such growth dynamics relates to GDP growth conditions over the same time period.

2.1 Structure of Recent US Corporate Profit Growth

US Bureau of Economic Analysis (BEA) provides annual review of US corporate profit growth through a series of releases on structural trends in corporate performance. These series of releases highlights growth in corporate profits with particular emphasis on how such dynamics varies from one quarter to another in the same year, and among quarters in different years. A review of 2011 release on such performance analysis show that corporate profits with inventory valuation and capital consumption adjustments grew from \$19.0 billion in the first quarter of 2011, to \$61.2 billion in the second quarter of the same year. This economic outlook release also indicate that current-production cash flow (net cash flow with inventory valuation adjustment) – that is, internal funds available to corporations for reinvestments also grew significantly from \$21.1 billion in the first quarter of 2011, to \$86.2 billion in the second quarter of the same year. The Bureau further documents that tax on corporate income within the same period decreased by \$1.8 billion in the second quarter, in contrast to an increase of \$17.6

billion in the first quarter of the same year. These conditions to some degree supports growing view that corporations in recent periods have had access to significant portion of operational revenues, leading to fairly sustain growth in profits in post-recession macroeconomic environment.

In a follow-up release documenting similar corporate profit performance conditions over the same period (2011), BEA's analysis further showed that profits from current production among corporations increased by \$32.5 billion in the third quarter of the same but later dipped to \$16.8 billion in the fourth quarter of 2011. Additionally, internal funds available to corporations for investment over the period is also shown to have increased by \$44.8 billion in the fourth quarter of 2011, compared to an increase of \$35.8 billion in the third of the same year. In the disaggregated section of the release on corporate profit growth, the data additionally show that over the same 2011 period, domestic profits among financial corporations alone increased by \$29.9 billion in the fourth quarter, compared to an increase of \$9.2 billion in the third of the same year. Domestic profits among nonfinancial corporations on the other hand also increased by \$28.4 billion in the fourth quarter, compared to just an increase of \$17.9 billion in the third of the same year. Available data further suggest that these growth conditions which characterized corporate profits in 2011, continued into 2012; with the period also witnessing significant corporate profit growth.

For instance, according to revised December 20th 2012 release by BEA, corporate profits before tax with inventory valuation adjustment (noted as the best measure of industry profits), increased by \$86.2 billion in the third quarter, compared to a decrease of \$16.3 billion in the second of 2012. Corporate Profit after tax with inventory valuation and capital consumption adjustments on the other hand, also increased by \$36.7 billion in the third quarter, compared to an increase of \$31.9 billion in the second quarter of 2012; showing relatively sustained growth over the period. The release further submitted that undistributed profits accruing from production over the same period increased by \$23.8 billion, compared to an increase of \$11.6 billion in prior quarter. Additionally, a breakdown of corporate profit trends in the same period in question with respect to industry type, further indicates profits among financial corporations alone increased by \$68.1 billion in the third quarter of 2012, compared to a decrease of \$39.7 billion in the second quarter of the same year. Corporate profits among nonfinancial corporations over the same period however, decreased by \$14.1 billion in the third quarter, compared to an increase of \$27.8 billion realized in the second of 2012.

The above analyses provide strong evidence in support of significant growth in corporate profits in recent years. However, macroeconomic performance data over the same period, suggests the economic environment often associated with such corporate performance was virtually nonexistent. For instance, economic performance (Note 3) encapsulated in recent US GDP growth and other macroeconomic indicators provide little or no evidence to support persistent growth in corporate profit being realized among corporation in recent quarters. Growth data over the period (Note 4) (2011 & 2012) for instance, show that growth conditions among key economic indicators have been considerably weak to occasion significant growth in corporate profits documented over the period in question. Despite the weak economic performance, corporate profit growth, as discussed earlier, soared from quarter to quarter in most part of the periods under consideration. In its September 29, 2011 press release, BEA report on real personal consumption expenditure growth (a significant component of GDP growth, accounting for over 70% of GDP) for instance, showed only 0.7 percent growth in the second quarter, compared to 2.1 percent growth in the first. An indication of significant decline in economic activity; however, within the same period, corporate profits grew significantly as reported earlier. Durable goods production in the same period (second quarter of 2011) also recorded substantial decline from 11.7 percent in the first quarter to 5.3 percent in the second quarter. Nondurable goods production on the other hand, grew by only 0.2 percent in the second quarter of 2011, compared to 1.6 percent growth in the first quarter of the same year. These trends to some extent show that fairly sustained growth in corporate profits over the periods in question had little or no correlation with prevailing macroeconomic conditions.

2.2 Corporate Profit Growth and US Economic Performance (GDP Growth)

This section provides data-driven analysis in support of the position that corporate profit growth in recent years, especially in post-recession periods, has out-perform underlying economic conditions normally required to occasion such performance. Comparative analysis of growth patterns characterizing US GDP and corporate profit growth between 2002 and the third quarter of 2012 are performed. Quarterly analysis captured in figures 1 and 2, show that over the past decade, US GDP and corporate profit growth have exhibited significant growth variability; with corporate profit growth out-performing US economic performance on average. Figures 1 and 2 illustrate linear trend analysis for the two economic indicators over the past decade with data sourced from BEA.

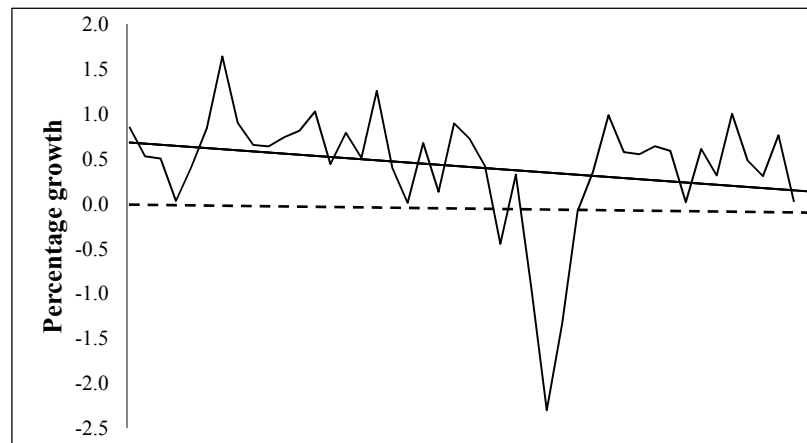


Figure 1. Quarterly US GDP growth (2002–2012)

Data Source: St. Louis FED (FRED).

Graphical trend analysis captured in figures 1 and 2 shows that on average, US corporate profit growth over the past decade has fared relatively better than GDP growth. A quick look at trend dynamics characterizing figures 1 and 2 suggest that on average, GDP growth over the past decade has been fairly weak; and exhibits relatively negative sloped trend-line (solid line). Comparatively, corporate profit growth trend over the same period exhibit a fairly stable trend, with a slightly positive trend-line (solid line) which suggests significant stability and growth potential. Apart from highlighting the diverging trend between the two variables, this trend analysis further provides evidence to the effect that corporate profit growth might not be counter-cyclical as recent conditions seem to project; in that, trend features associated with both figures 1 and 2 exhibits sharp declining trend consistent with reaction to the 2008 recession.

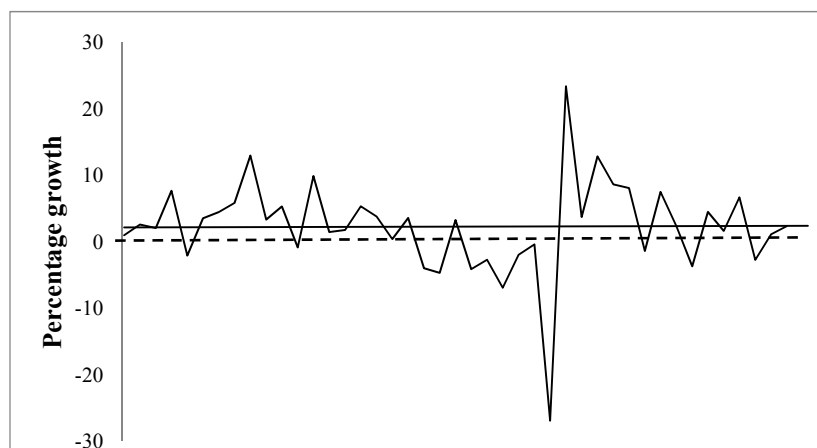


Figure 2. Quarterly US corporate profit growth (2002–2012)

Data Source: St. Louis FED (FRED).

Additionally, examination of the rate of adjustment associated with the variables after the 2008 economic shock, as illustrated by figures 1 and 2, indicates the rate of recovery or adjustment associated with corporate profit growth tend to be relatively faster than US economic performance (as measured by GDP growth). This condition to some extent could explain why post-recession US corporate profit growth has rebounded faster and significantly outperformed other macroeconomic indicators (consumption growth, GDP growth etc.). From figures 1 and 2, it could be observed that recovery trend associated with corporate profit growth is tighter, and almost a straight line, suggesting relatively faster adjustment compared to relatively positively sloped recovery trend associated with GDP growth in figure 1; which suggest significantly constrained recovery feature.

3. Modeled Macroeconomic Variables

To test the extent to which macroeconomic conditions influence corporate profits growth, conditions/factors modeled as key explanatory variables are stated. This study employs five macroeconomic conditions/factors external to corporations; namely: recession probability (expectations), fiscal policy uncertainty, inflation probability (expectations), consumer sentiments and macroeconomic uncertainty. Macroeconomic uncertainty in this study is modeled as a generalized autoregressive conditional heteroscedastic (GARCH) trend in US GDP growth. This variable is meant to capture the extent to which significant swings or uncertainty in US economic performance affects corporate profit growth. Fiscal policy uncertainty on the other hand will seek to determine how fiscal policy fluctuations influence rate of growth in investment and ultimately corporate profitability. Consumer sentiment variable further tracks how variability in consumer attitude (taste and preferences) impact consumption and ultimately, corporate profitability. Finally, recession and inflation expectations will address the extent to which potential for recession or persistent inflation, and not the actual conditions, influences corporate profit growth.

3.1 Corporate Profit Growth and Macroeconomic Conditions: The Hypothesis

This study revolves around fundamental assumption suggesting that adverse macroeconomic conditions or the potential for occurrence of such conditions could have significant negative impact on corporate profit growth. Subsequent empirical tests are thus meant to verify this assumption. Apart from this presumption that modeled macroeconomic conditions are more likely to constrain the rate of corporate profit growth, the study also seeks to identify macroeconomic conditions or variables which should be of great concern to US corporations given their impact on profitability. Such information could help corporate decision makers in targeting specific external threats to performance and profitability. Corporate profit growth, the regressand in this study's empirical analysis, is based on after-tax Corporate Profit growth data sourced from BEA and St. Louis FED (FRED) data base respectively. This variable is made up of quarterly time series data spanning the period 1960 and 2011; and constitutes aggregate US corporate profit growth regardless of the type and structure of such corporations.

4. Macroeconomic Conditions and Corporate Profit Growth: The Literature

A thorough review of existing literature suggests empirical examination of the link between corporate profits growth and specific macroeconomic conditions or factors such as those employed in this study, are few and far between. We find that unlike studies focusing on profitability of specific firms or industries such as banks etc. which abounds in existing literature (eg. Athanasoglou et al. (2008), Staikouras and Wood (2004)); studies focusing on dynamics of aggregate corporate profit growth as pursued in this study are limited. This condition may reflect the fact that critical assessments of recent corporate profit growth dynamics and how the trend relates to core macroeconomic variables is still evolving in the finance and economics literature. This condition notwithstanding, available evidence suggests both firm level features and macroeconomic conditions external to corporations such as those employed in this study, play significant role in profitability and economic growth, Kotha and Nair (1995). Apart from verifying the relationship between modeled variables and corporate profit growth, methodology adopted in this study also employs derived approach in analyzing how modeled explanatory variables influence corporate profit growth or otherwise. In such derived approach, effects of modeled explanatory variables on corporate profit growth are verified via how such variables impact core macroeconomic variables such as consumption and investment growth; which are critical in corporate profit growth. Empirical examination of the link between corporate profit growth and modeled macroeconomic conditions are classified into the following groups:

4.1 Fiscal Policy Volatility and Corporate Profitability

The macroeconomics literature provides theoretical foundation which explains how fiscal policy measures could depress or enhance corporate profit growth. This foundation suggests that fiscal policy mechanism in a macroeconomic framework could either bolster growth in corporate profits or depress them (Note 5). For instance, expansionary fiscal policy characterized by significant reduction in corporate taxes, increases the likelihood of significant growth in corporate profits all things being. Growth in profits among corporations in this case stems from excess revenue due to lower taxes on operational incomes and profits. However, contractionary fiscal policy characterized by increased taxes on corporate incomes and profits, decreases the likelihood of any measureable growth in corporate profit all things being equal. In order words, depending on the strand of fiscal policy measure in place, corporate profits growth could be constrained or enhanced holding corporate level specific factors constant. Following this theoretical foundation, this study projects that variability in fiscal policy have the potential to either constrain or enhance corporate profit growth all things being equal. Fiscal policy volatility variable in this study is modeled as a GARCH process. This GARCH process employs

quarterly time series tax revenue growth data. Effects of fiscal policy volatility on corporate profit growth are verified via the following propositions:

Preposition 1: Fiscal Policy Volatility has significant effect on corporate profit growth.

Preposition 2: Fiscal Policy Volatility has no significant effect on corporate profit growth.

4.2 Recession Expectations and Corporate Profitability

Recession expectation variable defines macroeconomic environment characterized by potential for significant decline in economic activities; such macroeconomic environments are often characterized by adverse economic conditions known to precede or herald recessionary conditions. This study in its review of relevant literature, found no prior empirical study verifying how this macroeconomic condition influence corporate profitability. Nonetheless, sections of corporate performance and firm profitability literature focusing on how macroeconomic conditions influence such performance, suggests effects of recession expectation on corporate profitability might depend on other firm specific factors. For instance, empirical work exist to the effect that some firms or corporations experience significant growth or performs relatively well in pre-recessionary and recessionary environment against all odds, whereas others are negatively impacted by the same condition. Discount retailers for instance, are known to have prospered in periods prior to the 2008 recession and continued to do well during the recessionary period. In the first quarter of 2009 for instance, Forbes reported that despite significant decline in economic activities during the period (2008 recession) Wal-Mart's sales rose 5.1%, far exceeding analyst's projection of 2.4%. Apart from this counter-cyclical performance of most discount retailers, existing empirical enquiries into effect of business cycle on firm profitability also show that the phenomenon has significant impact on profitability. For instance, in a study of factors determining bank profitability, Sufian (2011), showed that business cycles significantly impact variability in profit growth. Prior to Sufian's conclusion, Athanasoglou et al (2008) had earlier also showed that business cycle (recession/booming economy) has positive, albeit asymmetric effect on bank profitability; researchers in this case, showed that business cycles have significant positive impact only in the upper phase of the cycle. Following these conclusions, this study projects that the likelihood of recession, an adverse macroeconomic condition (often characterized by sub-par macroeconomic conditions) will have significant impact on corporate profit growth all things being equal. Effects of recession expectations (probability) on corporate profit growth are verified using the following propositions:

Preposition 1. Recession Probability has significant effect on corporate profit growth

Preposition 2. Recession Probability has no significant effect on corporate profit growth

4.3 Inflation Expectations and Corporate Profitability

Empirical assessments of the extent to which inflation expectations impact profitability diverge significantly, and could aptly be describe as inconclusive. The general view suggests inflation expectation may influence corporate operational costs; gross revenue; and ultimately profit growth. Emerging trend in our review of existing literature suggests most conclusions on how inflation impact corporate profitability dynamics depends on whether inflation is anticipated or unanticipated. This view purports that, all things being equal, if a measure of inflation is fully anticipated (expected) by firms, corporations etc., such firms or corporations (assuming rational behavior) will implement or initiate measures aimed at ensuring that effects on operational costs are minimized. This behavior, holding all else constant, will ensure that operational costs does not outpace revenue, resulting in a positive impact on profitability. Unanticipated inflationary condition however, forces firms, corporations etc. to react or adjust to persistent rise in cost of operations. In such condition, the likelihood that corporate operational cost will outpace projected revenues increases (Note 6); which heighten the potential for constrained profit growth. Financial institutions such as banks etc. have for instance, been shown to exhibits these features; and studies such as Pasiouras and Kosmidou (2007); and Rasiah (2010) have all alluded to this condition in their assessments of the link between inflation and bank profitability.

In the finance and banking literature where most of such firm specific studies have been conducted, Flamini et al (2009) for instance, showed that inflationary condition that is fully anticipated tend to have positive impact on profits among banks; because such entities can appropriately adjust interest rates to compensate for the expected inflation. The study further showed that unexpected inflationary condition could raise costs due to imperfect interest rate adjustments; a condition which increases the potential for diminished profits. In a related literature still focusing on the banking sector, Rasiah (2010) also concluded that inflation may affect profitability by diminishing real value of firm or corporate assets. If these conclusions of industry specific studies accurately capture relative relationship between expected inflation and profitability in general, then, inflation expectations modeled in this study should have positive impact on corporate profit growth, all things being equal. However,

Athanasoglou et al., (2005) found that the relationship between expected inflation and long-term interest rate, which ultimately defines the relationship between inflation expectations and profitability, is at best vague. From these discussions, it is evident that this study's estimate could either support existing findings of positive impact, or diverge significantly from such conclusions. The following prepositions are consequently tested:

Preposition 1: Inflation Expectations has significant effect on corporate profit growth.

Preposition 2: Inflation Expectations has no significant effect on corporate profit growth.

4.4 Macroeconomic Uncertainty and Corporate Profitability

In the macroeconomics literature, uncertainty emanating from persistent variability in economic activity has been shown to significantly influence corporate performance, and for that matter profitability. For instance, evidence exist to the effect that uncertain macroeconomic conditions significantly distort demand/sales projections and forecasts, ultimately affecting performance. Although industry and corporate specific factors such as concentration, structure, size etc. have been shown to be significant determinants of profitability (Benjamin Maury (2006), Kaen, Fred R., and Hans Baumann, (2003)), this study is modeled on the assumption that effects of macroeconomic condition transcends such firm or industry specific factors. This position stem from our belief that unlike industry or corporate specific factors, macroeconomic conditions are systemic and in most instances beyond the control of individual firm or industry. In a study assessing the impact of such macroeconomic factors on profitability among companies listed on the Bucharest Stock Exchange, Triandafil, Brezeanu, Badea (2010) for instance, showed that macroeconomic-related variables to a large extent are the prime determinants of corporate profitability. Again, in an empirical estimation of how macroeconomic volatility (uncertainty) impact profitability among manufacturing firms in emerging markets, Demir (2009), also showed that increasing uncertainty has significant negative effect on manufacturing firm profitability. Following these conclusions, it is reasonable to project that macroeconomic uncertainty would have negative impact on corporate profit growth. However, if recent US corporate profit growth dynamics in the midst of lingering economic uncertainty is anything to go by, then such projection will be premature without empirical verification. Macroeconomic uncertainty in this study is modeled as a generalized arch function; GARCH (1, 1) on GDP growth which captures volatility associated with US economic performance. The following GARCH function is use in modeling macroeconomic uncertainty;

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \quad (1)$$

where, α_j and β_j , are all nonnegative; and $\omega > 0$. Effect of macroeconomic uncertainty on corporate profit growth is verified using the following prepositions:

Preposition 1. Macroeconomic Uncertainty has significant effect on corporate profit growth

Preposition 2. Macroeconomic Uncertainty has no significant effect on corporate profit growth

4.5 Data Source and Model Specification

Empirical estimations conducted in this study are based on data from St. Louis Fed and Bureau of Economic Analysis. This data is made up of quarterly time series from 1960 and 2011. Key variables employed include, inflation expectations (*InfEx*), recession expectations (*RecEx*), corporate profit growth (*Corpg*), consumer sentiments (*Cons*), Macroeconomic Uncertainty (*MacUn*) and fiscal policy volatility (*Fispv*). To estimate potential effects of these modeled macroeconomic conditions on US corporate profit growth, this study employs augmented Autoregressive Distributed Lag (ARDL) model which allows for simultaneous short and long run effects analysis.

5. Effects of Macroeconomic Conditions on Corporate Profitability

5.1 Model Specification: ARDL-Bound Test

To model effects of specified macroeconomic variables on corporate profit growth, ARDL-bound test approach structured to ascertain potential short and long run effects of selected explanatory variables is employed. ARDL bound test technique propounded by (Pesaran et al., 2001) is first utilized to ascertain cointegrating relationships between corporate profit growth and modeled independent variables. ARDL-bound test framework has been adopted in this estimation because it has been shown to yield significant results irrespective of the order of integration of variables being tested; that is, whether study regressors are purely I(0), I(1), or mutually cointegrated; Pesaran et al., (2001). Further evidence provided by Alam & Quazi, (2003), also show that ARDL-bound testing approach is robust even when explanatory variables are endogenous. Although bound test framework propounded by Pesaran et al (2001) yields robust results in small sample data test, this study opt for bounds test critical values suggested by Narayan (2004). Critical bound values suggested by Narayan have been

shown to be more accurate for smaller sample data sets (< 500) compared to those propounded by Pasaran et al (2001) which dominates studies in the literature. Reviewed literature further suggest that critical bound values propounded by Pasaran et al (2001) might underestimate critical bound range values for relatively smaller sample data because of its orientation which favor's sample size data set between 500 and 1000 data points. Short and long run effects of modeled variables on US corporate profit growth via the ARDL-bound test technique are evaluated using ARDL-bound test estimation framework stated as follows:

$$\begin{aligned} \Delta(\text{Corpg})_t = & \alpha_0 + \sum_{i=1}^p \phi_i \Delta(\text{Corpg})_{t-i} + \sum_{i=0}^p \theta_i \Delta(\text{Re cEx})_{t-i} + \sum_{i=0}^p \varepsilon_i \Delta(\text{InfEx})_{t-1} \\ & + \sum_{i=0}^p \lambda_i \Delta(\text{Fispv})_{t-i} + \sum_{i=0}^p \varphi_i \Delta(\text{MacUn})_{t-i} + \sum_{i=0}^p \mu_i \Delta(\text{Cons})_{t-1} \\ & + \psi_1(\text{Corpg})_{t-1} + \psi_2(\text{Re cEx})_{t-1} + \psi_3(\text{InfEx})_{t-1} + \psi_4(\text{Fispv})_{t-1} \\ & + \psi_5(\text{MacUn})_{t-1} + \psi_6(\text{Cons})_{t-1} + v_t \end{aligned} \quad (2)$$

where the first two lines with the summation symbol (\sum) verifies short-run dynamic relationship between modeled macroeconomic variables and corporate profit growth. The second part, denoted by \square_1 to \square_6 on the other hand tests long-run effects of modeled variables on corporate profit growth. \square_1 captures the error term assumed to meet all classical assumptions; and Δ denotes first difference of the various variables in treatment. To investigate the presence of long-run relationship amongst the variables in Eq.(2), bounds test procedure propounded by Pesaran et al is employed. This bounds testing procedure is based on partial F-test estimation analysis. The procedure tests the joint significance of (null hypothesis) no cointegrating relationship between modeled explanatory variables and corporate profit growth against alternative hypothesis rejecting such condition as follows:

$$H_0: \square_1 = \square_2 = \square_3 = \square_4 = \square_5 = \square_6 = 0$$

$$H_1: \square_1 \neq \square_2 \neq \square_3 \neq \square_4 \neq \square_5 \neq \square_6 \neq 0$$

In this estimation method (F-test analysis), if computed F-test statistic is found to be greater than the adopted upper bound critical value, (i.e. critical values from Narayan (2004)) the null hypothesis of no cointegration between modeled independent variables and corporate profit growth, can be rejected irrespective of the order of integration of the variables in treatment. However, if computed F-test statistic value is less than the lower adopted critical value, then null hypothesis of no cointegration cannot be rejected. In an extreme case, the estimated F-test statistic could fall between the adopted lower and upper critical values; in such case, no conclusive submission could be made on the relationship between the dependent and independent variables. If cointegrated relationship between modeled macroeconomic variables and corporate profit growth is ultimately established, then a short run dynamic relationship between variables in treatment and study regresand could further be estimated via an error correction model (ECM) framework as follows:

$$\begin{aligned} \Delta(\text{Corpg})_t = & \alpha_0 + \sum_{i=1}^p \phi_i \Delta(\text{Corpg})_{t-i} + \sum_{i=0}^p \theta_i \Delta(\text{Re cEx})_{t-i} + \sum_{i=0}^p \varepsilon_i \Delta(\text{InfEx})_{t-1} \\ & + \sum_{i=0}^p \lambda_i \Delta(\text{Fispv})_{t-i} + \sum_{i=0}^p \varphi_i \Delta(\text{MacUn})_{t-i} + \sum \mu \Delta(\text{Cons})_{t-1} + \pi \text{ECM}_{t-1} + v_t \end{aligned} \quad (3)$$

where, ECM_{t-1} the error correction term is defined as:

$$\begin{aligned} \text{ECM}_{t-1} = & \Delta(\text{Corpg}) - \alpha_0 + \sum_{i=1}^p \phi_i \Delta(\text{Corpg})_{t-i} + \sum_{i=0}^p \theta_i \Delta(\text{Re cEx})_{t-i} + \sum_{i=0}^p \varepsilon_i \Delta(\text{InfEx})_{t-1} \\ & + \sum_{i=0}^p \lambda_i \Delta(\text{Fispv})_{t-i} + \sum_{i=0}^p \varphi_i \Delta(\text{MacUn})_{t-i} + \sum \mu \Delta(\text{Cons})_{t-1} + v_t \end{aligned} \quad (4)$$

With π in Eq. (3) representing the rate of adjustment towards equilibrium following any distortions in the short run. This study finally verifies goodness of fit of modeled ARDL-Bound test framework, and performs diagnostic tests examining the presence of serial correlation among variables employed.

5.2 Empirical Results and Discussions: Unit Root Tests

As noted earlier, empirical framework adopted in this study yields significant results irrespective of the order of integration of variables in treatment; however, unit root tests are still performed to assess stationary condition of study variables in case computed F-test statistic is found to fall between adopted critical value bounds. To test for stationary conditions of study variables, an optimum lag order for the estimation is first determined. This is done using Akaike Information Criterion (AIC). Test result based on this procedure found lag order of 4; consequently an optimal lag order of 4 is employed in ensuing stationary condition tests. In table 1, we present results of unit root test for stationarity via Augmented Dickey-Fuller (1981) (ADF) and the Phillip-Perron (1988) (PP) unit root tests procedures. Results reported in table 1 show employed variables are stationary with the exception of consumer sentiments (*Cons*).

Table 1. Univariate stationary analysis

Variables	ADF Test		Results	Philips Perron Test		
	Optimal Lag Order	Test Statistics		Newey-West lag	Results	Z(t) tau Statistics
<i>Corpg</i>	4	-4.382***	I(0)	4	I(0)	-15.72***
<i>RecEx</i>	4	-6.933***	I(0)	4	I(0)	-17.01***
<i>InfEx</i>	4	-4.406***	I(0)	4	I(0)	-4.67***
<i>Fispv</i>	4	-3.085*	I(0)	4	I(0)	-3.84**
<i>MacUn</i>	4	-4.604***	I(0)	4	I(0)	-10.03***
<i>Cons</i>	4	-0.811	I(1)	4	I(1)	-1.47

*Indicate various levels of significance on stationarity of individual variables.

6. Dynamics of Corporate Profit Growth: Macroeconomic Impact Analysis

This section verifies dynamic interactions between modeled macroeconomic variables and corporate profit growth as modeled in in equations (2) and (3). Using equation (2) we first test for the presence of long run relationship between corporate profit growth and specified macroeconomic variables using bound test cointegration procedure. Table 2 reports computed F-test statistic value testing the null hypothesis of no long-run relationship or cointegration between corporate profit growth and modeled macroeconomic variables. This cointegration analysis employs critical bound values propounded by Narayan (2004) for relatively small data sample as noted earlier. F-test statistic value reported in table 2 exceeds upper critical bound value at 1%, 5% and 10% significance level respectively; consequently, the null hypothesis of no cointegration between corporate profit growth and modeled explanatory variables is rejected in support of significant long run relationship between the variables.

Table 2. Bound test for cointegration

Test Statistics	Value	Alpha Level	Lower Bound Critical Value	Upper Bound Critical Value
F-Statistic	21.55		I(0)	I(1)
		1%	3.42	4.88
		5%	2.55	3.71
		10%	2.17	3.22

Critical values based on Bound Critical Values Propounded by Narayan (2004), Case II.

6.1 Short-Run Dynamic Model of Corporate Profit Growth: Error Correction Approach

With cointegrating relationship between corporate profit growth and modeled explanatory variables verified, this section estimate error correction model to assess short-run dynamics of corporate profit growth. Empirical results reported in table 3 which is based on equation 3 captures short run effects of modeled independent variables on

corporate profit growth. Reported coefficient estimates show that modeled macroeconomic conditions have no empirically significant influence on corporate profit growth in the short run. This outcome is inconsistent with traditional view suggesting that modeled conditions have significant influence on corporate performance. These results suggest modeled macroeconomic conditions might have little or no marked effects on corporate profit growth in the short run. A review of the literature in search for plausible explanation for these results, failed to unearth any similar empirically verifiable conclusion in support of these findings. Estimated error correction coefficient of -0.302 associated with the results is however, statistically significant with the correct sign; this illustrate the speed of adjustment back to equilibrium after short-run disturbance. The error correction (ECT_{t-1}) coefficient (-0.302) suggests corporate profit growth adjust relatively slow to shocks or disturbances in the short run.

Table 3. Error correction short run results

Variables	Corporate Profit Growth	Standard Error
<i>LD.Corpg</i>	0.168	-0.099
<i>LD.RecEx</i>	0.0305	-0.031
<i>LD.InfEx</i>	0.696	-0.799
<i>LD.Fispv</i>	-1.807	-0.927
<i>LD.MacUn</i>	-0.0495	-0.049
<i>LD.Cons</i>	-0.0011	-0.0016
ECT_{t-1}	-0.302*	-0.141
<i>Const</i>	2.174**	-0.765
$R^2=0.58$		

6.2 Long-Run Dynamics of US Corporate Profit Growth

With no empirically significant relationship found between modeled macroeconomic variables and US corporate profit growth in the short run, this section focuses on the mechanics of corporate profit growth in the long run, and the role of modeled macroeconomic variables. Table 4 reports empirical results of long run dynamics of corporate profit growth. The results point to significant relationships between corporate profit growth and modeled macroeconomic conditions in the long run. In the first scenario for instance, where all modeled macroeconomic conditions or factors are presume to occur concurrently, results show that among five explanatory variables tested, only inflation expectations, fiscal policy volatility and macroeconomic uncertainty are significant in explaining variability in US corporate profit growth. In this concurrent scenario, we find that inflation expectation, fiscal policy uncertainty and macroeconomic uncertainty have significant negative effects on corporate profit growth all things being equal. A percentage increase in inflation expectation for instance, is found to decrease corporate profit growth by 0.835% in the long run. Additionally, long run coefficient estimates also show that a percentage increase in fiscal policy uncertainty reduces corporate profit growth by 0.731% holding all other factors constant. Scenario (1) results reported in table 4 further confirms generally espoused view that macroeconomic uncertainty has constraining effects on corporate performance and profitability. Reported results suggest a percentage increase in macroeconomic uncertainty reduces corporate profit growth by 0.125%; a much lower rate than this study expected.

In a second scenario (2) which excludes effects of consumer sentiments in the estimation process, we find that the same macroeconomic conditions or variables are significant in explaining variability in corporate profit growth. Coefficient estimates for the second scenario (2) shows recession expectation is still insignificant in explaining variability in corporate profit growth in the long run. Results in this instance, also show that a percentage growth in inflation expectation, fiscal policy volatility and macroeconomic uncertainty still has depressing effect on corporate profit growth in the long run. A percentage increase in inflation expectation, fiscal policy volatility and macroeconomic uncertainty in this scenario is found to reduce corporate profit growth by 0.86%, 0.727% and 0.127% respectively. Results from this scenario further show that among macroeconomic conditions modeled, only three tend to have significant impact on corporate profit growth in the long run. In a third scenario captured in column 3 where effect of recession expectation has been suppressed, our results still

show that the same macroeconomic conditions found in the first two cases, are significant; and continue to exhibit similar effects on corporate profit growth. A percentage increase in inflation expectation, fiscal policy volatility and macroeconomic uncertainty in the absence of potential for recession, is still found to constrain corporate profit growth in a manner similar to the first two scenarios. Coefficient estimates in this third scenario are strikingly similar to those found in the first two scenarios; suggesting that the three macroeconomic conditions found significant in the first two scenarios have little or no interaction with consumer sentiments and/or recession expectation in how they influence corporate profit growth.

Table 4. ARDL-Bound model

	(1)	(2)	(3)	(4)	(5)
	Corporate Profit	Corporate Profit	Corporate Profit	Corporate Profit	Corporate Profit
	Growth	Growth	Growth	Growth	Growth
<i>L.Corpg</i>	-1.149*** (0.088)	-1.150*** (0.087)	-1.149*** (0.088)	-1.087*** (0.075)	-1.153*** (0.089)
<i>L.RecEx</i>	0.0004 (0.046)	0.0017 (0.045)		0.0045 (0.036)	0.0052 (0.046)
<i>L.InfEx</i>	-0.835* (0.479)	-0.860* (0.460)	-0.834* (0.472)		-0.994* (0.477)
<i>L.Fispv</i>	-0.731* (0.379)	-0.727* (0.377)	-0.731* (0.376)	-0.465* (0.271)	-0.680* (0.382)
<i>L.MacUn</i>	-0.125* (0.065)	-0.127* (0.063)	-0.125* (0.064)	-0.150* (0.059)	
<i>L.Cons</i>	-0.0003 (0.002)		-0.00034 (0.0017)	-0.0001 (0.0013)	-0.0009 (0.0017)
<i>Const</i>	12.70** (4.538)	12.65** (4.513)	12.70** (4.502)	7.172** (2.697)	12.67** (4.586)
N	134	134	134	177	134
R-sq	0.586	0.586	0.586	0.561	0.574
adj. R-sq	0.566	0.569	0.570	0.548	0.557

Standard errors in parentheses. *p<0.05, ** p<0.01, *** p<0.001.

The last two scenarios featured in columns (4) and (5) of table 4 are meant to test for mutual interactions among the three macroeconomic conditions found to be statistically significant in determining corporate profit growth in the first three scenarios. In column (4), we find that in the absence of inflation expectation, effects of fiscal policy volatility and macroeconomic uncertainty on corporate profit growth are altered significantly. Coefficient estimates in this case show that a percentage increase in fiscal policy uncertainty results in 0.456% decline in corporate profit growth; which is much lower than reported results in the first three scenarios. A percentage increase in macroeconomic uncertainty however, results in 0.15% decline in corporate profit growth, slightly higher than conditions found in the first three cases. Similar technique applied in the final column (5) where effects of macroeconomic uncertainty has been suppressed, further support significant interactions among the three macroeconomic conditions found to be significant in explaining corporate profit growth in the long run. In this scenario, we find that in the absence of macroeconomic uncertainty, effects of inflation expectation on corporate profit growth is magnified significantly where as that of fiscal policy volatility is reduced compared to the first three cases, although slightly higher than the fourth scenario captured in column (4). A percentage increase in inflation expectation and fiscal policy volatility in this instance reduces corporate profit growth by 0.994% and 0.680% respectively.

6.3 Post-Estimation Diagnostic Tests

Post-estimation diagnostic tests verified presence of serial correlation among modeled variables as well as the

stability of the empirical framework employed. Breusch–Godfrey test for higher-order serial correlation results found no serial correlation between corporate profit growth and modeled macroeconomic variables. Additionally, reverse estimation analysis further indicates empirical framework employed in this study is statistically stable.

6.4 Conclusions

This study examined short and long run dynamic relationship between US corporate profit growth and specific macroeconomic conditions. We find that macroeconomic conditions such as macroeconomic uncertainty, fiscal policy volatility and the likelihood of persistent inflation, could be inimical to corporate profit growth in the long run all things being equal; an outcome which disputes conclusions sited earlier suggesting that expected inflation tend to have positive impact on performance and profitability. Our results also show that recession expectations and variability in consumer sentiments has no statistically significant impact on corporate profit growth in the long run. Coefficient estimates further show that modeled macroeconomic conditions have no statistically significant impact on corporate profit growth in the short run. These results suggest that contrary to what recent trends seem to suggest, corporate profit growth dynamics among US firms are not invulnerable to adverse macroeconomic conditions.

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Notes

Note 1. Recession expectation, inflation expectation, fiscal policy volatility, macroeconomic uncertainty and consume sentiments.

Note 2. Periods characterized by sustain growth in consumption emanating from positive consumer sentiments, investments growth etc.

Note 3. Post-recession macroeconomic performance.

Note 4. That is the period within which above corporate profit conditions have been analyzed (2011 & 2012).

Note 5. Depending on the intent of the policy being implemented.

Note 6. Based on the assumption that prices for services and products of most corporations exhibit upward

stickiness.

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Adapting the Hodrick-Prescott Filter for Very Small Open Economies

Aaron George Grech¹

¹ Central Bank of Malta, Valletta, Malta & London School of Economics and Political Science, London, United Kingdom

Correspondence: Aaron George Grech, Economics & Research Department, Central Bank of Malta, Valletta, VLT 1060, Malta. Tel: 356-2248-7920. E-mail: grechga@centralbankmalta.org

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Abstract

The Hodrick-Prescott (HP) filter is a commonly used method, particularly in potential output studies. However its suitability depends on a number of conditions. Very small open economies do not satisfy these as their macroeconomic series exhibit pronounced trends, large fluctuations and recurrent breaks. Consequently the use of the filter results in random changes in the output gap that are out of line with the concept of equilibrium. Two suggestions are put forward. The first involves defining the upper and lower bounds of a series and determining equilibrium as a weighted average of the filter applied separately on these bounds. The second involves an integration of structural features into the standard filter to allow researchers to set limits on the impact of structural/temporary shocks and allow for lengthy periods of disequilibria. This paper shows that these methods can result in a smoother output gap series for the smallest Euro Area economies.

Keywords: potential output, output gap, Hodrick-Prescott filter, detrending, business cycles, small open economies

1. Introduction

Macroeconomics is based on the concept of equilibrium, with the economy developing in the long term in a balanced way, with full employment of resources and a constant inflation rate (Note 1). However in the short term there can be deviations from this path and discovering the extent of these disequilibria is one of the main tasks of empirical macroeconomists (Note 2). Given that these long term variables are unobservable, they need to be estimated. There tend to be two main branches in the literature, particularly on potential output studies. On the one hand, statistical de-trending methods, such as the Hodrick-Prescott (HP) filter, attempt to extract equilibrium values using past values of a macroeconomic series (Note 3). The line of reasoning underlying these methods is essentially neo-classical as the economy's dynamics are assumed to gravitate towards equilibrium, so that past values of actual data should give a very good indication. By contrast, the other category of models is based on the idea that given that the economy can deviate from equilibrium for long periods, past observations can provide little indication, and a structural model, such as a production function in the case of potential output estimation, must be developed.

Both empirical approaches were conceived for large economies with relatively stable macroeconomic series. The structural methods, if they are not correctly specified or are based on an inaccurate assessment of factors of production, can provide a rather incorrect view of potential output. Unfortunately very small economies do not tend to have high quality data on factors of production, notably the capital stock. In many cases, due to data unavailability, estimates of total factor productivity and the natural rate of unemployment—both important determinants of potential output in structural methods—have to be estimated using statistical filters. However, while there is a tendency to apply statistical filters uniformly in cross-country studies, this ignores the fact that these filters tend to require quite specific properties which are not found in data for very small open economies. Due to their very open and very small nature, these economies tend to have macroeconomic series with pronounced trends, large fluctuations and recurrent structural breaks. The finalisation of a big export order or the carrying out of an infrastructural project, for instance, would tend to regularly affect their series, while for large countries these kinds of shocks tend to be rare occurrences. In this light, standard filtering methods should preferably be adjusted to take into account the special characteristics of very small open economies.

This paper will attempt to tackle this issue by looking at the use of the HP filter to derive quarterly output gap

estimates for the six smallest Euro area (EA) economies, namely Cyprus, Estonia, Luxembourg, Malta, Slovenia and Slovakia (Note 4). All of these countries have a share of total EA GDP of less than 1% (Note 5). They also are very open economies, with the ratio of exports to GDP more than two and a half times that of the largest EA economies. Over the last decade, they have also tended to grow at a much faster rate than the rest of the EA and to have much more volatile economic outcomes. These differences, expanded in more detail in the section 2 of this paper, mean that they are an excellent example of countries where the application of the standard HP filter could provide policymakers with an incorrect value for potential output. In section 3 of this paper, two suggestions are put forward to allow for a smoother quarterly output gap series for the smallest EA economies and, more broadly, for other economies would allow for long-term deviations from potential.

2. Are the Very Small Economies Different from the Rest of the EA?

There is no standard definition of what constitutes a small country. Kuznets (1960) uses an upper limit of 10 million people, whereas the Commonwealth opts for a threshold of 1.5 million (Note 6). However territory size or GDP are also used (see Alesina & Spolaore (2003)). In this paper we denote by the very small economies of the EA all those countries with a GDP less than 1% of the EA's total GDP. Of these, only Slovenia and Slovakia have a population higher than 1.5 million.

Studies of small economies find that they tend to be much more open to international trade and also very dependent on FDI flows (Note 7). This reflects the fact that the absence of a large domestic market creates clear incentives for a more open trade and investment regime. The export-to-GDP ratio of very small EA economies is, in fact, two and a half times that of the large EA countries. However this dependence on volatile or relatively uncontrollable external demand gives rise for an expanded scope of government to stabilise income (see Rodrik (1998)). The high volatility and exposure to external risk probably also contributes to smaller states having higher saving rates (Note 8). Figure 1 compares the quarter-on-quarter real GDP growth rate of the five largest EA economies and that of the six smallest. Besides displaying very little correlation up to the end of 2007, the two series differ greatly in terms of volatility and range. Quarter-on-quarter growth rates range from +1.1% to -2.9% for the largest economies and from +2.4% to -4.6% for the smallest ones. The latter also change very randomly. For instance, in 2007Q4 the quarter-on-quarter growth rate for the very small economies was 2.4%, turning to a negative 0.4% in the first quarter of 2008, again shifting to a significant positive in the second quarter. These differences are even more pronounced when one looks at particular economies (Note 9).

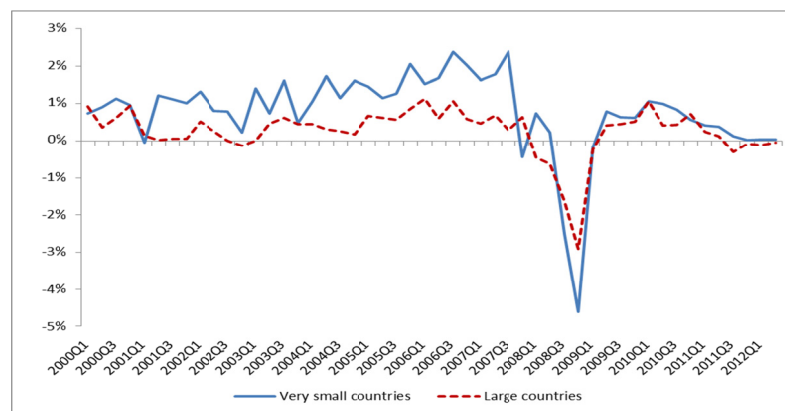


Figure 1. Quarter-on-Quarter real GDP growth (seasonally adjusted)

Source: Eurostat.

Table 1 illustrates even more starkly this difference in volatility. The coefficient of variation of GDP data of the smallest economies is more than three times that of the largest ones. Smaller countries face issues even in data compilation, with inventory changes and statistical discrepancies being, on average, greater than those of bigger economies. Both private and government consumption, as suggested by the literature, are much more volatile in the smallest EA countries. The range of quarter-on-quarter changes in these national accounts components is very high in very small economies. Successive quarter-on-quarter changes tend to vary very substantially in these countries, whereas in the larger economies developments are much smoother. Exports and investment are quite volatile in the largest EA countries, but still not to the extent observed in very small economies. To exacerbate things, both exports and investment constitute a much higher ratio to GDP for the very small EA

economies. The completion of large orders or gains of significant orders by individual enterprises can affect export turnover in the latter cases. Similarly, in a very small economy, capital projects tend to be relatively larger and more one-off than in a bigger economy. Figure 2 shows how while investment in the largest EA economies follows relatively smooth cyclical behaviour, for the smallest countries it is replete of temporary surges and drops.

Table 1. Indicators of volatility (2000-2012)—the impact of country size

	Very small countries*	Small countries*	Large countries*
<i>Coefficient of variation (%)</i>			
GDP	13.2	6.5	4.3
Private consumption	11.5	6.6	3.5
Gov. consumption	11.1	6.5	6.7
Exports	22.2	12.3	14.0
Investment	15.4	8.7	9.5
<i>Range of quarter-on-quarter changes (percentage points)</i>			
GDP	7.0	4.1	4.0
Private consumption	4.2	3.0	1.4
Gov. consumption	7.7	4.6	1.4
Exports	15.0	11.9	13.4
Investment	15.4	8.7	9.5
<i>Odds of successive quarter-on-quarter changes varying by more than 0.5 p.p.</i>			
GDP	0.45	0.33	0.20
Private consumption	0.33	0.10	0.04
Gov. consumption	0.78	0.20	0.00
Exports	0.82	0.80	0.71
Investment	0.84	0.57	0.45
<i>Mean value of Inventory changes/Statistical discrepancy (% of GDP)</i>			
	0.3	0.4	0.1

* Very small countries have a GDP less than 1% of total EA GDP, that of small countries is between 1% and 5%, while the large economies are the remaining EA countries.

Source: Own analysis using Eurostat GDP seasonally-adjusted quarterly data.

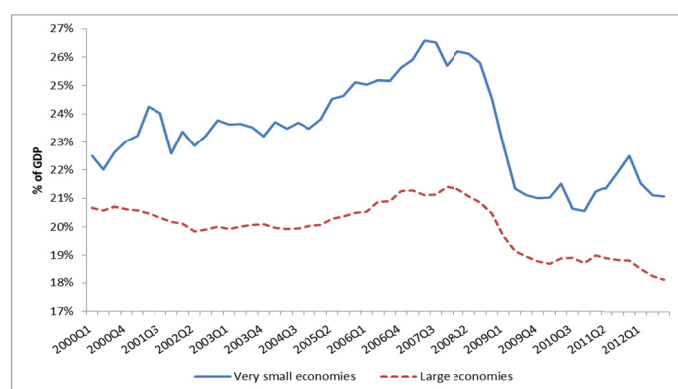


Figure 2. Investment as a ratio to GDP (seasonally adjusted)

Source: Eurostat.

3. Modifying the HP Filter

The estimation of potential output has tended to be done in two ways. One school, harking back to the classical tradition, views the business cycle as fluctuations around a long-term trend, with the economy having some form of mean-reverting process that leads it back to equilibrium. By contrast, the other line of thinking, which draws

from Keynesian macroeconomics, allows for the possibility of permanent or long-term divergences and sees the output gap as the result of significant movements in aggregate demand in relation to a slowly moving level of aggregate supply. The emergence of an output gap is attributed to rigidities that delay the immediate adjustment of prices and wages. Conversely, the first line of thinking sees potential output as being ‘driven by exogenous productivity shocks to aggregate supply that determine both the long-term economic growth and, to a large extent, short-term fluctuations in output over the cycle’ (Note 10).

Broadly speaking, potential output in neoclassical macroeconomic thought is synonymous with the trend growth rate of actual output. The output series can be decomposed into a permanent component and a cyclical one that exhibits stationary behaviour in that it reverts always to the permanent level. What complicates matters is that the permanent or equilibrium level of output, however, is not stable and instead exhibits an upward trend in most economies, reflecting mainly productivity shocks. Therefore methods that attempt to extricate the cyclical element must be able to identify movements in the time series that are due to the cycle and those that reflect changes in potential output. The most popular filtering method is the HP filter (Note 11) which takes the form:

$$\text{Min}(\sum_{t=1}^T (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2) \quad (1)$$

This first term minimises the distance between the actual and the potential (τ_t) value, while the second minimises the change in the trend value. Given that these two objectives contradict each other, the weight λ is used to control for the smoothness of the trend. It is typically set at 1600 for quarterly data. Its widespread use derives mainly from its simplicity, though it has other useful properties, for example it produces an output gap that is stationary even though the original series is integrated.

Despite its popularity, its use has been controversial. It is mechanistic and results depend crucially on the choice of λ . If λ is set to zero, the trend is the same as the actual series, while if it is set at infinity it reduces to the linear form. The arbitrary choice of the smoothing parameter influences the size of potential output estimates and some studies have argued that the commonly used λ s are only applicable for the normal business cycle of the US (Note 12). Long run deviations from equilibrium are ruled out, and the filter assumes the cycle lasts between 2 and 32 quarters. The method also suffers from an end-of-sample problem (Note 13). Baxter & King (1999) find it takes data for three additional years to make sure the actual output gap makes sense (Note 14). Cotis et al (2005) argue that ‘the sample end point weaknesses characterising HP filtering are beyond practical remedy’ given that official forecasters tend to adopt a ‘back to average growth’ forecasting approach. Another criticised feature of the HP filter is that it assumes the cycle is symmetric. In addition, Scacciavillani (1999) notes that if there are structural breaks, the use of the HP filter ‘could be inappropriate since the filtering procedure may remove from the data shifts that in fact represent a change in the trend level or growth rate of potential output’. Guay & St-Amant (2005) also note that it is based on assumptions that are unlikely to be satisfied in practice; namely that transitory and trend components are not correlated with each other, that the process is integrated of order 2, and that the transitory component is white noise.

Structural methods tend to be preferred by policymaking institutions as their results are relatively easier to ‘to frame economic policy discussions or explain policy decisions to the public’ (Note 15). While potential output is not something which is expected to drop, there is increasing evidence that its growth is affected by severe financial crises or deep recessions (Note 16). Structural methods have the advantage that they can allow for longer deviations from potential. The main method used is the production function approach (Note 17), involving the modelling of aggregate supply via an economy-wide production function. Despite its attractiveness, this presents significant practical drawbacks for very small economies, as data requirements are substantial. Arriving at a measure of capital stock is difficult (Note 18). Furthermore systematic deviations of output from the level given by factor inputs, ascribed to total factor productivity (TFP) growth, tend to require the use of de-trending techniques and result in very large changes for small countries as factors of production may be measured incorrectly (Note 19). Other structural alternatives to production functions, such as structural VARs (Note 20) and micro-founded dynamic stochastic general equilibrium models (Note 21) are equally hard to implement for very small economies. Semi-structural methods (Note 22), such as the multivariate Beveridge-Nelson decomposition, which try to use statistical approaches in a structural context by using information from several series to estimate the output gap, are less challenging. Yet they still are problematic. For instance, the unobserved components method (Note 23) tries to extract information on the output gap using the co-movement of observed series, such as inflation, but these too could also be subject to shocks that have little to do with changes in potential output (Note 24). Modifying the simple HP filter to try to account for the

particular needs of very small open economies, while also allowing for more flexibility in determining the length of deviations from potential, may present an interesting alternative.

3.1 A suggested Alternative Use of The Standard HP Filter

Due to noise in the data, applying the HP filter on the GDP series of a very small open economy gives the impression that the output gap is very volatile (Note 25). For instance when applied to the smallest country, Malta (Note 26), the filter yields an output gap series that ranges between -3.4% and $+3.8\%$ of potential GDP. This is not that different from that of the EA (i.e. -2.6% to $+3.3\%$). However, while the Maltese series is stationary, as can be seen from Figure 3 it is erratic and does not display clear cyclical behaviour. For instance, looking at 2000, it moves from a gap of 0.9% in the first quarter to a surplus of 2.3% in the second, a gap of 0.2% in the third and a surplus of 1.7% in the last quarter. The Maltese series changes sign 18 times while the EA's does so 6 times (Note 27). The relevance of such a measure of 'equilibrium' is clearly limited and it cannot serve as a good guide for decisions on economic policy.

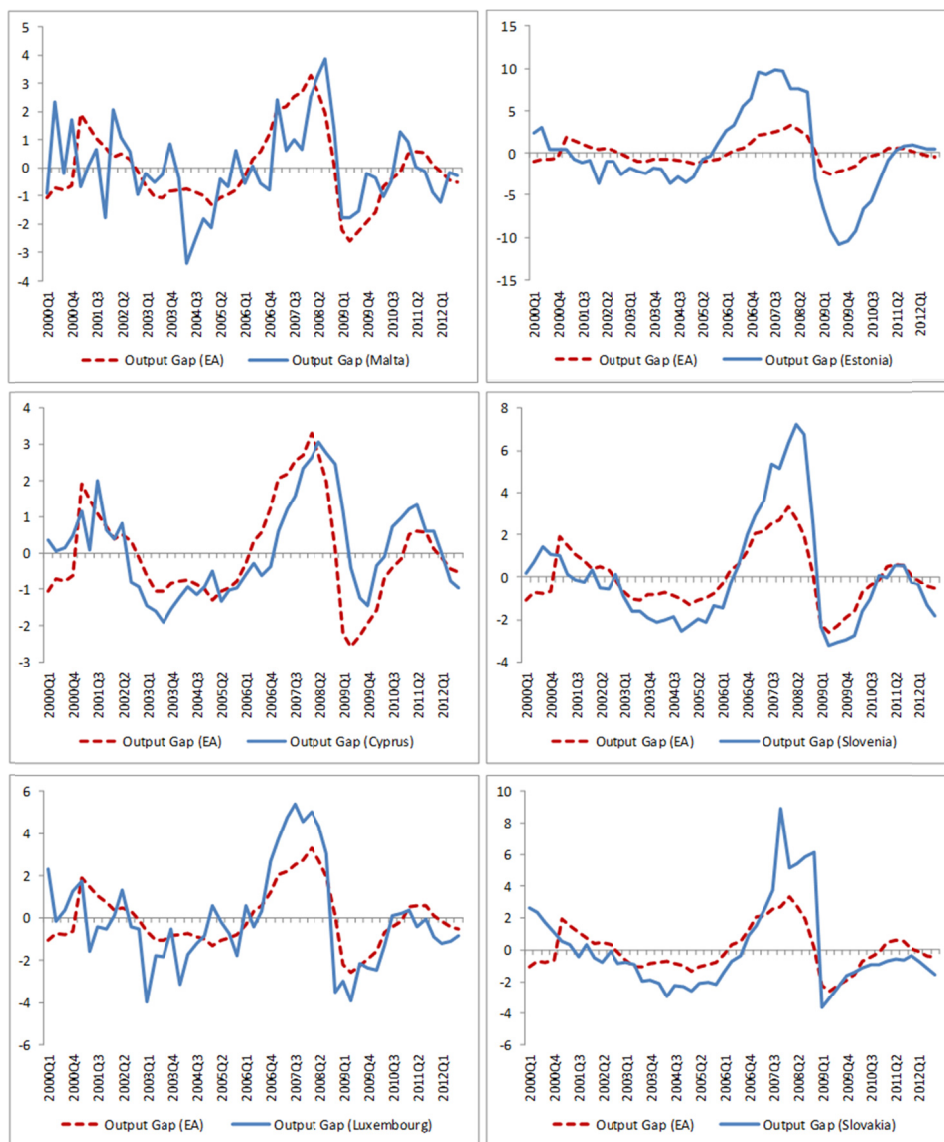


Figure 3. Output gap (HP filter on seasonally-adjusted quarterly GDP data)

Source: Own calculations using Eurostat data.

The variability of the HP-filtered output gap measure for very small open economies can however be reduced. The first step is to divide their GDP time series into an upper and a lower bound data sequence. The upper bound

takes all those GDP readings which are underpinned by a quarter-on-quarter increase, while the lower bound takes the readings resulting from a decline. The successive actual values of these series are interpolated to create a complete time series (Note 28) that is considerably smoother than the actual GDP series, which is characterised by very large spikes and subsequent drops. Following this, an HP filter is applied separately on the upper and lower data sequence. Then for some weight, θ (with a value between 0 and 1), one would define the potential output series as:

$$\theta Y_L + (1-\theta)Y_H \quad (2)$$

where Y_L stands for the trend of the lower bound of the series while Y_H is the trend fitted to the upper bound. One would set the value of θ on the basis of an assessment as to where the equilibrium lies. It would be closer to 1 the more one believes that equilibrium lies close to the trend set by the lower bound of the time series, and vice versa. As GDP in small open economies tends to be boosted by one-off events such as large capital projects and bulky export orders, choosing a θ of 1 would appear preferable. Conversely given that potential output is generally taken to mean 'maximum' output, one could argue that the bias for θ should be closer to 0. The setting of θ introduces an element of judgement, which inevitably implies that the method is not easy to standardise across countries.

Adopting a constant θ does not necessarily affect the variability of the output gap estimates. It just allows one to have a lower potential output series. Varying θ over time can, however, help reduce the variability of the output gap. The algorithm used to determine this variation was based on observing the changes in the standard HP filter derived output gap for the very small economy and comparing them with those of a larger (and more stable) economy - in this case, the EA as a whole. Whenever the change in the standard HP filter output gap for the very small economy was substantially larger than that in the EA, the θ was changed to $1-\theta$, so that the upper bound series is given the weight usually given to the lower bound. In this way, potential output is allowed to react when there is a spike in growth, but not be dragged downwards excessively by abrupt downturns. The selection of the value of θ for each country was based on that value that gave the lowest standard deviation for the resulting output gap series.

As can be seen from Figure 4, the output gap series resulting from the modified approach for all very small EA countries is smoother than that derived from the standard HP filter. Returning to the earlier example of the output gap estimates for 2000 for Malta, these are now all positive values, rather than have a different sign each quarter. Table 2 summarises some volatility indicators. The number of times the output gap changes sign is much lower, and more in line with the changes for the EA as a whole. While the smallest EA economies still have a relatively higher-than-average volatile series, the cycles are slightly better-defined. The time span between changes in sign of the quarterly output gap converges, for most of the countries, a bit more to the EA average. Even more interestingly, the modified approach lowers substantially the range of the second difference in the quarterly output gap series of these very small economies.

Table 2. Indicators of output gap volatility—the impact of modified approach

	Chosen value of θ	Changes in sign of successive output gap estimate	Average no. of quarters between change in sign	Range of second difference in output gap (p.p.)
Malta	0.999	13 (18)	3.6 (2.7)	6.7 (12.0)
Estonia	0.965	4 (4)	10.2 (10.2)	15.7 (16.7)
Cyprus	0.999	5 (5)	8.5 (8.5)	5.5 (6.3)
Slovenia	0.458	5 (9)	8.5 (5.1)	7.6 (7.7)
Luxembourg	0.790	9 (13)	5.1 (3.6)	11.8 (12.3)
Slovakia	0.489	5 (5)	8.5 (8.5)	7.7 (20.3)
EA	NA	(6)	(7.3)	(5.4)

Note: Figures in ()s denote values derived using the standard HP filter.

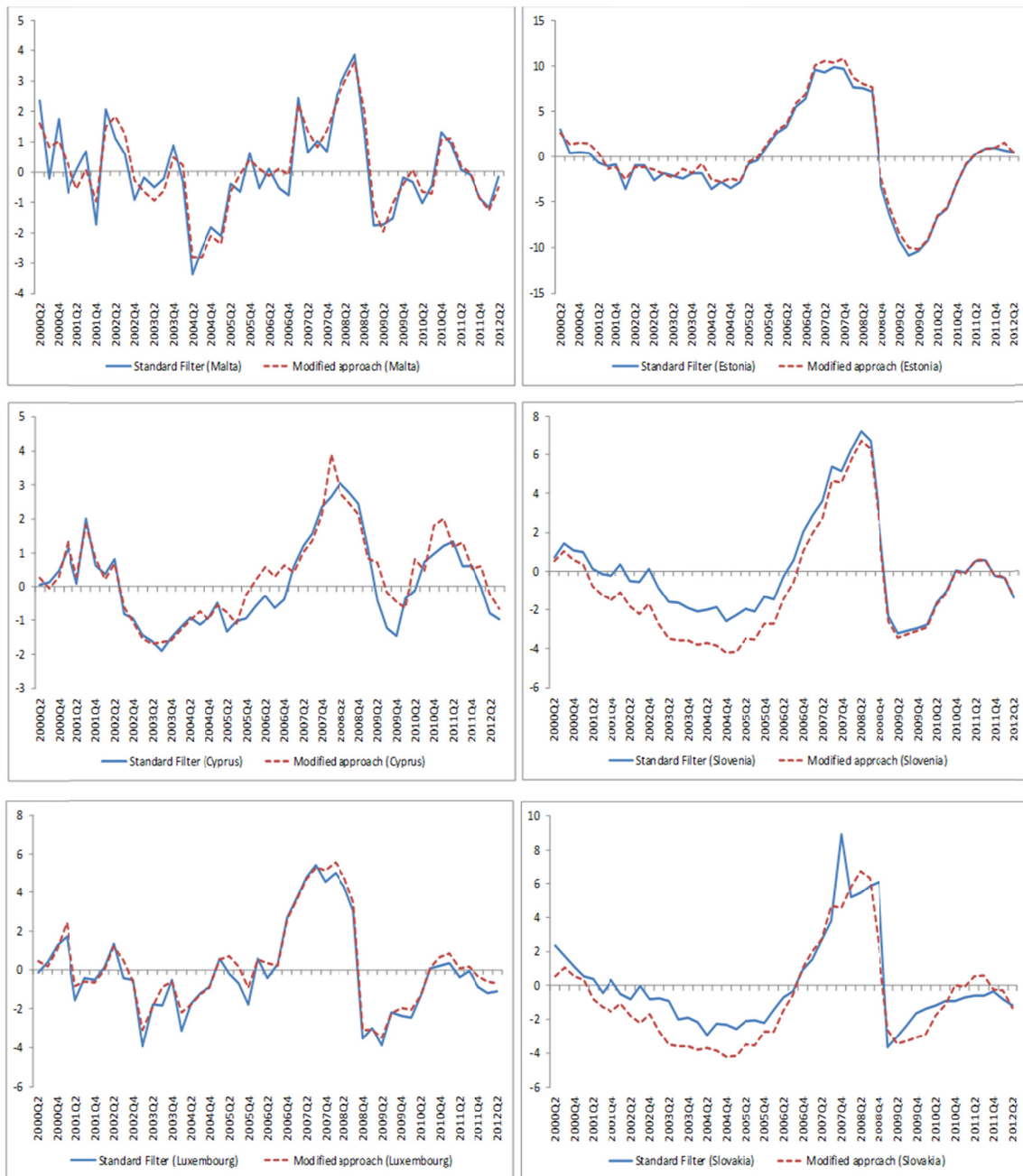


Figure 4. Output gap resulting from using standard HP filter and the modified approach

Source: Own calculations using Eurostat data.

The values of θ in this exercise were chosen to smoothen as much as possible the changes in quarterly output gap by linking it to changes observed for the more stable EA average. However another potential use of this approach is to allow for long-term deviations from equilibrium. This is particularly useful if the series one has to work with is very short – a common occurrence when working with data for small open economies. In this case, one could set the factor θ on the basis of considerations from other data (e.g. indications from changes in inflation rates, sentiment indicators or capacity utilisation rates) or by looking at developments in related economies for which the data series is longer and less affected by one-off events. If one sets θ close to 1, the series for the gap has a positive mean value and the reverse for θ close to 0. Of course, the extent of the deviation can be controlled by applying the factor differently in different time periods. For instance, in an initial period where the researcher believes there was under-employment of resources, θ would be set closer to 0 and then this would be changed gradually to become closer to 1. The other thing to consider is that the extent to which θ would need to be

modified depends crucially on the nature of the upper and lower bound series. When there is a noticeable gap, the setting of θ would require more thought.

3.2 A Suggested Modification to the Standard HP Filter

Due to its shortcomings, there have been several attempts to modify the HP filter. Chagny & Dopke (2001) describe one such attempt – the multivariate HP filter (Note 29). The latter attempts to give the filter an economic basis by means of three structural equations, namely an augmented Phillips curve with inflation depending on expected inflation and the current and lagged output gap, an Okun's law relation with current unemployment depending on an exogenously determined NAIRU and the current and lagged output gap and capacity utilisation compared vis-à-vis its optimal level. A loss function is then set up that minimises the standard HP filter and the residuals of these three equations. The problem the authors note in this approach is that it is hard to judge the weight to set to the structural equations in the loss function.

Ross & Ubide (2001) review another modification known as HP-ARIMA. The latter aims to minimise the end-of-sample problem by forecasting and backcasting the series with an ARIMA model. Since the choice of the smoothing parameter, λ , amounts to identifying the allocation of variations in output to trend and to cyclical components, they suggest calculating λ in a cross-country setting so as to equalise the volatility of the trend across countries, using one country as the benchmark (Note 30). They propose two methods; allowing for a larger variability of the growth rate in countries with a more volatile component, or else assuming similar economic structures between the benchmark and the comparator country.

Dennis & Razzak (1995) make another important contribution, basing their modification to the standard HP filter on the fact that λ can be interpreted as a function of the ratio of the variances of aggregate demand and supply. They note that setting a constant λ implicitly assumes that the relative variances of demand and supply disturbances of output are time-invariant. Applying their thinking to the case of New Zealand, a small open economy, they suggest that keeping λ constant does not make sense. New Zealand's GDP has undergone a number of significant structural shocks and they argue in favour of allowing λ to vary with time to reflect changes in the variation of aggregate demand and supply (Note 31). The idea of having a time-variant λ is attractive as the effect of structural shocks and one-off factors could be reduced and, thus, the potential output series would give a fairer picture of the equilibrium of the economy. However, there is an alternative way to arrive at a similar result via a more fundamental modification of the standard HP filter, intended to give researchers more leeway to reduce the mechanistic nature of the filter and adjust it for underlying characteristics of a particular series.

Consider the following modification of the standard HP filter:

$$\text{Min}(\sum_{t=1}^T w_t (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2) \quad (3)$$

The second part of the equation (including λ), which smoothens the growth in potential output, is the same. Instead the first part of the equation now includes an additional term w_t . This is a generalisation of the standard filter, which is the case when w_t is 1. The weight w_t is the means by which the filter is modified to suit better a series' characteristics.

The choice of this weight would reflect two considerations, namely:

a) w_t is smaller the more y_t is below the previous high y value, with maximum $w_t = 1$ when y_t is higher or equal to the previous high. More formally, if the previous high y at time t is h_t , then:

$$w_t = \frac{1}{1 + \mu \{\max(h_t - y_t, 0)\}} \quad (4)$$

Through this modification, a researcher is able to control the extent to which potential output falls in level by means of the value of the factor μ . A higher μ means less weight is given to quarters when GDP is much lower than it used to be. The logic behind this is that drops in the level of potential output are rare and occur only when resources or knowledge are destroyed. Statistical filters should therefore have a bias against declines in equilibrium output. In the case of very small open economies, this bias is particularly important as due to their size, these countries tend to have very volatile investment, government consumption and export figures, due to projects and orders being large and one-off in nature.

b) w_t is lower the greater the time difference between y_t and h_t . Letting p_t denote this difference:

$$w_t = \frac{1}{1 + \varphi \{\max(p_t, 0)\}} \quad (5)$$

This modification introduces the possibility that there may be long-term deviations from equilibrium. This is done by means of the factor φ . For any given φ , for a decline in output to be allowed to affect the level of potential output, the decline must persist for some time. In the standard HP filter, declines in output automatically result in lower potential GDP, thus eliminating the possibility of long disequilibria. With this modification the researcher has the discretion to allow for longer periods when output is below potential.

Uniting these two concepts, the weight w_t in the first part of the HP filter is:

$$w_t = \frac{1}{1 + \mu \{\max(h_t - y_t, 0)\}} \times \frac{1}{1 + \varphi \{\max(p_t, 0)\}} \quad (6)$$

This new weight has two parts: the first affecting the impact of temporary shocks on a series and the second allowing for long-term deviations from equilibrium. As a result, the solution of the generalised HP filter differs slightly from that of the standard filter, as one needs to consider the influence of w_t . Whereas the solution of the minimisation problem in the standard filter (Note 32) is:

$$\tau = (I_T + \lambda K' K)^{-1} X \quad (7)$$

Where τ is a vector with the values of the filtered series, I_T is the identity matrix with dimension T , X is a vector with the readings of the series being filtered, λ is the smoothing parameter, and

$$K = \begin{pmatrix} 1 & -2 & 1 & 0 & 0 & \dots & 0 & 0 & 0 \\ 0 & 1 & -2 & 1 & 0 & \dots & 0 & 0 & 0 \\ 0 & 0 & 1 & -2 & 0 & \dots & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \dots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & 0 & \dots & 1 & -2 & 1 \end{pmatrix}$$

In the generalised filter, X is a vector with the values of the series being filtered multiplied by their respective w_t . The choice of μ and φ depend on the characteristics of the series. The closer they are to 0, the more the underlying series is allowed to determine potential output (Note 33). On the statistical side, the issues to keep in mind are the variability of the series and the possibility that downward movements in a series may be more serious than upturns (i.e. leverage issues). On the economic side, one needs to consider that inflation, unemployment and other such variables of interest to policymakers tend to respond more to upward movements in the GDP series than to downward movements. Not only are prices notoriously sticky downwards, but also the presence of labour hoarding in small economies typically means that unemployment takes time to rise after a downturn. These factors should be taken into consideration when setting μ and φ . The researcher would need to look at micro-studies or other evidence on several factors, such as the level of education of the workforce, the amount and quality of the capital stock and other measures of potential resources, past evidence of hysteresis effects, when trying to determine the value of w_t . The factors μ and φ can also be interpreted as indicating the rate of adaptability of factors of production to economic shocks and the rate of recovery of an economy from downturns. Studies of past recessions or cross-country evidence on cyclical fluctuations would be useful in this regard.

Another thing to consider is whether to allow μ and φ to vary over time. This would depend on whether there is evidence that there are noticeable changes in the adaptability of economic resources. For instance, in an economy where the production structure shifted substantially over time and new activity requires a much higher skilled, and thus less available, workforce, one might want to change μ and φ . Another thing to consider is judgement regarding noise in the data. It might be that a researcher has evidence that data quality in a particular period is worse than in others, and might want to address this by using time-varying factors. Similarly a researcher might want to use information from a more stable series to improve the reliability of the estimates from the generalised filter. For the purposes of this paper, we limited ourselves to test a range of values of μ and φ between 0.001 to 0.999 and selected those which resulted in the lowest standard deviation, while imposing a

rule that whenever the change in the output gap from the standard HP filter for each small country was larger than that in the EA average, the sign for the factors was changed, to try to address potential noise in the data.

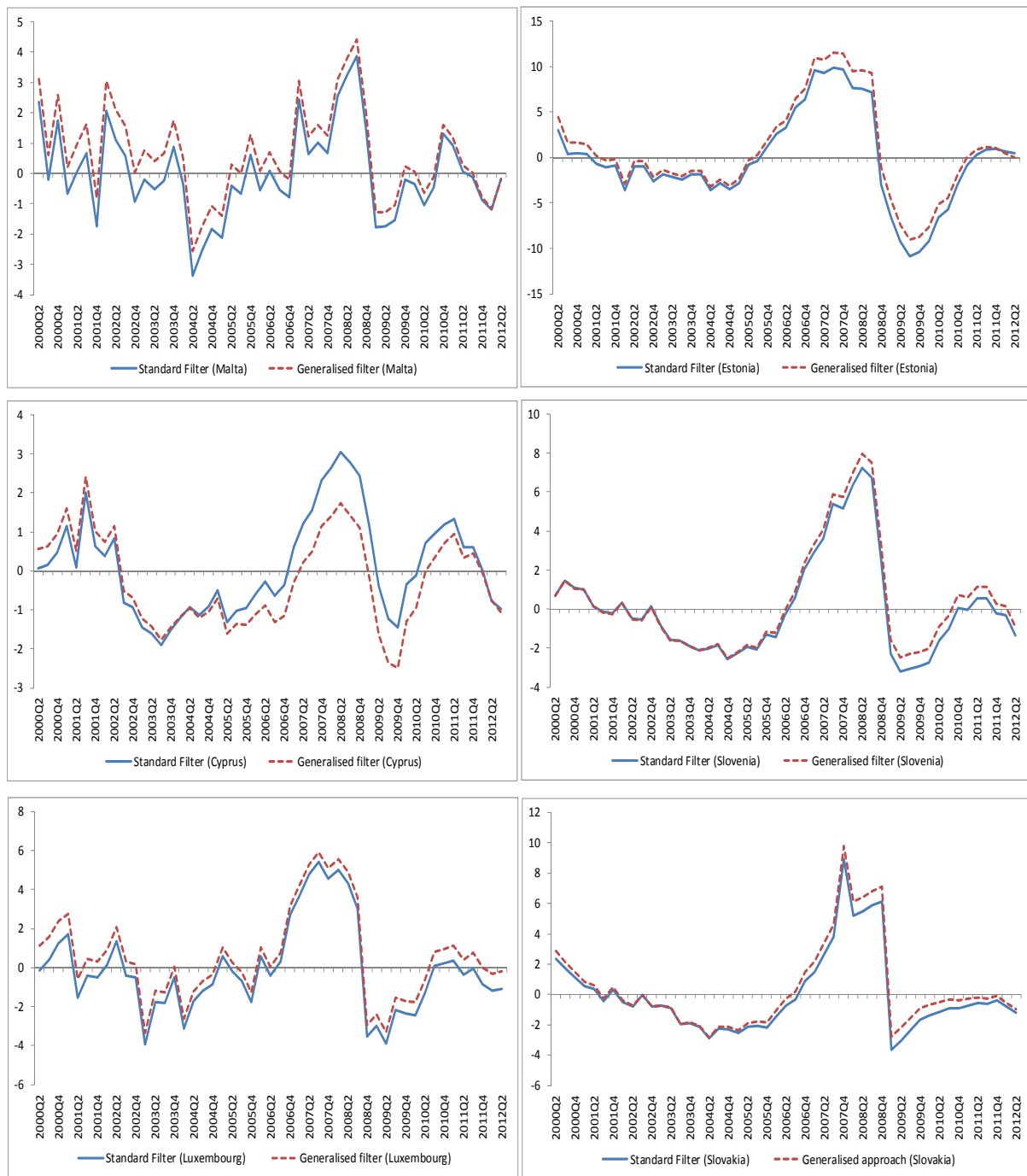


Figure 5. Output gap resulting from using standard HP filter and the generalised filter

Source: Own calculations using Eurostat data.

Figure 5 shows the estimates of the output gap resulting from the application of this generalised HP filter. Compared to the series derived using the modified approach described in section 3.1, the results are less smooth, particularly for the start of the period. However, similar to the modified approach, the generalised filter results in fewer changes in sign of the output gap, particularly within the same year (see Table 3). Further improvements of

the algorithm used to set the parameters determining μ and φ could result in a smoother series, but the scope of this exercise was just to introduce this approach (Note 34). Its benefits lie more in the fact it allows researchers to use evidence on factor adaptability and related considerations to reduce the mechanistic nature of the standard HP filter. To determine the right values of μ and φ for each country would require in-depth country studies.

Table 3. Indicators of output gap volatility—the impact of the generalised filter

	Chosen value of μ and φ	Changes in sign of successive output gap estimate	Average no. of quarters between change in sign	Range of second difference in output gap (p.p.)
Malta	0.015	12 (18)	3.9 (2.7)	11.4 (12.0)
Estonia	0.033	4 (4)	10.2 (10.2)	16.7 (16.7)
Cyprus	0.01	5 (5)	8.5 (8.5)	6.3 (6.3)
Slovenia	0.015	9 (9)	5.1 (5.1)	7.7 (7.7)
Luxembourg	0.011	9 (13)	5.1 (3.6)	12.3 (12.3)
Slovakia	0.015	5 (5)	8.5 (8.5)	20.3 (20.3)
EA	NA	(6)	(7.3)	(5.4)

Note: Figures in ()s denote values derived using the standard HP filter.

4. Discussion

Having a reliable estimate of potential output is crucial for policymakers, both on a national and a supranational setting. This interest has fuelled significant research and a plethora of methods have been developed over the years. However the implementation of these approaches can be problematic when looking at very small open economies. Lack of data, and erratic developments in investment and labour demand, complicate the construction of a production function based on quarterly data. Quarterly GDP series, even when seasonally adjusted, do not fit well the statistical properties underpinning most standard filtering methods. Series for very small countries tend to be short, have large fluctuations and recurrent structural breaks. This paper has shown that when applied to the smallest EA countries, the HP filter results in very pronounced and recurrent changes in the output gap that are inconsistent with the theoretical idea of equilibrium. The filter is affected significantly by shocks to data, which in turn reflect the small size of these economies rather than actual changes in potential output.

On this basis, two suggestions were put forward. The first involves an innovative use of the standard filter, whereby the upper and lower bounds of a series are defined and the equilibrium level is determined as a weighted average of the HP filter applied separately on these bounds. This was shown to result in a smoother output gap series with the possibility of long-term deviations from equilibrium. The second suggestion involves a rethinking of the standard HP filter to integrate structural features. The modified or generalised HP filter allows researchers to set limits on the impact exerted by structural or temporary shocks and to allow for the possibility of having lengthy periods of disequilibria. These suggestions can be criticised as granting too much discretion to researchers and thus doing away with one of the main benefits of the HP filter, namely the lack of judgement needed to apply it. However, the special characteristics shown by the output series of very small open economies make this benefit appear to be more of a drawback. Rather than ignore the properties of the series being studied, the two suggestions allow researchers to apply their judgement and knowledge on a particular economy to arrive at a measure of equilibrium that is based on sounder reasoning, while not involving the complexity of constructing a model. Though this would probably lead to various estimates of the output gap being made for the same economy, a healthy debate between economists on the adequate parameters to be set is much to be preferred to a blind adherence to a standardised filtering method. Given the importance of gauging the level of potential output properly, it is better to have a number of partially correct opinions rather than one incorrect result.

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Notes

Note 1. In his seminal paper, Okun (1962) defined potential GDP as the answer to the question: “How much output can the economy produce under conditions of full employment?”. For literature surveys of the topic see De Masi (1997), European Central Bank (2000) and Chagny & Dopke (2001).

Note 2. Besides its use as a measure of inflationary pressures and/or the extent of under-utilisation of resources, the output gap serves other important purposes, which are more medium-term. It is used to adjust cyclically variables, such as the fiscal deficit, to reflect the levels that would prevail were the economy to operate at potential (see for instance Giorno et al (1995)). The European Union has gone as far as including this concept in the Stability and Growth Pact, and uses it to assess the progress made by countries towards achieving the goal of

medium-term fiscal balance.

Note 3. For a review of the various statistical methods, see Ladiray et al (2003).

Note 4. For recent estimates of potential output for Euro area economies, see European Central Bank (2011).

Note 5. In fact, at the end of 2012 taken together these countries accounted for 1.9% of total EA GDP.

Note 6. See Commonwealth Advisory Group (1997).

Note 7. See for instance Laurent (2008) and Alesina et al (2004).

Note 8. World Bank Development Indicators show that in 2005, for instance, the gross saving rate for small states amounted to 27% as against 20% in the EU and the OECD.

Note 9. For example, between the last quarter of 2001 and the first quarter of 2002, the smallest economy, Malta, had quarter-on-quarter real GDP growth moving from -2.1% to +4.2%. In the second quarter of 2007 real GDP fell by 1.2% after having risen by 3.9% in the previous quarter. By contrast, the largest change seen in the largest economy, Germany, was the sharp recovery from a drop of 4% in the first quarter of 2009 to positive 0.2% in the following quarter. For one third of the series, the change in quarter-on-quarter growth in Malta is larger than the second-largest quarter-on-quarter change in the German GDP data.

Note 10. Scacciavillani (1999).

Note 11. This method is described in Hodrick & Prescott (1997).

Note 12. Chagny & Dopke (2001).

Note 13. St-Amant & van Norden (1997) show that observations at the centre of the sample receive a 6 percent weight while the last observation accounts for 20 percent of the weight. Thus estimates of the gap for recent periods tend to change substantially as new (or revised) data are available.

Note 14. They also criticise the usual λ 's set for annual data, 100 and 400, and suggest a weight of just 10.

Note 15. Economic Policy Committee (2001). The EU Commission, for instance, decided to stop using the HP filter as its main gauge of potential output and to instead develop a simple production function.

Note 16. Haltmaier (2012) finds, for instance, that 'the Great Recession might have resulted in declines in trend output growth averaging about 3 percent for the advanced economies, but appear to have had little effect on emerging market trend growth'. Similar results are found in European Commission (2009).

Note 17. See for example Denis et al (2002) and Musso & Westermann (2005).

Note 18. D'Auria et al (2010) remark that no capital stock data was available for most small EU countries, and this series had to be constructed using common assumptions for all countries. Data on hours worked, another important component, tend to exhibit considerable noise and breaks compared to larger countries.

Note 19. European Commission estimates of TFP for Malta, for instance, imply that from a growth rate of 7.3% in 2001, in 2002 there was a decline of -7.8%. By contrast the largest change for a bigger economy, like Germany or Italy, was of about 4 to 5 percentage points during the financial crisis. For further information see <https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>

Note 20. The first such example is suggested in Blanchard & Quah (1989).

Note 21. Vetlov et al (2011).

Note 22. See Ross & Ubide (2001), De Masi (1997) and Chagny & Dopke (2001) for a survey of these methods.

Note 23. For a comprehensive explanation of this approach, see Claus et al (2000).

Note 24. To give an example, between January and June 2012, HICP inflation in Malta rose from 1.7% to 4%. This sharp acceleration, which was reversed in the following months, reflected a temporary spike in hotel prices – rather than any acceleration in underlying activity. Similarly inflation rose from 0.6% in March 2010 to 4% in December 2010, on the back of a surge in food prices, which moved from a negative 7.7% to a positive 8.3%.

Note 25. Canova (1998) points out that filters assume 'that the irregular (high frequency) fluctuations play little role'.

Note 26. To reduce the end-of-sample problem, the GDP series for all countries were extended forwards for four years beyond the historical sample by means of a simple ARMA(1,1) forecast.

Note 27. The output gap series changes sign 13 times for Luxembourg and 9 times for Slovenia. The series for other countries may not change their sign as much, but they display the same pattern of random changes.

Note 28. For simplicity's sake linear interpolation is used, but Lagrange interpolating polynomials could also be used.

Note 29. See Areosa (2008) for a somewhat similar modification of the HP filter.

Note 30. In a way, this is how the factor θ was set in the previous section.

Note 31. Again the approach of setting a time-varying factor θ in the previous section follows this line of thinking.

Note 32. One takes the derivative of the minimisation problem with respect to τ , re-arranges and converts to matrices.

Note 33. Of course they need to be less than 1, or else they would have too strong an impact. In the case of μ the value would need to be quite small, as the difference between current GDP and its previous peak could be quite high. In this paper we define this difference in terms of a percentage from the upper bound interpolated GDP series.

Note 34. For simplicity's sake, having a different value for μ and φ was not looked into, for instance.

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The Black-Scholes Currency Option Pricing Model: Evidence for Unbiasedness from Three Currencies against the US Dollar

Samih Antoine Azar¹ & Annie Tortian¹

¹ Faculty of Business Administration & Economics, Haigazian University, Beirut, Lebanon

Correspondence: Samih Antoine Azar, Professor, Faculty of Business Administration & Economics, Haigazian University, Mexique Street, Kantari, Beirut, Lebanon. Tel: 961-134-9230. E-mail: samih.azar@haigazian.edu.lb

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Abstract

Under risk neutrality and rational expectations, the future value of the option premium is an unbiased estimator of the future actual payoff of the option. In this paper, this unbiasedness hypothesis is tested for the Black-Scholes currency call option pricing model. Three currencies, against the US dollar, are considered: the British pound, the Swiss franc, and the Japanese yen. The data is monthly and starts from the late 1980s. A set of seven different strike prices are assumed for each currency. Unbiasedness is supported if the regression constants are statistically insignificant, and if the regression slopes are statistically insignificantly different from 1, and if there is no autocorrelation in the regression residuals. The results for the British pound are strongly supportive of this version of market option efficiency. For the other two currencies only long run cointegration relations are uncovered. The results, whether short run or long run, remain also strongly supportive when the theoretical constraints are imposed. In addition, the results are not materially different with alternative measures of currency volatility. It can be concluded that the Black-Scholes currency option pricing model is relevant not only theoretically but also empirically and practically.

Keywords: Black-Scholes currency option pricing model, British pound, Swiss franc, Japanese yen, European currency call options, rational expectations, unbiasedness, market efficiency

1. Introduction

The unbiasedness hypothesis states that the current forward rate is an unbiased predictor of the future spot rate. Unbiasedness is ordinarily tested in the foreign exchange market, although nothing prevents its application to other markets. Unbiasedness of the forward foreign exchange rate is sometimes called forward market efficiency. This paper has the purpose to test whether unbiasedness holds for Black-Scholes currency option prices. This test is crucial to the Black-Scholes option pricing model, and is intended to determine whether this model remains appropriate and useful despite the fact that it has been discovered to have many biases when applied to foreign exchange rates (Chesney and Scott, 1989; Dupoyet, 2006; Hull, 2012). See also Reiswich and Wystup (2010) who deal with the issue of volatility smiles in currency options, whereby implied volatility from option prices varies with the degree of moneyness. This paper introduces in the second section an original experimental design to test for option unbiasedness, or what may be called henceforth option market efficiency. This concept of efficiency is not the same as the ones in the literature where efficiency is defined either as the unbiasedness of implied volatility in predicting actual volatility (Shastri and Tandon, 1986) or whether option prices satisfy the no-arbitrage put-call parity condition (Hoque et al., 2008).

A related but a different approach to this paper's option unbiasedness model is the one adopted by Duan and Simonato (1998), Harikumar et al. (2004), and Shahbandarzadeh et al. (2013). These authors consider the following approximate call option pricing model for a call option premium (C_t) on a non-dividend-paying stock at time t , where r is the domestic interest rate, T is the maturity, S is the stock price, K is the strike price, $E(\cdot)$ is the expectation operator, and n is the number of simulations:

$$C_t = e^{-rT} E[\text{Max}(S_T - K, 0)] \approx e^{-rT} \text{Max}[E(S_T) - K, 0] = \frac{1}{n} e^{-rT} \sum_i^n (\text{Max}[S_{iT} - K, 0]) \quad (1)$$

The approximation in equation (1) holds better if Jensen's inequality is small, as is usually the case, although Azar (2008) finds that Jensen's inequality is statistically significant in many applications in finance. In support

indirectly to Azar (2008) Harikumar et al. (2004) obtain evidence that the Black-Scholes pricing model generates more accurate prices than a more sophisticated GARCH model of currency returns that uses equation (1), implying implicitly that Jensen's inequality cannot be ignored. This reestablishes the relevance and appropriateness of the Black-Scholes pricing model despite its many critics. The evidence in this paper further demonstrates the salient features of relevance and appropriateness of such a model.

The paper is organized as follows. In the following section, section 2, the experimental design is presented. The empirical results are in section 3. Section 4, the final section, concludes.

2. The Experimental Design

As already stated in equation (1), and in a risk-neutral world, the following is true (Hull, 2012, p. 314):

$$C = e^{-rT} E(\text{Max}[S_T - K, 0]) \quad \text{or} \quad e^{rT} C = E(\text{Max}[S_T - K, 0]) \quad (2)$$

If rational expectations are invoked, then:

$$\text{Max}[S_T - K, 0] = E(\text{Max}[S_T - K, 0]) + \varepsilon_T \quad (3)$$

where ε is the expectation error. Replacing equation (2) into equation (3) one obtains:

$$\text{Max}[S_T - K, 0] = e^{rT} C + \varepsilon_T \quad (4)$$

The RHS result of Equation (4) has the form of a simple linear regression where the slope is equal to +1, and the constant is equal to 0. The paper will assess whether these two constraints are going to hold. Moreover, for short run and long run unbiasedness to be verified the residual ε_T should not be autocorrelated, meaning that the residual should be orthogonal to past information and that all relevant information about the option actual payoff should already be incorporated in the future value of the option premium. For long run unbiasedness to hold, which is a weaker condition of unbiasedness, the two variables in equation (4) should be cointegrated.

The presence of autocorrelation, or serial dependence, is evaluated by the Ljung-Box (1978) Q-statistic at lag k:

$$Q(k) = N(N+2) \sum_{i=1}^k \frac{\rho_i^2}{(N-i)} \quad (5)$$

where N is the sample size, and ρ_i is the autocorrelation coefficient at lag i . This Q-statistic is distributed as χ^2 with k degrees of freedom under the null hypothesis of no autocorrelation. Three lag lengths (k) are used: 6, 12, and 24. In case of cointegration the residual in equation (4) may be autocorrelated but should however be stationary in distribution.

It must be noted that the unbiasedness hypothesis is not invalidated by non-linear dependence, or heteroscedasticity, i.e. when the residuals in the time series regressions are not identically distributed. As a matter of fact all the estimated regressions in this paper suffer from some type of heteroscedasticity. That is why heteroscedastic and autocorrelation robust standard errors and covariances (HAC) are applied using the Newey and West (1987) correction.

The first currency to be studied is the British pound against the US dollar. It is expressed with the *American convention* against the US dollar, i.e. in terms of US dollars per unit of British pound. This is in conformity to actual quotes in the markets for spot rates, futures and for options, and in conformity to the common usage in the academic literature. The other two foreign currencies are converted in terms of US dollars per one unit of foreign currency, which is the opposite of the actual quotes in foreign exchange markets. The data on end-month exchange rates and on end-month one-month LIBOR rates are retrieved from the web page of EconStats. The sample is monthly from 1987:1 to 2012:10 for the British pound, i.e. 310 observations, and from 1989:1 to 2012:10 for the other two currencies, i.e. 286 observations. Missing values for LIBOR rates are taken from the following website: www.global-rates.com. Call premiums are computed according to the Black-Scholes (1973) and Merton (1973) option valuation formulae, as modified by Garman and Kohlhagen (1983), Grabbe (1983), and Biger and Hull (1983):

$$\text{call premium at time } t = C_t = e^{-rT} S_t \phi(d_1) - e^{-rT} K \phi(d_2) \quad (6)$$

where $\phi(\cdot)$ is the standard cumulative normal distribution, S_t is the spot price of the foreign currency, K is the strike price, r is the domestic interest rate, r_f is the foreign interest rate, T is the term, and where:

$$d_1 = \frac{\log(S_t/K) + (r - r_f + 0.5\sigma^2)T}{\sigma\sqrt{T}} \quad \text{and} \quad d_2 = d_1 - \sigma\sqrt{T} \quad (7)$$

The term T is fixed as being one month. The volatilities (σ) are either retrieved from the conditional variance through GARCH methods or assumed to be constant. See Engle (1982) for the ARCH model and Bollerslev (1986) for the GARCH model. More than one strike price is assumed. In fact there are seven strike prices for each currency. For the British pound these are in US dollars: 1.50, 1.55, 1.60, 1.65, 1.70, 1.75, and 1.80. For the Swiss franc they are in US dollars: 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, and 0.95. For the Japanese yen these are in US cents: 0.70, 0.75, 0.80, 0.85, 0.90, 0.95, and 1.00. For each strike price the actual payoffs are computed. Then the monthly Black-Scholes option prices are computed with variable domestic and foreign interest rates and variable spot foreign exchange rates over the sample period. The actual payoffs are regressed onto the future value of the Black-Scholes option values as specified by equation (4).

3. The Empirical Results

While the actual call option payoffs are easily calculated, the Black-Scholes call premiums require an estimate of the volatility of the underlying asset, in addition to spot foreign rates, and to domestic and foreign interest rates. Two methods are adopted. One is to estimate the volatility according to GARCH models of the change in the logs of each currency (Table 1). See also Manzur et al. (2010) and Dash et al. (2012). The change in the logs is approximately equal to the percentage change, especially with high-frequency data like this paper's monthly data. The GARCH specification models the residual variance as time-dependent or time-variable, and can account for volatility clustering, which is a stylized feature of many assets, and not only of foreign exchange rates, although some authors did not find GARCH effects in monthly foreign exchange rates (Baillie and Bollerslev, 1989). The other method is by assuming a constant volatility. The first method finds significant GARCH effects for all three currencies, with a Generalized Error Distribution (GED) process for the conditional variance, and a statistically significant GED parameter. The estimates of the volatility from the GARCH models are then plugged in the Black-Scholes formulae. It is worthwhile to note that each currency has a different GARCH specification. Therefore each currency has unique characteristics, and the ensuing regression estimates are not redundant. The second method is justified because variance ratio tests fail to reject the null hypothesis of a martingale, or of a random walk, for the log of each currency (Table 2). The actual p-values are much higher than the 10% cut-off marginal significance level. This applies for both heteroscedastic robust tests and otherwise, and for both a normal distribution and a bootstrapped normal distribution. This means that all three log-level currencies are random walks, and are unpredictable, even when heteroscedasticity is not accounted for. A surprising finding is that the two methods for measuring volatility produce results that are not materially different.

Table 1. GARCH models of the change in the logs of the three currencies, with a generalized error distribution (GED)

	British pound	Swiss franc	Japanese yen
Constant	0.000839 (0.602690)	0.001301 (0.696274)	0.001295 (0.746273)
<i>Conditional variance equation</i>			
Dependent variable	GARCH	LOG(GARCH)	GARCH
Constant	8.80E-05 (1.571039)	-13.37638 (34.8199)	8.26E-05 (0.378244)
ARCH(-1)	0.114779 (2.236649)	-	-
GARCH(-1)	0.774775 (7.505076)	-	0.912856 (4.003672)
LOG(GARCH(-1))	-	-0.945303 (19.5530)	-
RESID(-1)/SQRT(GARCH(-1))	-	0.110429 (2.365840)	-
GED parameter	1.347038 (8.834409)	1.780623 (8.549434)	1.426006 (10.80754)

Notes: In parenthesis are absolute t-statistics. The data is monthly from January 1987 to October 2012 for the British pound and from January 1989 to October 2012 for the Swiss franc and the Japanese yen.

Table 2. Variance ratio tests on the log of each currency (The null hypothesis is a martingale)

Currency	Joint test for maximum	Joint test for maximum	Joint test for maximum $ z - statistic $ using	Variance ratio for period:			
	$ z - statistic $ assuming no heteroscedasticity	$ z - statistic $ (Lo and MacKinlay, 1988)	wild bootstrap from normal distribution (Kim, 2006)	2	6	12	18
British pound	0.5508	0.9485	0.3244	1.12777	1.18893	0.98796	0.85345
Swiss franc	0.9999	1.0000	0.8926	1.04073	1.01245	0.97010	0.86905
Japanese yen	0.9994	0.9993	0.6924	1.00815	1.05206	0.91014	1.02501

Notes: Bootstrapping is carried out with 5,000 replications. All standard errors are heteroscedastic robust except for the test in the second column. Actual p-values for the maximum absolute z-statistics are reported in columns 2, 3 and 4. The variance ratios for periods 2, 6, 12, and 18 are from heteroscedastic robust standard errors.

The actual option payoffs and the future values of the Black-Scholes call option premiums are tested for stationarity by the Augmented Dickey-Fuller test-statistic (Dickey and Fuller, 1979), with the lags chosen to minimize the Schwarz Information Criterion. The ADF test is known to be sensitive to the number of assumed lags. If N is the sample size, then the maximum number of lags is equal to the integer number of the factor $N^{0.25}$ (Diebold and Nerlove, 1990; Mills, 2000; Mills and Markellos, 2008; Schwert, 1987). Since the sample size is composed of 310 observations for the British pound, this rule provides a result of $310^{0.25} = 4.20$, which is rounded to 5. For the other two currencies the rule obtains a result of 4.11, which is also rounded to 5. All tests include a constant, but not a trend. The tests on the British pound variables indicate, in general, level stationarity (Table 3).

Table 3. Augmented Dickey-Fuller unit root tests with a constant (The maximum lag is set to 5. The null hypothesis is a unit root. The data are for the British pound)

Variable	Test statistic	Actual	Variable	Test statistic	Actual	Variable	Test statistic	Actual
		one-sided p-value			one-sided p-value			one-sided p-value
Payoff(1.50)	-3.175566	0.0224	Call(1.50)	-2.815825	0.0572	Call(1.50)c	-3.186943	0.0217
Payoff(1.55)	-2.912209	0.0451	Call(1.55)	-3.183191	0.0219	Call(1.55)c	-3.221382	0.0197
Payoff(1.60)	-3.268535	0.0172	Call(1.60)	-3.243432	0.0185	Call(1.60)c	-3.278694	0.0167
Payoff(1.65)	-3.409746	0.0114	Call(1.65)	-3.353532	0.0134	Call(1.65)c	-3.388550	0.0121
Payoff(1.70)	-3.668053	0.0050	Call(1.70)	-3.115240	0.0265	Call(1.70)c	-3.524453	0.0080
Payoff(1.75)	-3.652901	0.0053	Call(1.75)	-3.405186	0.0115	Call(1.75)c	-3.408783	0.0114
Payoff(1.80)	-3.882375	0.0025	Call(1.80)	-3.611253	0.0061	Call(1.80)c	-3.590351	0.0065

Notes: In parenthesis is the strike price. A suffix c stands for calculations based on a fixed monthly volatility of 0.028703. Otherwise the volatility is estimated from the GARCH model in Table 1. All call prices are in future values. The data is monthly from January 1987 to October 2012.

Table 4 presents the regression results for the British pound in the case of variable volatility. The adjusted R-Squares are high for monthly data, and they range between 0.828 and 0.901. The slope estimates are between 0.932 and 0.979. The null hypotheses that the slopes are equal to +1 fail to be rejected. The minimum actual p-value for these t-tests is 0.1130. The constants in the seven regressions are all statistically insignificantly different from zero, with a maximum t-statistic of 1.489. For all seven strike prices the joint null hypotheses that the slope is +1 and the constant is zero fail to be rejected. The minimum actual p-value for this Wald F-test is 0.1434. The Ljung-Box Q-statistics do not find autocorrelation in the residuals. Therefore the unbiasedness model is strongly well supported for the British pound. Moreover the unbiasedness relation is valid for both the

short run and the long run.

Table 4. Ordinary least squares (OLS) regressions (The dependent variables are the payoffs. The independent variables are the future values of the Black-Scholes call option premiums. The volatility is estimated from Table 1. K is the strike price. The data are for the British pound)

	K=1.50	K=1.55	K=1.60	K=1.65	K=1.70	K=1.75	K=1.80
Constant	0.002696 (0.790968)	0.003568 (1.489062)	0.001246 (0.637359)	0.000768 (0.458089)	0.001628 (1.152450)	0.001531 (1.350823)	0.000957 (1.099439)
Slope	0.979354 (53.04545)	0.971266 (50.14534)	0.974643 (45.77073)	0.972391 (40.69567)	0.958824 (33.72392)	0.942180 (25.90335)	0.932320 (20.66952)
Test for slope=1	0.2644	0.1390	0.2346	0.2488	0.1486	0.1130	0.1346
Constant=0 & Slope=1	0.5224	0.1920	0.4503	0.4843	0.2020	0.1434	0.2210
Adjusted R-Square	0.901198	0.898742	0.898891	0.896014	0.877043	0.846530	0.827704
Durbin-Watson statistic	1.641852	1.688529	1.676012	1.640998	1.709345	1.851683	1.987857
Q(6)	0.049	0.210	0.152	0.054	0.150	0.536	0.935
Q(12)	0.053	0.159	0.079	0.032	0.077	0.239	0.350
Q(24)	0.130	0.192	0.199	0.216	0.330	0.444	0.575

Notes: HAC standard errors and covariance (Newey and West, 1987). In parenthesis are t-statistics. The separate and joint tests are Wald F-tests. Actual p-values for the tests are reported. Q(k) is the Ljung-Box Q-statistic for lag length k. Actual p-values for the Q-statistics are reported.

The slope is then constrained to be +1, and the resulting difference variable, between the payoffs and the future values of the call option premiums, is tested for stationarity and is regressed onto a constant. In all 7 cases the null of non-stationarity is rejected with actual p-values lower than 0.0001. And in all 7 cases the constant is statistically insignificant. The highest absolute t-statistic is 0.571. The residuals do not show any serial correlation as judged from the Ljung-Box Q-statistics (Table 5). Hence the orthogonality hypothesis is not rejected. This is further evidence that the model is well specified, and that the unbiasedness hypothesis holds extremely clearly for the British pound in the short and in the long run.

Table 5. Ordinary least squares (OLS) regressions on the constant (The dependent variables are the difference between the actual payoffs and the future values of the call option premiums. The volatility is estimated from Table 1. K is the strike price. The data are for the British pound)

	K=1.50	K=1.55	K=1.60	K=1.65	K=1.70	K=1.75	K=1.80
Dickey-Fuller test	-14.83620 [0.0000]	-15.24081 [0.0000]	-15.08571 [0.0000]	-14.81339 [0.0000]	-15.41078 [0.0000]	-11.89423 [0.0000]	-17.98823 [0.0000]
Constant	-0.000848 (0.273680)	-0.000158 (0.057516)	-0.001191 (0.480359)	-0.001175 (0.539470)	-0.000477 (0.254002)	-0.000556 (0.362045)	-0.000682 (0.571066)
Durbin-Watson statistic	1.667805	1.721841	1.706306	1.673864	1.754285	1.911358	2.062131
Q(6)	0.102	0.277	0.165	0.054	0.134	0.358	0.626
Q(12)	0.091	0.175	0.075	0.027	0.053	0.134	0.167
Q(24)	0.167	0.175	0.177	0.189	0.247	0.281	0.359

Notes: Actual p-values are in brackets. Absolute t-statistics are in parenthesis, computed with the HAC standard errors and covariance correction (Newey and West, 1987). Q(k) are the Ljung-Box Q-statistics for lag length k. Actual p-values for the Q-statistics are reported.

Table 6 presents the regression results for the British pound in the case of constant volatility. The adjusted R-Squares are again high for monthly data, and they range between 0.828 and 0.903. The slope estimates are

between 0.932 and 0.976. The null hypotheses that the slopes are equal to +1 fail to be rejected. The minimum actual p-value for these t-tests is 0.0844. Six constants out of seven are statistically insignificantly different from zero. For all seven strike prices the joint null hypotheses that the slope is +1 and the constant is zero fail to be rejected. The minimum actual p-value for this Wald F-test is 0.0840. The Ljung-Box Q-statistics do not find autocorrelation in the residuals. Therefore the unbiasedness model is strongly well supported, and the results are not sensitive to the assumption about the volatility.

Table 6. Ordinary least squares (OLS) regressions (The dependent variables are the actual payoffs. The independent variables are the future values of the call option premiums. The monthly volatility is set at 0.028703. K is the strike price. The data are for the British pound)

	K=1.50	K=1.55	K=1.60	K=1.65	K=1.70	K=1.75	K=1.80
Constant	0.006506 (2.119804)	0.003504 (1.460550)	0.000925 (0.463759)	0.000581 (0.341849)	0.001676 (1.180934)	0.001626 (1.435512)	0.000993 (1.136402)
Slope	0.968098 (52.52587)	0.971484 (49.49802)	0.975772 (45.39479)	0.973351 (40.57812)	0.959065 (33.70735)	0.942057 (25.88018)	0.932392 (20.65516)
Test for slope=1	0.0844	0.1472	0.2606	0.2674	0.1512	0.1124	0.1352
Constant=0 & Slope=1	0.0840	0.2122	0.5173	0.5289	0.2035	0.1321	0.2166
Adjusted R-Square	0.902690	0.899018	0.898857	0.896027	0.877380	0.846884	0.827964
Durbin-Watson statistic	1.690159	1.699236	1.679952	1.642903	1.712289	1.855810	1.985614
Q(6)	0.182	0.246	0.171	0.060	0.147	0.494	0.912
Q(12)	0.133	0.174	0.083	0.032	0.077	0.230	0.353
Q(24)	0.250	0.210	0.210	0.207	0.312	0.421	0.571

Notes: HAC standard errors and covariance (Newey and West, 1987). In parenthesis are t-statistics. All the tests are Wald F-tests. Actual p-values for the tests are reported. See the notes under Table 5 for further information.

Table 7. Ordinary least squares (OLS) regressions on the constant (The dependent variables are the difference between the actual payoffs and the future values of the call option premiums. The monthly volatility is set at 0.028703. K is the strike price. The data are for the British pound)

	K=1.50	K=1.55	K=1.60	K=1.65	K=1.70	K=1.75	K=1.80
Dickey-Fuller test	-15.30477 [0.0000]	-15.33321 [0.0000]	-15.11973 [0.0000]	-14.82964 [0.0000]	-15.43609 [0.0000]	-16.71616 [0.0000]	-17.96863 [0.0000]
Constant	0.001092 (0.378075)	-0.000195 (0.072090)	-0.001409 (0.571166)	-0.001297 (0.597479)	-0.000414 (0.222480)	-0.000460 (0.302616)	-0.000641 (0.538104)
Durbin-Watson statistic	1.726280	1.732721	1.709518	1.675174	1.757246	1.915686	2.058990
Q(6)	0.257	0.290	0.182	0.057	0.121	0.298	0.584
Q(12)	0.160	0.179	0.081	0.029	0.050	0.118	0.165
Q(24)	0.246	0.186	0.192	0.187	0.221	0.252	0.361

Notes: HAC standard errors and covariance (Newey and West, 1987). Actual p-values are in brackets. Absolute t-statistics are in parenthesis. Q(k) are the Ljung-Box Q-statistics for lag length k. Actual p-values for the Q-statistics are reported.

The slope is then constrained to be +1, and the resulting difference variable, between the actual payoffs and the future values of the Black-Scholes call option premiums, is tested for stationarity and is regressed onto a constant. In all 7 cases the null of non-stationarity is rejected at a cut-off marginal significance level lower than 0.0001. And in all 7 cases the constant is statistically insignificant. Again the residuals do not show any serial correlation (Table 7). This is further evidence that the model is well specified, that the unbiasedness hypothesis holds extremely well in the short and in the long run and that the assumption about the volatility is not crucial.

In Table 8 Dickey-Fuller unit root tests on the Swiss franc variables are reported. Contrary to the evidence for the

British pound, all these Swiss franc variables have unit roots. All the actual payoffs and all the future values of the call options need first-differencing to become stationary. The minimum p-value for the level variables is 0.271, which is higher than the usual cut-off marginal significance level of 10%. The p-values for the first-differenced variables are all lower than 0.0001. This is testimony to the observation that the three currencies under study have each a different statistical behavior and that the tests that are carried out are not redundant. Therefore the regressions of the actual pay-offs on the future values of the call option premiums should be considered as cointegration regressions and must be tested for the presence of cointegration.

Table 8. Augmented Dickey-Fuller unit root tests with a constant (The maximum lag is set to 5. The null hypothesis is a unit root. The data are for the Swiss franc. The variable volatility is retrieved from the GARCH model in Table 1. The suffix c denotes a constant volatility. The constant monthly volatility is set at 0.032646. Δ is the first-difference operator)

Variable	Test statistic	Actual one-sided p-value	Variable	Test statistic	Actual one-sided p-value	Variable	Test statistic	Actual one-sided p-value
Payoff(0.65)	-2.114740	0.5349	Call(0.65)	-2.118804	0.5326	Call(0.65)c	-2.118693	0.5327
Δ Payoff(0.65)	-16.93936	0.0000	Δ Call(0.65)	-16.89632	0.0000	Δ Call(0.65)c	-16.91174	0.0000
Payoff(0.70)	-2.199217	0.4877	Call(0.70)	-2.194232	0.4905	Call(0.70)c	-2.190579	0.4925
Δ Payoff(0.70)	-17.62994	0.0000	Δ Call(0.70)	-17.56284	0.0000	Δ Call(0.70)c	-17.55345	0.0000
Payoff(0.75)	-2.237133	0.4667	Call(0.75)	-2.240222	0.4649	Call(0.75)c	-2.236411	0.4671
Δ Payoff(0.75)	-18.36698	0.0000	Δ Call(0.75)	-18.34262	0.0000	Δ Call(0.75)c	-18.30717	0.0000
Payoff(0.80)	-2.251552	0.4587	Call(0.80)	-2.273830	0.4464	Call(0.80)c	-2.262090	0.4529
Δ Payoff(0.80)	-19.13002	0.0000	Δ Call(0.80)	-19.04268	0.0000	Δ Call(0.80)c	-18.97337	0.0000
Payoff(0.85)	-2.266804	0.4503	Call(0.85)	-2.280866	0.4426	Call(0.85)c	-2.264467	0.4516
Δ Payoff(0.85)	-18.77908	0.0000	Δ Call(0.85)	-18.67838	0.0000	Δ Call(0.85)c	-18.59153	0.0000
Payoff(0.90)	-2.242222	0.4639	Call(0.90)	-2.292791	0.4361	Call(0.90)c	-2.285949	0.4398
Δ Payoff(0.90)	-17.27104	0.0000	Δ Call(0.90)	-17.48243	0.0000	Δ Call(0.90)c	-17.45483	0.0000
Payoff(0.95)	-2.605446	0.2783	Call(0.95)	-2.621571	0.2710	Call(0.95)c	-2.615970	0.2735
Δ Payoff(0.95)	-9.283800	0.0000	Δ Call(0.95)	-9.435990	0.0000	Δ Call(0.95)c	-9.468061	0.0000

Table 9. Augmented Dickey-Fuller unit root tests with a constant (The maximum lag is set to 5. The null hypothesis is a unit root. The data are for the Japanese yen (in US cents per one yen). The variable volatility is retrieved from the GARCH model in Table 1. The suffix c denotes a constant volatility. The constant monthly volatility is set at 0.031424)

Variable	Test statistic	Actual one-sided p-value	Variable	Test statistic	Actual one-sided p-value	Variable	Test statistic	Actual one-sided p-value
Payoff(0.70)	-1.829678	0.6878	Call(0.70)	-1.704517	0.7470	Call(0.70)c	-1.705672	0.7465
Δ Payoff(0.70)	-16.61495	0.0000	Δ Call(0.70)	-16.51708	0.0000	Δ Call(0.70)c	-16.52258	0.0000
Payoff(0.75)	-1.746888	0.7277	Call(0.75)	-1.605603	0.7887	Call(0.75)c	-1.605060	0.7889
Δ Payoff(0.75)	-16.61151	0.0000	Δ Call(0.75)	-16.52247	0.0000	Δ Call(0.75)c	-16.52435	0.0000
Payoff(0.80)	-1.623244	0.7816	Call(0.80)	-1.444730	0.8457	Call(0.80)c	-1.442892	0.8463
Δ Payoff(0.80)	-16.49942	0.0000	Δ Call(0.80)	-16.39192	0.0000	Δ Call(0.80)c	-16.38834	0.0000
Payoff(0.85)	-1.440921	0.8469	Call(0.85)	-1.262893	0.8945	Call(0.85)c	-2.264467	0.4516
Δ Payoff(0.85)	-16.14398	0.0000	Δ Call(0.85)	-16.13649	0.0000	Δ Call(0.85)c	-18.59153	0.0000
Payoff(0.90)	-1.498711	0.8281	Call(0.90)	-1.219827	0.9039	Call(0.90)c	-2.285949	0.4398
Δ Payoff(0.90)	-16.39310	0.0000	Δ Call(0.90)	-16.14653	0.0000	Δ Call(0.90)c	-17.45483	0.0000
Payoff(0.95)	-1.459473	0.8411	Call(0.95)	-1.159049	0.9158	Call(0.95)c	-2.615970	0.2735
Δ Payoff(0.95)	-15.58521	0.0000	Δ Call(0.95)	-15.49606	0.0000	Δ Call(0.95)c	-9.468061	0.0000
Payoff(1.00)	-1.668801	0.7626	Call(1.00)	-1.285841	0.8892	Call(1.00)c	-1.283989	0.8896
Δ Payoff(1.00)	-15.07124	0.0000	Δ Call(1.00)	-15.37934	0.0000	Δ Call(1.00)c	-15.38840	0.0000

In Table 9 Dickey-Fuller unit root tests on the yen variables are reported. Contrary to the British pound, but similarly to the Swiss franc, all yen level variables need first-differencing to become stationary. Hence regressions of the actual payoffs on the future values of the call options must be considered cointegration

regressions and must be tested for the presence of cointegration.

In Table 10 OLS regressions of the basic model for the Swiss franc (Panel A) and the Japanese yen (Panel B) are carried out. Included are results when the volatilities are considered variable and when they are set to be constants, equal to the sample standard deviations. In all 28 cases and for each one of the Engle-Granger and the Phillips-Ouliaris residual tests for cointegration the null of no-cointegration is rejected at marginal significance levels less than 0.0001. For these two tests see Engle and Granger (1987), and Phillips and Ouliaris (1990). Hence, the evidence is strong for cointegration, and for long run relations. The adjusted R-squares are all high for monthly data and they range between 0.914 and 0.966. Hypothesis tests are implemented on the estimated coefficients. In all 28 cases the constants are statistically insignificantly different from zero, with a minimum p-value of 0.2945. In all 28 cases the slopes are statistically insignificantly different from +1, with a minimum p-value of 0.5730. And in all 28 cases the joint null hypotheses of a zero constant and a unitary positive slope fail to be rejected, with a minimum p-value of 0.5766. The results are not sensitive to the method by which volatility is measured. First-order serial correlations of the cointegration residuals are generally absent for all regressions, the lowest Durbin-Watson statistic being 1.759 and the highest being 2.208. However high-order serial correlations are statistically significant. The latter may prompt the researcher to doubt the validity of hypothesis testing. In fact there are two reasons that imply that hypothesis tests are still valid. The first one is because robust standard errors to the presence of residual autocorrelation and heteroscedasticity of unknown origins are calculated according to the adjustment formulated by Newey and West (1987). The second one is because residual serial correlations bias the standard errors downward. This means that the tests on the nulls of the hypotheses will reject these nulls more frequently than otherwise. Hence the evidence that the null hypotheses are not rejected despite serial correlation indicates even stronger confidence, and therefore more reliability, in these hypothesis tests.

In Hull (2012, p. 355) the lower bound on European currency options is stated, and this is:

$$C_t \geq \text{Max} \left[S_t e^{-rT} - K e^{-rT}, 0 \right] \quad (8)$$

A sample of the generated Black-Scholes currency call premiums is studied, and the constraint in equation (8) is tested. The sample contains options with different strike prices and with the two different measures of the volatility. It is found that this constraint is binding for the chosen sample. Therefore the empirical analysis in this paper is sound.

Table 10. Hypotheses tests on Ordinary least squares (OLS) regressions. (The dependent variables are the actual payoffs. The independent variables are the future values of the call option premiums. The actual p-values of the different tests are reported, except for the Durbin-Watson statistics. The first row is for the variables with variable volatility, and the second row is for the variables with constant volatility)

PANEL A. The independent variable is call(K) for the first row and call(K)c for the second row

The data are for the Swiss franc.

	K=0.65	K=0.70	K=0.75	K=0.80	K=0.85	K=0.90	K=0.95
Test for constant=0	0.4595	0.6675	0.5820	0.9508	0.5295	0.3018	0.4002
	0.4676	0.6836	0.5838	0.9759	0.5474	0.2945	0.4010
Test for slope=1	0.5829	0.6872	0.6655	0.7022	0.6422	0.6450	0.5730
	0.5869	0.6931	0.6664	0.7079	0.6492	0.6464	0.5763
Constant=0 & Slope=1	0.7601	0.8995	0.8517	0.9199	0.8002	0.5860	0.6787
	0.7675	0.9066	0.8529	0.9183	0.8134	0.5766	0.6802
Adjusted R-Square	0.963848	0.962107	0.957840	0.950727	0.942960	0.936991	0.914347
	0.963854	0.962139	0.957886	0.950769	0.943424	0.937203	0.914523
Engle-Granger tau test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0049	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000
Phillips-Ouliaris tau test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Durbin-Watson statistic	1.989820	2.062250	2.158063	2.208429	2.170596	2.038733	2.098854
	1.989066	2.058456	2.154692	2.202544	2.160819	2.036266	2.092535
Q(6)	0.262	0.125	0.012	0.001	0.000	0.005	0.000
Q(12)	0.301	0.129	0.004	0.000	0.000	0.000	0.000
Q(24)	0.321	0.080	0.000	0.000	0.000	0.000	0.000
	0.268	0.127	0.011	0.002	0.000	0.005	0.000
	0.302	0.132	0.004	0.000	0.000	0.000	0.000
	0.325	0.078	0.000	0.000	0.000	0.000	0.000

PANEL B. The independent variable is call(K) for the first row and call(K)c for the second row.

The data are for the Japanese yen

	K=0.70	K=0.75	K=0.80	K=0.85	K=0.90	K=0.95	K=1.00
Test for constant=0	0.7591	0.9234	0.8652	0.4382	0.7674	0.6207	0.5677
	0.7352	0.9126	0.8521	0.4097	0.7248	0.5787	0.5996
Test for slope=1	0.6067	0.6807	0.7628	0.9692	0.7707	0.8312	0.5993
	0.5911	0.6748	0.7685	0.9838	0.7805	0.8388	0.6026
Constant=0 & Slope=1	0.8661	0.8941	0.8953	0.7081	0.9105	0.8721	0.6863
	0.8587	0.8935	0.8924	0.6810	0.8963	0.8468	0.7104
Adjusted R-Square	0.964455	0.964826	0.965138	0.965658	0.961890	0.960182	0.950982
	0.964468	0.964857	0.965151	0.965643	0.961893	0.960149	0.950975
Engle-Granger tau test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Phillips-Ouliaris tau test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Durbin-Watson statistic	1.914053	1.908455	1.914090	1.863961	1.879674	1.783993	1.759274
	1.915411	1.909377	1.913749	1.863104	1.878226	1.782053	1.758635
Q(6)	0.117	0.144	0.166	0.039	0.045	0.015	0.001
Q(12)	0.004	0.010	0.023	0.005	0.012	0.015	0.000
Q(24)	0.017	0.013	0.029	0.002	0.001	0.001	0.000
	0.117	0.144	0.166	0.039	0.045	0.016	0.001
	0.004	0.010	0.022	0.005	0.012	0.015	0.000
	0.017	0.013	0.028	0.002	0.001	0.001	0.000

Table 11. Ordinary least squares (OLS) regressions on the constant (The dependent variables are the difference between the actual payoffs and the future values of the call option premiums. The first row is for the variables with variable volatility, and the second row is for the variables with constant volatility. The Dickey-Fuller tests are on the difference variables. K is the strike price. All cell entries are actual p-values, except for the Durbin-Watson statistic)

PANEL A. Swiss franc

	K=0.65	K=0.70	K=0.75	K=0.80	K=0.85	K=0.90	K=0.95
Dickey-Fuller test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Constant=0	0.8419	0.9652	0.9786	0.7069	0.9741	0.8293	0.9442
	0.8483	0.9549	0.9781	0.6948	0.9665	0.8201	0.9507
Durbin-Watson statistic	2.002840	2.074125	2.173457	2.226039	2.194925	2.066886	2.141276
	2.001978	2.070109	2.169998	2.219728	2.184452	2.064179	2.134507
Q(6)	0.250	0.119	0.010	0.002	0.000	0.004	0.000
Q(12)	0.260	0.104	0.002	0.000	0.000	0.000	0.000
Q(24)	0.301	0.068	0.000	0.000	0.000	0.000	0.000
	0.256	0.122	0.010	0.002	0.000	0.003	0.000
	0.262	0.107	0.002	0.000	0.000	0.000	0.000
	0.306	0.067	0.000	0.000	0.000	0.000	0.000

PANEL B. Japanese yen

	K=0.70	K=0.75	K=0.80	K=0.85	K=0.90	K=0.95	K=1.00
Dickey-Fuller test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Constant=0	0.7942	0.7207	0.6440	0.4665	0.6621	0.6236	0.9594
	0.8061	0.7264	0.6369	0.4480	0.6381	0.5974	0.9821
Durbin-Watson statistic	1.923833	1.916455	1.920246	1.864884	1.886644	1.789729	1.773335
	1.925514	1.917504	1.919763	1.863593	1.884916	1.787544	1.772585
Q(6)	0.104	0.131	0.156	0.039	0.038	0.013	0.000
Q(12)	0.005	0.012	0.026	0.005	0.013	0.015	0.000
Q(24)	0.020	0.015	0.032	0.002	0.001	0.001	0.000
	0.104	0.130	0.156	0.039	0.039	0.014	0.000
	0.005	0.012	0.025	0.005	0.013	0.015	0.000
	0.020	0.015	0.031	0.002	0.001	0.001	0.000

In Table 11, as in Table 7, the theoretical constraint that the slope is exactly +1 is imposed. The Dickey-Fuller unit root tests on the ensuing difference variables are applied. In all 28 cases the tests reject the null of non-stationarity at marginal significance levels lower than 0.0001. It can be concluded that assuming a slope equal to +1 provides evidence that the cointegration coefficients are indeed +1. Then these difference variables are regressed on a constant. The null hypotheses that each of the 28 constants is statistically insignificantly

different from zero fail to be rejected. This supports the evidence on long run unbiasedness. First-order serial correlation of the residuals is generally absent, the lowest Durbin-Watson statistic being 1.773, and the highest being 2.220. However higher-order serial correlation is significant in most cases. This mirrors the results obtained by the unconstrained regressions in Table 10.

4. Conclusion

In this paper, the unbiasedness hypothesis is tested for Black-Scholes currency call option premiums. Three currencies are tested, each with seven different strike prices. Unbiasedness implies that the future value of a call option premium is an unbiased predictor of the future actual option payoff. Unbiasedness is supported if the regression constants are statistically insignificant, if the regression slopes are statistically insignificantly different from 1, and if there is no serial correlation in the regression residuals, meaning that there is orthogonality in the residuals. The results are strongly supportive for this version of currency option market efficiency in the case of the British pound. The results remain also strongly supportive when the theoretical constraints are imposed. As for the other two currencies, the Swiss franc and the Japanese yen, the null hypotheses of no-cointegration are rejected and hence a long run relation is well supported. Cointegration is a weaker condition for unbiasedness because it is a characteristic of only a long run relation. However, the theoretical constraints in the cointegration regressions hold also for these two currencies, although orthogonality of the residuals is naturally rejected. In addition, the results are not materially different with alternative measures of currency volatility. As a conclusion the Black-Scholes option pricing model is still robust, practical, useful, appropriate, and relevant.

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Post-M&A Operating Performance of Indian Acquiring Firms: A Du Pont Analysis

Neelam Rani¹, Surendra S. Yadav¹ & P. K. Jain¹

¹ Department of Management Studies, Indian Institute of Technology Delhi, New Delhi, India

Correspondence: Neelam Rani, Department of Management Studies, Indian Institute of Technology Delhi, Vishwakarma Bhawan, Shaheed Jit Singh Marg, Hauz Khas, New Delhi, 110016, India. E-mail: neelam.iitd@gmail.com

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Abstract

This paper investigates the impact of mergers and acquisitions (M&A) on corporate performance. It compares performance of the corporates involved in M&A before and after M&A. The results pertaining to operating cash flow ratios show that there is an improvement in performance of the acquiring firms in the post-M&A period. The analysis in terms of Du Pont shows improvement in the long-term operating profit margin of the acquiring firms. This indicates that the acquiring firms earn higher profits per unit net sales after M&A. The higher cash flows are generated primarily due to the better operating margins.

Keywords: merger & acquisition, operating performance, synergy, assets turnover

1. Introduction

Mergers and acquisitions (M&A) as growth strategy have received attention from developed as well as emerging economies. Globalization and liberalization have led firms from emerging markets like India to become more aggressive and opt for M&A to fight the competitive battle.

M&A are one of the mechanisms by which firms gain access to new resources; via resource redeployment, they increase revenues and reduce cost. But, does the financial performance of the acquiring firm (in long-term) really improve following mergers and acquisitions? The present paper intends to measure the impact of M&A on long-term performance of the acquiring firms. It investigates profitability as well as operating performance. This paper addresses the major question related to the long-term performance of the acquiring firm. This study uses long-term financial data before and after merger and acquisition to determine firm operating performance of acquiring firms. A sufficiently long period is required to understand and analyze the impact of a merger and acquisition since efficiency improves over a long time horizon. Hence, operating performance of Indian acquirers for ten years period-five years prior to and subsequent to the merger and acquisition has been observed.

For better exposition, the remainder of the paper has been organized in four sections. Section 2 reviews select relevant existing empirical works on the subject. Section 3 delineates sources of data and research methodology; it also describes the variables and empirical method used in analysis of pre-merger and post-merger corporate performance; section 4 documents the empirical findings. Finally, section 5 provides summary and discusses concluding observations and implications.

2. Literature Review

There has been an ongoing debate on short-term as well as long-term performance of M&A. Voluminous literature exists to support the debate on whether mergers create value or are wealth reducing events. Empirical work on the issue has adopted two major approaches; share price analysis and accounting measure analysis to investigate the issues related to mergers profitability. Extant literature based on share price analysis use event studies to investigate the short-term returns to shareholders during the period surrounding announcement of merger deals. These studies have not been able to investigate the long-term economic gains of mergers. Studies analyzing accounting measures examined the financial results reported by corporate to assess post-merger performance.

These studies have focused on the comparative analysis of accounting statements of the acquirers before and after M&A to observe how they affect the financial performance. The present section briefly describes the survey

of relevant studies in this context.

Healy et al. (1992) investigated the 50 largest US acquisitions during the period January 1979 to June 1984. They have analyzed the post-merger operating performance of the combined firm using industry median as benchmark. They have observed that operating performance improves significantly after merger. The study has been criticized for using industry median firms as benchmark.

Switzer (1996) has extended the Healy et al. (1992) study to analyse the operating performance of a larger sample of 327 merged firms during a larger period 1967-1987 in US. She has criticized Healy et al. (1992) for analyzing the large 50 mergers and dealing with the time period categorized as “merger mania”. She has also documented the improved post-merger operating efficiency for a substantially large sample and involving larger period. She has also observed positive association between abnormal return surrounding the announcement and the long-term performance of the merged firms. Manson et al. (2000) further investigated a sample of 44 takeovers in UK during 1985-1987 by using the similar cash flow variables and methodology used by Healy et al. (1992). They have observed significant operating as well as non-operating gains resulting from takeovers in UK.

Ramaswamy and Waegelein (2003) have examined the financial performance of the target and acquiring firms over 5 years post-merger period using a sample of 162 US firms during the period 1975-1990. The study has also followed Healy et al. (1992) measure of performance (industry adjusted cash flow returns on market value of assets). They have also observed a significant improvement in post-merger financial performance. Parrino and Harris (1999) examined operating performance of 197 mergers during 1982-1987. They observed a significant increase of 2.1 per cent in acquirers operating cash flow return post-merger. The study defined the cash flow return as operating cash flow divided by market value of assets. Rahman and Limmack (2004) have investigated operating performance of industry-matched control sample of 94 listed and 113 private Malaysian companies during 1988-1992. Their findings reveal that post-merger operating performance improved to the extent of 3.75 per cent per year.

Ravenscraft and Scherer (1989) examined financial performance of target firms during 1957-1977 in US. They have investigated 2732 lines of business by US manufacturing companies. They have observed that mergers have substantial negative impact on the post-merger profitability. They have concluded that mergers destroy value in respect of profitability.

Ghosh (2001) has investigated performance of 315 US mergers completed during the period 1981-1995. He has used control firms as benchmark instead industry median firms unlike Healy et al. (1992). He has selected the control firms matched on performance and total asset size from pre-merger years to use as benchmark. The study also replicated the methodology used by Healy et al. (1992). He has observed that operating performance does not improve if the firms matched on performance and size is used as benchmark.

Sharma and Ho (2002) also replicated the methodology used by Healy et al. (1992). They have used a sample of 36 manufacturing firms during 1986-1991 in Australia to investigate the improvement in post-acquisition operating efficiency. They have used matched sample based on assets size and industry to control for industry and economic factors. They have not observed significant improvement in post-acquisition operating performance.

Yeh and Hoshino (2000) investigated the impact of mergers and acquisitions on both the acquiring firms' stock prices and financial performance by using a sample of 20 Taiwanese corporations during 1987-1992. They have examined accounting measures of profitability, financial health and growth of the acquirers. They have observed that the stock market reacts positively to the announcements of mergers and acquisitions, but profitability shows a downward change from pre-merger to post-merger periods. Unlike previous studies, they have not observed any significant correlation between stock returns and the change in accounting performance.

Gugler et al. (2003) have analyzed the effects of mergers around the world by using a large panel of data over the past 15 years. They have examined effects of the mergers by comparing the performance of profitability and sales of the merging firms with control groups of non-merging firms. Their findings show that mergers result in significant increases in profits but reduce the sales of the merging firms. They have observed similar post-merger patterns across countries. They have not traced differences between mergers in the manufacturing and the service sectors, and between domestic and cross-border mergers. The study also reports that conglomerate mergers decrease sales more than horizontal mergers.

Ghosh and Jain (2000) investigated whether merging firms increase their financial leverage after mergers on the basis of a sample of 239 mergers during 1978 and 1987 in US. Their results show that the mean financial leverage increases by 17 per cent compared to the pre-merger financial leverage of the combined firms.

Studies of mergers in India are very few. Moreover, these empirical investigations have focused on comparing pre-merger and post-merger performance on case to case basis.

Pawaskar (2001) has conducted an investigation in India by using the methodology developed by Cosh et al. (1998) and Mueller (1986) to analyze the pre-and post-merger operating performance of acquiring firm. Pawaskar has also identified the sources of merger induced changes by using a sample of 36 mergers during 1992-1995. He has observed that corporate performance has not improved significantly post-merger. The study has certain limitations due to control group used and the small size of the sample. Ramakrishnan (2008) studied a sample of 87 domestic mergers of Indian companies during the period 1996-2002 to study the long-term performance of merged companies. The study reports improvement in the operating performance accounting measures.

In an empirical survey of 152 companies, Rani et al. (2010) have observed that the primary motive of mergers in India during 2003-2008 has been to take advantage of synergies. Operating economies, increased market share and financial economies have been indicated in order of importance as the desired synergies to be gained through corporate merger in India.

In a review paper, Bruner (2002) reported that out of fifteen studies he reviewed on acquiring firms' financial performance post-merger and acquisition, four studies reported negative performance post-acquisition and three studies reported significantly positive performance, eight studies reported non-significant change.

Mueller (1980) noticed no consistent pattern of either improved or deteriorated profitability in review of collection of studies across seven nations (Belgium, German, France, Netherlands, Sweden, UK and US).

It is evident from the findings of various studies that empirical research on post-merger long-term performance throughout world has not converged to a conclusion whether mergers are wealth enhancing or value destroying. In the present study, an attempt has been made to examine post-merger performance by utilizing operating measures. The study focuses on analysis of changes in operating performance. The change is examined by comparing operating performance before and after merger. The study contributes to the existing literature by comparing operating performance of acquirers before and after M&A using operating cash flow ratios for a substantially large sample.

3. Methodology, Data and Scope of the Study

The methodology aims at examining whether the financial performance of the acquiring firm really improves following mergers and acquisitions. The secondary sources of data have been used for the present study. The major sources are Capitaline, Prowess database of Center for Monitoring Indian Economy (CMIE), websites of National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). The study is performed on the database that includes the ten year data of the acquiring company.

The sample for this study consists of acquiring companies involved in merger and acquisitions during January 2003 to December 2008. The initial announcements of merger and acquisition by public-listed Indian acquirer companies have been identified from Centre for Monitoring Indian Economy (CMIE) database Prowess. Mergers and acquisitions made by financial companies, withdrawn and denial of news of deal subsequently, mergers not approved by Government, formation and exit from joint ventures, acquisitions of business, assets, divisions and brands, acquisitions of less than controlling stake have been excluded from the sample. Information regarding completion of merger has been obtained from websites of BSE, NSE and annual reports of the companies. These exclusions left us with a sample of 383 mergers and acquisitions. The study is limited to performance of acquiring firms only.

The final sample consists of 383 mergers and acquisitions. Table 1 describes the distribution of sample across years. It is evident from the Table that the maximum 38 per cent of mergers and acquisitions took place in year 2007. Extreme values have been excluded from the data to do away with the influence of outliers. After analyzing data for outliers, the values beyond three standard deviations have been dropped from the analysis. Only those firms have been retained in analysis for which data is available in pairs of prior and after one year of M&A (-1, 1), one year before and two year mean after M&A (-1, 2), one year before and three year mean after M&A (-1, 3), one year before and four year mean after M&A (-1, 4), one year before and five year mean after M&A (-1, 5), two years of M&A (2, 2), three years of M&A (-3, 3), four years of M&A (-4, 4) and five years of M&A (-5, 5).

Due to these inconsistency, the number of firms utilized for long-term analysis of financial performance (ratio analysis) varied: 305 firms for one year before and after M&A, 295 firms for one year before and two year mean after M&A (-1, 2), 260 firms for one year before and three year mean after M&A (-1, 3), 230 firms for one year

before and four year mean after M&A (-1, 4), 133 firms for one year before and five year mean after M&A (-1, 5), the mean of two years before and after M&A (-2, 2) of 285 firms, the mean of three years before and after M&A (-3, 3) of 259 firms, the mean of four years before and after M&A (-4, 4) of 214 firms, the mean of five years before and after M&A(-5, 5) of 124 firms have been analyzed. The final sample consists of 63.3 percent firms in manufacturing sector, 31.15 firms in services sector, 4.92 per cent in construction and real estate, 1.3 per cent in mining, electricity and diversified sector.

Table 1. Distribution of sample across years, 2003-2008

Year	Number of merger and acquisition studied	Number of merger and acquisition analyzed
2003	23 (6%)	19 (6.2%)
2004	21(5.4%)	17(5.6%)
2005	37(9.6%)	30(9.8%)
2006	87(22.7%)	77(25.2%)
2007	144(37.6%)	112 (36.7%)
2008	71(18.4%)	50(16.4%)
Total	383(100%)	305(100%)

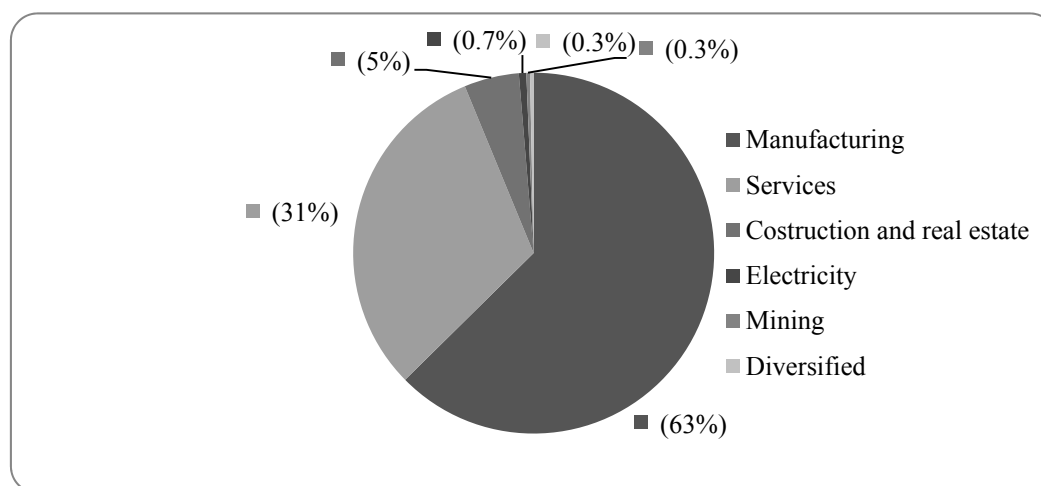


Figure 1. Sector-wise distribution of sample

The present work uses the long-term financial data of five years prior to and subsequent to M&A to investigate the long-term performance. The operating performance of the companies for ten years, five years before and five years after M&A has been reported. Pre-merger (period -5 to -1) and post-merger (period 1 to 5) performance has been calculated for the acquiring company. The year of merger and acquisition (Year 0) has been excluded from the analysis as its inclusion may cause distortions due to change in financial reporting caused because of adjustments in accounting. In order to provide a holistic view of the long-term performance of mergers and acquisitions, operating cash flow ratios have been investigated in the study.

The study measures and compares the pre-and post merger and acquisition financial performance of acquiring companies in terms of operating cash flows. The improvement in profitability in post-M&A period can arise from various sources such as better operating margins, higher assets productivity, reduced costs or enhanced market power etc. Cash flow measures capture the actual economic gains from assets. Pre-tax operating cash flows scaled by sales as well as assets are used to measure the change in performance measures.

$$OCFR_A = \frac{\text{Profit before interest and taxes-nonoperating income+depreciati on+amortisati on}}{\text{Average of (total assets-preliminer yexpenses-fictitious assets-miscell expenses)}} \quad (1)$$

Operating cash flow ratio based on sales OCFR_S has also been calculated:

$$OCFR_S = \frac{\text{Profit before interest and taxes-nonoperating income+depreciati on+amortisati on}}{\text{Net sales}} \quad (2)$$

Total assets turnover indicates the efficiency with which the firm uses its assets to generate sales. This measure is probably of the greatest interest to management because it indicates whether firm's operations have been financially efficient (Gitman, 2009, p. 82) Accordingly, total assets turnover ratio (TATR) has been computed by dividing net sales to average total assets. Total assets have been used net of preliminary expenses, fictitious assets and miscellaneous expenses.

Total assets turnover ratio (TATR) has been computed by dividing net sales to average total assets. Total assets have been used net of preliminary expenses, fictitious assets and miscellaneous expenses.

$$TATR = \frac{\text{Net sales}}{\text{Average of (total assets-preliminer yexpenses-fictitious assets-miscell expenses)}} \quad (3)$$

To determine the significant difference over pre-and post-merger and acquisition, two-sample paired t- test has been conducted for each measure used in the study. The null hypothesis for each test is that the mean level for the post-merger and acquisition period is not significantly different from the mean from pre-merger and acquisition period. A positive t-value indicates a higher mean value for post-merger and acquisition period and vice-versa. The empirical evidence presented in the paper validates the hypothesis that Indian acquirers have performed better after M&A, compared to their performance in pre-M&A period. The findings indicate that M&A seem to have been beneficial for the acquiring companies in the long-run with regard to their operating performance. The results suggest that profitability of acquiring firms has improved during post-M&A phase. Mergers and acquisitions have resulted to better and improved performance.

4. Empirical Results

The objective of the present paper is to compare the operating performance of acquirers before and after M&A in terms of sales as well as assets. It is hypothesized that acquirers have posted better post-M&A financial performance vis-à-vis pre-M&A performance.

The paired samples t-test for comparison of means provides a test-statistics of 2.72 ($p=0.007 < 0.01$) for OCFRS for one year difference (Table 2). The mean difference is positive for all the pairs. These results validate the hypothesis that M&A in India have resulted in improved long-term operating performance. The paired test is also carried out for operating cash flow ratio based on assets. OCFR based on assets reveal that in comparison to one year before the acquirers are able to generate higher operating cash flows five years post-M&A (-1, +5). The performance of acquiring firms appear to have improved significantly in fifth year after M&A as indicated by t-statistics of 2.45 ($p=0.02 < 0.05$). The improvement seems to be higher as the years progress subsequent to the event of M&A. The change in post-M&A performance in each of the four and five year are not significant.

4.1. Analysis of Sources of Performance

The improvement in the period, following M&A can arise from various sources such as better operating margins, greater assets productivity, lower labor costs or higher volume or higher sales etc. In order to ascertain the sources of the better long-term returns subsequent to M&A, the measure of operating performance has been decomposed into its constituents in terms of Du Pont analysis. Du Pont analysis indicates that the profitability is improved either by improving profit margin per rupees of sales or by generating more sales revenue per rupee of investment. The operating cash flow ratio (OCFR_A), based on assets, can be decomposed into operating cash flow based on sales and total assets turnover ratio.

Table 2. Paired sample t-test of operating cash flow ratios before and after M&A

Paired sample (before, after)	Mean ratio after-M&A	Mean ratio before -M&A	Mean difference	Positive: Negative	T-Value	Degree of freedom	Significance
Operating cash flow ratio based on sales (OCFR _S)							
(-1, +1)	20.1	18.9	1.2	190:115	2.72**	304	0.007
(-1,+2)	25.3	19.4	5.9	167:128	1.25	294	0.21
(-1, +3)	16.5	14.8	1.7	150:112	0.027	261	0.93
(-1, +4)	19.6	15.1	4.5	140:90	1.41	229	0.15
(-1, +5)	18.1	17.1	1	85:40	1.14	132	0.26
(-2,+2)	19.2	18.7	0.5	170:115	1.62	284	0.11
(-3, +3)	19.6	16.1	3.5	160:198	1.25	258	0.21
(-4, +4)	19.7	19.1	0.6	134:80	0.237	213	0.81
(-5, +5)	17.8	16.6	1.2	71:53	0.971	123	0.33
Operating cash flow ratio based on assets (OCFR _A)							
(-1, +1)	15.7	15.5	0.2	162:143	0.85	304	0.4
(-1,+2)	14.9	14.3	0.6	127:168	1.01	294	0.28
(-1, +3)	14	13.7	0.3	139:123	0.6	261	0.56
(-1, +4)	14.1	13.6	0.5	124:106	0.883	229	0.38
(-1, +5)	15.3	14.2	1.1	67:66	2.45*	132	0.02
(-2,+2)	14.5	14.8	-0.3	128:157	-0.605	284	0.55
(-3, +3)	14.2	14.4	-0.2	126:132	-0.42	258	0.68
(-4, +4)	13.9	13.8	0.1	109:104	0.149	213	0.88
(-5, +5)	14	13.9	0.1	65:58	0.188	123	0.85

* and ** Denote significance at 5 per cent and 1 per cent, respectively.

The operating cash flow ratio based on assets (OCFR_A) calculated as operating cash flow (OCF) divided by average total assets equation (4). OCFR_A may be decomposed into the operating cash flow based on sales (OCFR_S) equation (5) and the total assets turnover ratio as per equation (6):

$$OCFR_A = \frac{\text{Profit before interest and taxes-nonoperating income+depreciati on+amortisati on}}{\text{Average total assets}} \quad (4)$$

Or

$$OCFR_A = \frac{\text{Profit before interest and taxes-nonoperating income+depreciati on+amortisati on}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Average total assets}} \quad (5)$$

Where

$$\frac{\text{Profit before interest and taxes-nonoperating income+depreciati on+amortisati on}}{\text{Net sales}} = \text{Operating cash flow ratio based on sales (OCFR}_S) \quad (4)$$

And

$$\frac{\text{Net sales}}{\text{Average total assets}} = \text{total assets turnover ratio (TATR)} \quad (5)$$

In Du Pont terms:

$$OCFR_A = OCFR_S \times TATR \quad (6)$$

Table 3. Paired sample T-test of constituent ratios in terms of Du Pont before and after M&A

Paired sample (before, after)	Mean ratio after-M&A	Mean ratio before -M&A	Mean difference	Positive: Negative	T-Value	Degree of freedom	Significance
Operating cash flow ratio based on sales (OCFR _S)							
(-1,+1)	20.1	18.9	1.2	190:115	2.72**	304	0.007
(-1,+2)	25.3	19.4	5.9	167:128	1.25	294	0.21
(-1,+3)	16.5	14.8	1.7	150:112	0.027	261	0.93
(-1,+4)	19.6	15.1	4.5	140:90	1.41	229	0.15
(-1,+5)	18.1	17.1	1	85:40	1.14	132	0.26
(-2,+2)	19.2	18.7	0.5	170:115	1.62	284	0.11
(-3,+3)	19.6	16.1	3.5	160:198	1.25	258	0.21
(-4,+4)	19.7	19.1	0.6	134:80	0.237	213	0.81
(-5,+5)	17.8	16.6	1.2	71:53	0.971	123	0.33
Operating cash flow ratio based on assets (OCFR _A)							
(-1,+1)	15.7	15.5	0.2	162:143	0.85	304	0.4
(-1,+2)	14.9	14.3	0.6	127:168	1.01	294	0.28
(-1,+3)	14	13.7	0.3	139:123	0.6	261	0.56
(-1,+4)	14.1	13.6	0.5	124:106	0.883	229	0.38
(-1,+5)	15.3	14.2	1.1	67:66	2.45*	132	0.02
(-2,+2)	14.5	14.8	-0.3	128:157	-0.605	284	0.55
(-3,+3)	14.2	14.4	-0.2	126:132	-0.42	258	0.68
(-4,+4)	13.9	13.8	0.1	109:104	0.149	213	0.88
(-5,+5)	14	13.9	0.1	65:58	0.188	123	0.85
Total assets turnover ratio							
(-1,+1)	0.94	0.96	-0.02	141:164	-1.06	304	0.29
(-1,+2)	0.92	0.98	-0.06	173:122	-2.63**	294	0.009
(-1,+3)	0.89	0.96	-0.07	168:94	-2.86**	261	0.005
(-1,+4)	0.89	0.95	-0.56	101:129	-2.13*	229	0.03
(-1,+5)	0.96	1.08	-0.13	51:81	-2.78**	132	0.006
(-2,+2)	0.92	0.97	-0.05	114:171	-1.86	284	0.07
(-3,+3)	0.90	0.94	-0.04	105:154	-1.76	258	0.079
(-4,+4)	0.89	0.91	-0.02	92:122	-0.941	213	0.348
(-5,+5)	0.93	0.96	-0.03	59:65	-1.09	123	0.066

* and ** Denote significance at 5 per cent and 1 per cent, respectively.

The operating cash flow based on sales indicates the operating cash flow obtained through each unit of sales. Total assets turnover depicts the efficiency with which the firm uses its assets to generate sales. The relevant data contained in Table 3 shows that the operating profit margin based on sales have improved post-M&A. As we have divided the operating profit of the acquirer with the net sales of the acquirer, the positive and significant changes in operating cash flow after M&A reveals that the acquirer seems to have produced higher operating profit per unit net sales after M&A. The better operating margin appears to be due to the lower of costs as a result of economies of scale. Negative T-values identified by paired sample t-test on expense ratio also corroborates this finding. Further, the evidence of increase in the operating profit margin based also supports these results.

The assets utilization efficiency to produce higher sales does not appear to have improved as revealed by total assets turnover ratio during post-M&A period. It cannot be inferred that total assets turnover of acquiring firms after the M&A is significantly different from their total assets turnover before M&A. On the basis of these results, it may not be concluded that M&A have led to higher total assets turnover. These results depict that it is unlikely that acquirer firms have produced higher incremental sales by improving their assets utilization efficiency.

5. Concluding Observations

The present paper aims at analyzing the operating performance of corporates involved in M&A in India. The major hypothesis is that acquiring firms have improved post-M&A operating performance. The empirical evidence validates the hypothesis that Indian acquirers have performed better after M&A, compared to their performance in pre-M&A period.

The study indicates that M&A appear to have been beneficial for the acquiring companies in the long-run with regard to their operating performance. The findings suggest that profitability of acquiring firms has improved during post-M&A phase. Mergers and acquisitions have resulted to better and improved performance.

However, mergers and acquisitions have not resulted improvement in assets turnover ratios, as initially there might not be increase in sales and any consequently, further improvement in combined capacity utilization may not be possible. Therefore, assets turnover ratio improves slowly. It appears that global recessionary conditions in the year 2008 resulted in low assets turnovers of acquiring firms.

Further, the disaggregated analysis of the measure of operating cash flows into its two constituents in terms of Du Pont (operating cash flow ratio based on sales and total assets turnover based on sales) reveal that the long-term operating cash flow ratio based on sales of the acquiring firms have improved. The Du Pont analysis in terms of its components provides insights into sources of the economic performance. The analysis indicates that net sales have resulted higher per unit profit of the acquiring firms after the M&A.

The better margins have led to higher operating cash flows. This may be due to the reduced cost, economies of scale and operating synergies obtained by the acquired firms' larger size after M&A. Further, the evidence of significant increase in the operating cash flow also supports these results.

However, assets turnover of the acquiring firms does not seem to have improved, after M&A (also revealed by paired samples t-test); assets invested have not generated higher sales after M&A. In operational terms, the efficiency/utilization of assets does not get manifested in generating higher net sales after M&A. In operational terms, the efficiency in assets utilization does not increase and result into higher net sales after M&A. That may be, partly, due to recessionary conditions in global economy after 2008. The implications of the present paper for acquiring firms is that economic benefits may be realized due to cost synergies and economies of scale (reduced cost leading to better profit margins) when it is difficult to realize revenue synergies in recessionary conditions.

On the basis of Do Pont analysis, it may be concluded that acquiring firms in India appear to have performed better after M&A in comparison to their performance before M&A, primarily due to reduced cost, economies of scale and operational synergies.

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A Review of Human Resource Accounting and Organizational Performance

Jacob Cherian¹ & Sherine Farouq²

¹ Department of Management, College of Business Administration, Abu Dhabi University, Abu Dhabi, UAE

² Department of Accounting, College of Business Administration, Abu Dhabi University, Abu Dhabi, UAE

Correspondence: Jacob Cherian, Department of Management, College of Business Administration, Abu Dhabi University, Abu Dhabi, UAE. E-mail: jacob.cherian@adu.ac.ae

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Abstract

Human Resources are important assets of an organization. However, there is no legal regulation for accounting human resources in any of the organization's annual report. The main aim of this review is to study the benefits of HR practices to the firm. This review highlights the theoretical definitions for HRA and challenges faced during implementation of HRA measurement models to predict the organization's performance. The Human Resource Accounting is defined as "the process of identifying and measuring data related to human resource and communicating this information to interested parties" (American Accounting Association's Committee on Human Resource Accounting 1973). However, several challenges are faced by organizations during the execution of HRA. Since disclosures on human assets act as an evidence for wealth creation, it is resisted by several entrepreneurs. Human Resource Accounting helps to calculate the human resource capital, worth of management development, and enhances the value of management accounting.

Keywords: human resource accounting (HRA), intangible assets, human assets, employees, performance measurement

1. Introduction

A group shares a paradigm, shares examples and they share symbolic generalizations when they collectively rely on specific models as suggested by Thomas Kuhn (1996, p.182-4). In accordance to this definition, researcher who advocated the human resources accounting has certainly created a paradigm. Today, HR practitioners agree and realized that the employees are valuable assets and are considered more important than the intangible and physical assets of the organizations. Further, HR people generally agree that assets measured in terms of physical value should be reported in the financial statements of the organizations but not recommended for the organizational human assets reporting. However, due to shift and change in the paradigms it has become a part of the intellectual capital domain to be reported in the accounting statements with the notion that accounting for the value of HR, change the relationship of the organizations (Kuhn, 1962).

In the past decade, there are several studies on human resource accounting (HRA) that focused on wide and diverse range of research concerns. For an instance, researchers have linked a HRA measures with firm or organizational performance (Afiouni, 2007; van der Zahn et al., 2007; Johansson, 2007; Martin-de-Castro et al., 2006; Youndt & Snell, 2004; Roos et al., 2004; Perez & Ordonez de Pablos, 2003). Few others have focused on the valuation or measurement of HRA (Carrell, 2007; Catusus & Grojer, 2006; Burr & Girardi, 2002; Bontis et al., 1999; Boudreau & Ramstad, 1997) while some addressed the issues of regulations, standards or reporting of HRA (Cuganesan, 2007; Bozzolan et al., 2006; Catusus & Grojer, 2006; Roslender et al., 2006). Although several articles have been debated the importance of accounting HR in the organizational performance but still research are not conclusive that HR assets are important in creating value of organizations.

This paper identifies and discusses the different perceptions of HRA. The primary objective of this review is to understand whether accounting HR practices creates value to the firm? In order to answer the question framed, the review will identify the conceptual definitions of HRA from financial accounting perspective by examining the difference in ontological foundations of accounting and HRM's scientific discipline; and basic difference between corporate management and human resource as well as the value of the employee contribution to

corporate performance. Further the challenges faced in studies on predicting organizational performance from HRA measurement models is debated. Finally, the review concludes with remarks on how the present work can be built upon for future research.

2. Accounting for Human Resources: An Introduction

According to the American Accounting Association's Committee on Human Resource Accounting (1973), Human Resource Accounting is nothing but "the process of identifying and measuring data related to human resource and communicating this information to interested parties". From this definition, we could recognize that HRA is not only involved in the measurement of data related to placement, training and development of employees but also involved in the evaluation of financial condition of people in an organization. This has been supported by Flamholtz (1971) who defined HRA as "the measurement and reporting of the economic value of people in organizational resource. "Overall, the HRA can be defined as the process of identifying and measuring data related to human resource for the development and enhancement of economic value of interested parties associated with corresponding organization.

Human Resource is one of the biggest assets of an organization. Unfortunately, there's no legal regulation in any of the organization annual report. Sometimes, the HR value might increase beyond the tangible assets value of organization but conventional accounting method does not facilitate recording and recognizing the HR values. For example, the announcement of Bill Gates retirement from the Microsoft Corporation drastically reduced the share price of the company. But, firm's conventional accounting method suggests no such impact on the financial aspect of the company while in reality the situation is completely different from what is claimed. The primary function of Human Resource Accounting (HRA) is to manage organizational expenditures which provide future benefits for the development of organization. Here the expenditure related to human resource are recorded as assets on the balance sheet contrary to the older system of accounting where these costs are considered expenses that reduce net profit of an organization. In addition, HRA process of measurement has a role to play in any decision making process related of the organization. Though the history of HRA can be traced back to USA, its contribution for the growth of HRA has come from various other countries.

According to scholars and HRA experts, the HR valuation is unsuccessful. This is because, they consider that treating people as assets is incorrect (Mayo, 2004). To execute proper HRA practice, the proponents must aware of two important aspects. First of all, they have to be clear about how their explanation works and also demonstrate how it fix's with other works and accepted theories. For example, their demonstration should answer this simple query "How would a human asset concept fit and work with the other current business concepts? "Subsequently, the proponents should explain how to measure the concept of their theory. These aspects are very basic and important scholarly requirement as for instance, if the asset value could not be measured properly then it is unfeasible to exhibit the value affects of assets.

In general, accounting and finance managers do not agree with the HR evaluation proposals. As a result, HRA asset supporters have failed in terms of implementing HR practices. The main reason for their objection is that the proposed HR accounting practice is extremely varied from the known HR evaluation techniques and thus it is difficult to show that employees meet two tests of an asset. Assets should produce a future income for accountants and can be controlled by organization. But, in the case of human resources, the actual or marginal flow of income has attributed to an inaccurately measured HR values which could not be accepted by accountants and other finance managers. Moreover, the HR assets could not be owned or sold by organization and thus it would differ from other class of assets. Similarly, the widespread perception on knowledge economy has developed the intellectual property concept to include intellectual capital as one of the important assets for the reporting purpose of firms (Guthrie, 2001; Mouritsen et al., 2004; Roslender 2009). This has been supported by Flamholtz et al. (2003) who noted that intellectual capital in the enrolment of investment capital statement is highly emphasized. To incorporate managerial decision making, accounting users should have more accurate information with respect to financial and managerial accounting. Such information can offer additional value to both financial and managerial accounting.

Despite of all such facts, still there is some area that remains elusive in HRA, which is defined by Roslender (2009) as "accounting for people" (AFP) and by Guthrie and Murthy (2009) as human competency accounting (HCA) which intimates the complexity in determining the competency of employees (Roslender & Dyson, 1992; Mayo, 2005; Verma & Dewe, 2008). In spite of the mutual efforts, there has been a continuous aloof among the accounting and financial professionals on the subject of "human resources". A general argument among financial and accounting experts is that the human assets measurement often deals with more subjectivity than physical assets measurement and this issue makes them to be excluded from financial statement. As intellectual property

capitals are considered as the major reporting elements, there may be chances for moving beyond such debates. For instance, the concept of intellectual capital is considered as crucial in reporting the value of company's intellectual assets. In spite of all these factors, this context is highly focused on the general evaluation issues like dilemma on capitalizing or expending investment in HR and whether human resources meet the criteria of assets with respect to accounting sense.

Based on a survey conducted with business professionals, Khan et al. (2010) revealed that most Human Resource directors consider healthy workforce as an important asset. But the accounting and financial experts who worked in private sectors were found to have least concern about the well-being of the employees. Considering all such concerns, Covaleski and Aiken (1986) said "no theory gave greater impetus to the need for accounting in organizations than Taylor's scientific management". Due to influence of economics, there is much emphasis on monetary measurement since it is believed to lead to a dominant financial reporting regarding the perspectives of company's performance measurement, managerial control and efficacy (Hopper et al., 2001). However, such emphasis on monetary measurement hasn't been applied to the context of human resources.

Considering human as assets has become morally repulsive following the abolition of slavery. As a result, it is expected that it would take more time to apply this concept in accounting agenda. With the liberation of the eighteenth century debates, humans have been excluded from financial statements. But since company's production lacks human contribution, as evidenced in the financial statements, has probably made the recognition and rewarding of employees' contributions more challenging. The present debate after the Second World War is focused on the question whether humans can be considered as assets; this contention is based on 18th and 19th century ideals. Since the labour cost is seen as an expense rather than acknowledged as an asset it could be considered to be in line with the consumer model followed by the modern capitalist economies.

Similar to the field of accounting, HRM is also found to be influenced by economics and scientific management thinking, as it is a scientific field of inquiry. As a result, the resource based view (RBV) of the firm has become popular in recent years. The main objective of the RBV is to provide accurate information on how certain rare, peerless and unique source could provide competitive advantage (Verma & Dewe, 2008). In HRM literature, various studies are available on the contribution of HR for improving productivity and performance of the firm (Boxall & Purcell, 2000). But, there is no adequate information on the role of HR measurement on firm's growth (Bowen & Ostroff, 2004). Thus HR and accounting could share a common theoretical base but there is a lot of confusion and assumption in terms of people. For example, in accounting literature, the term "human resource" has traditionally denoted as "human assets". But the term "human resource" was chosen to replace "personnel" to indicate employees within the firms. At last, these issues have come to an end in 1980 and both HR and accounting are being mentioned in the name of "human capital".

In spite of all such different perspectives, HRA suggests how to combine the different professional concerns while looking for a solution. Basically, accounting has involved with reporting and managing non-human resources by means of developing accurate rules and regulations. Likewise, Human resource has involved with the development of financial benefits by means of improved training and other HR related system and practices. In fact, HRA has also involved in the progress of managerial decision making and at the same time, it provides supporting data to HR managers for the development of human resources. Though the adoption of HRA practices has been accepted only to a small extent, most of them are arguing that metrics such as ROI may lead to the failure of the HR professions (Pfeffer, 1997). As a result, the adoption of more economic and less welfare-oriented perspective has become questionable (Rynes, 2004).

Accordingly, the emerging fields including HRA has demonstrated the migration of knowledge across the artificial edifices those have been erected by scientific disciplines (Daft & Lewin, 2008). Moreover, HRA assists the proponents to seek an accurate way to determine the competency of employees as well (Roslender & Dyson, 1992). In order to implement effective HRA practices, it is essential to focus three main settings: (1) profound knowledge on human resource cost, values, outcome and how to calculate these (2) high management demands (3) high target settings. Finally, it is essential to execute HRA from strategic-management perspective.

3. Issues in HRA Measurement Models

In the progression of Human Resource Accounting, researchers have centred on the theoretical aspects ingrained in calculating the worth human resources. HRA can be calculated pertaining to human resource outlay or according to human resource worth. In accordance to Flamholtz's method for the calculation of fundamental human resource outlay (1973, 1999, p. 59), human resource outlay could be described as two main classifications acquisition costs and learning costs where acquisition costs comprises of direct expenses of staffing such as enrolment, choosing, appointment and assignment, and indirect expenses of promotion or hiring

from inside the establishment. Learning costs comprises of direct costs like official training and guidance and on-the-job instruction. In a HRA structure, acquisition and learning costs are considered as benefit accounts with assures fiscal advantages in the years to, hence are not seen as expenditures. Flamholtz (1999, p. 160) stated that the notion of human resource value is got common economic value theory, and similar to all resources individuals have value as they have the capacity to offer services in the years to come. Therefore like Flamholtz states, a person's worth to an establishment could be described as the current worth of the potential services the person is anticipated to offer for the time frame the person is projected to stay in the establishment. The Stochastic Rewards Valuation Model, initially formatted by Flamholtz (1971) for human resource assessment, and described in more detail in Flamholtz (1999), consists of a five stage procedure that starts with describing the different service or institutional posts that a person could hold in the establishment. The following stage is to decide the worth of every post to the establishment, the service state values that could be measured by utilizing several means like the price-quantity approach or income approach. Further the individual's anticipated stay in service in the establishment is measured and the personnel's mobility likelihood or the likelihood of the individual holding every probable position in the specific years to come is calculated from archival statistics. After that, the anticipated cash flows in the years to come, that the individual produces are marked down so as to decide their current worth. As per Flamholtz (1999, 160-161), one can note a dual characteristic to a person's worth. Initially, the individual's "anticipated conditional value," is the extent the establishment can possibly attain from their employment if the individual retains institutional membership all through the time of their useful employment tenure. Secondly, the individual's "anticipated realizable value." is the quantity really anticipated to be obtained, considering the individual's probability of turnover.

Sveiby (1997) suggested a different means for calculating intangibles termed "Intangible Assets Monitor." The 'intangible assets monitor' recommends a method for calculating intangible resources like the capability of a staff member, in-house composition like patents and patterns, and the exterior composition of the establishment like correlation with consumers and the like. This method incorporates pointers of development and restitution, and pointers of competence and constancy. Nevertheless, utilizing Flamholtz method, Flamholtz, Bullen & Hua (2003) revealed a convenient methodology for measuring ROI on management advancement and revealed the increased funds flows that an establishment will get owing to investing in management advancement. The literature summarized that employing Human Resource Accounting as an instrument to calculate the worth of management development improves the worth of human resource capital and enhances the value of management accounting. Parallel to Flamholtz's method, yet another previous method of human resource value assesses human resource by measuring the current worth of an individual's earning capacity in the years to come (Lev & Schwartz, (1971). Dobija (1998) suggests a different method for capitalization, wherein the proportion of capitalization is decided with the help of natural and the societal circumstances of the surroundings. Employing a multifaceted interest attitude, this methodology considers three features for valuing the human resource personified in an individual. These comprise of capitalized value of living expenses, the capitalized value of educational expenses to get professional qualifications and the value attained with experience. Turner (1996) puts forward a different theory, where he points out to the structure released by the International Accounting Standards Committee and suggests the utilization the current value of the value added by enterprise, and calculates resources by the four methodologies, such as historical outlay, present outlay, realizable worth and current worth. Cascio (1998) suggested a methodology for calculating human resource on the basis of pointers of human resource of innovation, personnel attitudes and the record of well-informed staff members. As per this methodology, modernization decrees a premium and thus requires to be calculated, for instance, by contrasting gross profit margins from latest goods to the profit margins from existing goods. Staff approaches envisaging consumer contentment and retention are significant pointers of human resources and consequently require to be calculated, in addition to measures of term, proceeds, experience and learning.

One explanation pertaining to the part of Human Resource Accounting suggested by investigators is connecting HRA to the Balanced Scorecard, for example, Johanson and Mabon (1998). By connecting the two, HRA will be grounded on business approach and the Balanced Scorecard can utilize the means that were formatted by HRA. A symbolic correlation between the two features would offer the needed recognition to HRA in business planning and the Balanced Scorecard will be extremely competent when it utilizes the weathered methods formulated by Human Resource Accounting. Although investigators happen to accept the notion of connecting the two theoretically, there is difference of opinion on the means that could be utilized to attain this. Flamholtz and Main (1999) suggest a different approach for grounding HRA in business policies. As per this method, one can note six important features of institutional functioning, comprising of markets, goods, assets, functioning structure, management structure and tradition. Yet another crucial feature comprises of fiscal outcomes of an establishment. Generally, one can note seven aspects or important outcome fields that require being observed and

kept in control by the administration of the establishment. Measurement is a vital element of control and HRA might hence be a helpful instrument for assessing human capital that consequently will be of use to the establishment, for efficiently controlling and managing human capital.

Lev (2001) in his ground-breaking book, 'Intangibles', talks about human capital as being one amongst several intangibles, that maybe the most difficult to calculate. Intangibles frequently have constructive response impacts, that is, employing them in one field could in reality augment benefits in another area. This is termed as the network advantages. For instance, the personnel who currently get training may eventually train others. Nevertheless, the worth of intangibles in common and human capital in specific is hard to calculate owing to difficulty in being purchased and sold and the absence of control over advantages in the years to come. The personnel oriented by one firm might eventually seek employment in another firm. In the event of this taking place the value generated by orienting the employee is not attained totally by the first firm that trains the employee. The value "spills over", as it is termed, as the investment in training the employee goes to the second firm that employs him. Nevertheless, 'spill over' setback offers human resource managers with a distinctive chance to augment company value. If human resource strategies are built to decrease spill over, additional value from orientation is effectively held within the establishment. Effort should be taken to decrease spill over, this could take the strategy of particular instead of generalized training (Becker, 1975), strategies structured to augment worker allegiance that brings about decreased turnover and service agreements that hold "no compete" clauses.

4. HRA and Organizational Performance

Numerous investigations centred on showcasing a connection Human Resource Accounting methods and organization or company performance (Afiouni, 2007; van der Zahn et al., 2007; Johansson, 2007; Martin-de-Castro et al., 2006; Youndt & Snell, 2004; Roos et al., 2004; Perez & Ordonez de Pablos, 2003). Additionally investigations were also centred on the impact of HRA knowledge on decision making (Herman & Mitchell, 2008; Flamholtz et al., 2003; Ogan, 1988; Chris Dawson, 1994; Flamholtz, 2004; Lev & Schwartz, 1971; Elias, 1972; Hendricks, 1976).

Herman and Mitchell (2008) illustrated the way to report under a human capital liability concept which corresponds with the conventional accounting structure of contingent liabilities; scrutinize the fiscal influences of these reporting on market assessment, internal scheduling and investigate extents of human resource liabilities. Based on appraisals of fiscal influences of human resource liability reporting, the investigation rationally widens the findings to back the projected concept. The investigation offers backing for the possibility and necessity to take up a human resource liability concept for valuing, reporting and organizing human capital. Flamholtz et al. (2003) employs Human Resource Accounting method of anticipated realizable value, and noted that workers' involvement in a management development program improved the worth of the people to the company. Additionally the investigators found that HRA methods offered upper level executives with an different accounting structure to calculate the outlay and worth of workers to an establishment. Therefore HRA symbolized a concept or a method of looking at human resource decisions, and the group of methods for enumerating the influences of human resource management plans on the outlay and worth of individuals as institutional assets.

Chris Dawson (1994) illustrated a correlation between two narrow methods of HRA – the replacement cost model (RCM) and the stochastic rewards valuation model (SRVM). Researchers concentrated on the functioning of the two methods and further the analysis utilized by executives in deciding or getting at the data. He further talks about the common advantages and restrictions of simulation methods and the way they correlate to prescriptive and descriptive attitudes to the investigation of management. Ogan (1988) stated that the findings a case study formulated to evaluate the influence of HRA data on layoff actions taken by executives. The results of this investigation reveal that HRA data, in fact has an impact in staff layoff decisions and allows managers to augment their degree of self-assurance pertaining to decisions of this kind. Tomassini (1977) offered to a sample group made up of accounting students, conventional monetary data and data comprising HRA. Human Resource Accounting data resulted in extraordinary dissimilarities in decision-making. Hendricks (1976) conducted a research utilizing accounting and finance students as subjects. His simulated depositors completed two stock investment/capital allocation decisions, one with and one without human resource cost statistics. In this investigation, HRA showed a significant influence on adopted decisions numerically.

Schwan (1976) measured the outcome of human resource cost methods on banker decision-making. He noted that the including HRA information in published financial statements lead to, considerably dissimilar grading of management's awareness to confront problems and chances they may face in the years to come and numerically

diverse prophecies of a company's net income. Acland (1976) choice an example of 500 financial analysts and supplied fiscal reports for a few of them and reports having behavioural indexes to a few other analysts to enable them to decide on investments in one or two firms. Inclusions of behavioural data ensured that a few analysts might make decision dissimilar to the ones who were only given financial statistics. This dissimilarity was seen in the analysts who had got HRA data along with behavioural indexes. Examination was done on relative influence of revelation of HRA financial data as compared to non-monetary data. Flamholtz (1976) requested professional accountants to choose between two individuals for taking up a post. He supplied three types of data to the accountants, conventional data about performance, non monetary data about HRA and monetary data about HRA. This data was supplied for three cases A, B and C correspondingly to the accountants. Contrasting to Flamholtz's anticipation, non-monetary data had influence on decisions. Nabil Elias (1972) offered 2 sets of financial reports, that is, one was a conventional report and the other having HRA data, in his investigation to the example comprising accounting students, financial analysts and accountants. Investigative findings revealed that HRA data had wholesome influence on decisions numerically, though the correlation between HRA data and the taken decisions were not strong. Moreover the findings revealed that circumstances and experience of peoples' variables did not have any influence on decision-making on the basis of HRA data.

5. HRA Reporting Challenges

It is evident that organizations face several challenges during the HRA implementation. A case study of an Australian bank's human capital disclosures was provided by Dumay and Lu (2010). It describes the investigation of such exposed disclosure by both external and internal stakeholders. According to Dumay and Lu (2010), the adversarial stakeholders can question the firm or even change the management and disrupt the balance between staffs and management if the organisation fails to implement the rhetoric obtained from the above-mentioned disclosures. In November 2005, based on the repealing of human capital law, Roslender and Stevenson (2009, p. 861) stated "genuinely shocked interested parties and led to widespread criticism." As a result, these disclosures placate the individuals from accounting profession, especially the auditors (Roslender & Stevenson, 2009). The studies by Foong et al., (2003) describe the rationale for resisting these disclosures by entrepreneurs. The disclosure of HR information may act as a proof for wealth creation and hence this may result in increased bargaining power for both unions and employees. The critical accounting theory supports these findings. According to critical accounting theory, accounting numbers quantify the events and are used to subjugate the labour by the firm owners.

A survey was conducted by Verma and Dewe (2008) to recognise and explain the perceptions of human resources and their practices in different organization sectors of UK. A number of respondents considered the human resources measurement as vital to the organization. However, it was expected that a little or considerable improvement will occur in the measurement practices of human resources in the upcoming years. This is due to the following reasons: uncertainties in the reporting areas; sensitivities in the reporting areas; less accuracy in present measurement techniques and lack of organizational support. However, several HR personnel are not considering human capital as a fundamental element of intellectual capital. This can be illustrated by a job title mentioned in an editorial issue of a US journal, Human Resource Management (Welbourne, 2011, p. 168): "Head of human capital strategy & workforce analytics". Human capital-centric organization acts as a competitive advantage source (Lawler III, 2009). Lawler III stated that "Unlike experts in finance and experts in accounting, experts in HR typically are not on [company] boards". As per the act of US Sarbanes-Oxley, every US publicly listed organizations should have a qualified, financially experienced board member. However, the HR department does not have any such standards. This clearly reveals that organizations face several challenges during the implementation of HRA.

6. Conclusion from the Review and New Directions

From the review, it is clear that firms particularly lawyers, corporate acquisition specialists, accountants, company management and in addition to HR professionals are not willing to execute HRA. This may be the factor for less number of researches conducted in this topic. However, a majority of preliminary research conducted on this topic have been successfully completed. Further research on developing HRA was complicated since it requires the organization's cooperation to act as research sites for the purposed study. Hence, only few major studies were conducted in this field. In addition to this, this research involves the HRA implementation in organizations, and hence the cost of operation is high. The benefits of HRA implementation to the sponsoring firm and also to the field are not certain. This study includes the adaption process of HRA technology and can be extended to evaluate the different types of intellectual property. The HRA implementation helps to improve managerial decisions like layoffs, better performance evaluation measures of the firm and also acts as a guide during buying, selling and merger transactions.

7. Conclusion

Human resources are considered as building blocks for any organization. Firstly, it is necessary to identify the contribution of the employees to the firm. Then, the evaluation measures of “human resources” are carried out. The task of assessing the human resources is daunting. There are no precise evaluation measures to assess the human resources. However, by measuring these intangibles even though imprecise, it will help improved decision making on evaluating the value of the firm.

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The Impact of Bank Regulations and Institutions on Efficiency in Selected MENA Banks

Houda Sassi¹

¹ IHEC School of Business, LEFA, University of Carthage, Tunisia

Correspondence: Houda Sassi, IHEC School of Business, LEFA, Carthage Presidency, 2016 Tunisia. Tel: 216-98-543-724. E-mail: houdasassi01@yahoo.fr

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Abstract

This paper suggests analyzing the relationship between the regulatory and institutional indicators and the technical efficiency of commercial banks in 5 MENA countries during the period of 2003-2011. Firstly, we calculate the scores of efficiency with non parametric approach (DEA: Data Envelopment Analysis). Secondly, we use the Tobit regression to study the impact of the specific characteristics of banks, the indicators of governance, regulation and economic freedom indexes. The empirical results indicate evidence that a strong restriction can result in higher bank inefficiency. However, banks operating in conditions of economic freedom and governance are more likely to benefit from higher operating efficiency levels.

Keywords: bank efficiency, DEA, economic freedom, bank regulation, governance

1. Introduction

During the last two decades, the globalization of financial markets has gained importance due to liberalization programs undertaken by different countries. This, in turn, increased economic ties between these markets and therefore thorough integration of financial institutions (Ragunathan, 1999). Accordingly, these financial institutions today face a dynamic and competitive environment on a global scale. In this environment, financial institutions are forced to examine their performance because their survival in these dynamic economies of the 21st century will depend on their productive efficiencies. Some previous studies (Berger and Humphrey, 1991; Berger, Hancock and Humphrey, 1993, and Berger, Hunter and Timme, 1993) have shown that, especially in the banking sector, inefficiencies are more important than issues of size and capacity production. Therefore, companies have tried to adapt and adjust to improve their productive efficiencies to cope with the change of social and economic environment (Harker and Zenios, 2000).

All these circumstances have led many countries to liberalize their financial sectors through deregulation in order to improve efficiency. However, the results are mixed regarding the short-term effects of deregulation and productivity gains due to liberalization programs have not reached government targets across economic growth. (This may vary across countries and also depends on industry conditions prior to deregulation).

This paper contributes to the literature by studying the impact of different aspects of economic freedom and governance on bank efficiency in the countries of the MENA region from 2003 to 2011. We use the nonparametric methodology: Data Envelopment Analysis (DEA) to calculate efficiency scores. Unlike existing studies measuring the efficiency of banks, this analysis is not based on accounting ratios, but rather a methodology that enables the construction of a border of "best practice" by wrapping the data points observed in the input-output space.

In addition, while the literature generally considers various forms of regulatory constraints, we use financial considerations rather indices of economic freedom. In particular, we use the index of economic freedom based extract "the Heritage Foundation (2011)". We also used as control variables institutional indicators of the World Bank (WB) database on governance issues.

Firstly, Technical efficiency score is the variable used to measure the efficiency of the banks. Secondly, we consider the relationship between alternative measures of economic freedom and institutional variables on the one hand, and the banking efficiency on the other hand using the Tobit model censored variables. This method is considered the most suitable to give better estimates than the MCO approaches in the analysis of the second

stage of the DEA efficiency analysis.

Our results indicate that there is a strong link between the various forms of economic freedom and the efficiency of the banks. Specifically, financial institutions that seem to be more open and more democratic are associated with small inefficiencies, whereas strong regulatory policy and more restrictions on banking activities decreased the level of efficiency of the banks. The rest of the paper is organized as follows. Section 2 describes the financial and banking sector in selected MENA countries. Sections 3 and 4 present the empirical methodology and data analysis. Section 5 discusses the empirical results and section 6 concludes.

2. Banking Sector in MENA Countries

Countries in the MENA region show similar indicators in terms of cost and performance. Table 1 shows statistics on the banking sector.

Table 1. Banking sector indicators (2010)

Countries	BANK OVERHEAD COSTS / TOTAL ASSETS	NET INTEREST MARGIN	CONCENTRATION	BANK ROA	BANK ROE	BANK COST-INCOME RATIO	BANK CAPITAL TO ASSETS RATIO	BANK Z-SCORE	DOMESTIC CREDIT PROVIDED BY BANKING SECTOR /GDP	DOMESTIC CREDIT TO PRIVATE SECTOR / GDP
<i>Egypt</i>	0,04	0,03	0,53	0,06	0,06	0,43	0,06	2,41	0,75	0,36
<i>Jordan</i>	0,02	0,03	0,86	0,01	0,08	0,42	0,11	13,65	0,99	0,72
<i>Morocco</i>	0,01	0,03	1,00	0,01	0,22	0,36	0,08	22,00	1,01	0,65
<i>Tunisia</i>	0,02	0,04	0,59	0,34	0,83	0,33	n.a	6,75	0,68	0,62
<i>Turkey</i>	0,04	0,04	0,39	0,02	0,52	0,30	0,13	21,35	0,63	0,37
MENA (Mean)	0,02	0,03	0,67	0,08	0,34	0,36	0,09	13,23	0,81	0,54
High income countries (Mean)	0,03	0,03	0,79	0,09	0,21	0,64	0,06	11,75	2,09	1,69

Source: World Bank

As shown in Table 1, overhead costs as a share of total assets are in the order of 3%. Similarly, the net interest margin on average 4%, thus indicating that the cost of financial intermediation is similar for most countries in the MENA region but also that approximates the high-income countries. For the cost-income, averages also close, with an overall average of 37% against 64%, but for high-income countries.

About performance indicators, return on assets (ROA) and return on equity (ROE) are significantly higher for Tunisia in the countries of the MENA region. The concentration ratio (the share of 3 largest banks by capital against all the assets of the banking sector) indicates a relatively high concentration in the MENA region (67%). The high concentration is often considered an indicator of lack of competitiveness, although recent empirical studies are inconclusive (Claessen and Laeven, 2004; Casu and Girardone, 2006).

Bank capital to assets is the ratio of bank capital and reserves to total assets. Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Capital includes tier 1 capital (paid-up shares and common stock), which is a common feature in all countries banking systems, and total regulatory capital, which includes several specified types of subordinated debt instruments that need not be repaid if the funds are required to maintain minimum capital levels (these comprise tier 2 and tier 3 capital). Total assets include all nonfinancial and financial assets. (World Bank)

Z-scores (calculated as the ratio of return on assets plus capital-to-asset ratio to the standard deviation of return on assets) are used as an indicator of the stability of a bank: the higher the value of z-scores the more stable the bank is considered. An analysis of z-scores over time (Beck and Demircuc-Kunt, 2009) indicates that their value has been decreasing in high-income countries and upper middle income countries, while there is no clear trend in

the low-income countries and lower middle income countries. In the case of countries in the MENA region values are relatively large indicating a stable banking system.

Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other banking institutions are savings and mortgage loan institutions and building and loan associations. (World Bank)

Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. (World Bank)

Literature and empirical studies shows that countries with higher rates grow faster (Beck and Demirgüç-Kunt, 2009). These two indicators show low values in 2010 for most countries in the MENA region compared to the average high-income countries.

3. Methodology

3.1 Measuring Efficiency

In the literature, the measurement of the efficiency remains the objective of researchers since the first approximations until the current measurement techniques available for this type of efficiency.

So the researchers attempting to measure efficiency raises two questions: a conceptual one and a practical one. At the conceptual level what is meant by decision making unit (DMU) efficiency? And more specifically why there is inefficiency?

The measurement of technical efficiency requires knowledge of the maximum amount of output that can be produced from a set of inputs. Alternatively, we must have the specification of a production function. The value of this function in the input shows the maximum output possible.

"Data Envelopment Analysis (DEA)" represents a method based on mathematical programming and calculates the efficiency score technique by solving a linear programming problem, instead of performing algebraic calculations proposed by Farrell (1957).

For the model orientation, studies have demonstrated the suitability of the orientation inputs, when the study will be conducted to measure the efficiency of production (Paradi et al., 2011). Similarly, it is beneficial to study the presence of scale inefficiencies and determine the rate of return, that is to say, considering both constant returns to scale (CRS) and variable returns to scale (VRS).

In this study, we adopt the policy of minimizing inputs based on the assumption that during the study period, banks are looking to strategically reduce costs. Also, the intermediation approach is adopted in this analysis (Berger and Humphrey, 1997) which considers that the bank is an institution that uses labor, capital and deposits to generate credits (variables used are detailed in the following section).

Efficiency scores vary between 0 and 1 with 1 representing a total efficiency. Moreover, to be able to compare the scores between banks, we assume that the countries studied access to the same bank production technology, which is a principal limit because the production technology can be different across countries with different levels of financial development. To remedy this drawback, recent empirical studies try to incorporate country-specific environmental variables in the estimation of bank efficiency either directly (one step approach) or by regressing the efficiency scores obtained on the all environmental variables (two-stage approach); for more detail see Coelli et al., (2005).

3.2 The Second Stage DEA Efficiency Analysis

In a second analysis, we will attempt to measure the impact of specific variables and bank regulatory on the efficiency measured before. Banker and Natarajan (2008) indicate that the DEA procedure with two steps OLS or maximum likelihood or Tobit estimation in the second step provide results more significant than parametric methods in a single step. This approach allows us to enhance the existing literature by testing the significance of these variables as well as their combined effect on efficiency.

So we study if these levels of efficiency can be explained by the different groups of country-specific factors or by bank-specific characteristics. We first determine the variables and then we will include them as explanatory variables in the following equation:

$$TE_{i,t} = \beta_0 + \beta_k M_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $TE_{i,t}$ represent the level of technical efficiency score of bank and $M_{i,t}$ includes the variables that may have a potential impact on levels of economic efficiency banks. More precisely, we consider four groups of variables. The first group includes factors that are specific to various banks, the second concerns the institutional and governance variables, the third takes into account the variables of economic and financial freedom, and the fourth includes variables relating to the regulation and supervision banks.

Thus, the estimated regressions to analyze the influence of factors specific to banks, governance factors, economic freedom and regulatory measures on bank efficiency are:

$$TE_{i,t} = \beta_0 + \beta_1 Bank_{i,t} + \beta_2 Governance_{i,t} + \beta_3 Liberty_{i,t} + \beta_4 Regulation_{i,t} + \varepsilon_{i,t} \quad (2)$$

These factors are detailed in the following section.

Since we are studying the data across countries, only the specific characteristics of banks may not be sufficient to explain the difference in efficiency levels observed across the sample. In fact, there may be important factors in specific countries which are omitted, but are significantly correlated with levels of efficiency and the specific characteristics of banks used. To isolate the impact of bank specific factors banks to environmental factors, we maintain bank-specific variables in each regression. To avoid multicollinearity possible between the different groups of variables, we also include each group of factors one by one. After these steps, we conduct a robustness analysis to discuss the correlations that might exist between variables in the sample.

4. Data and Variables

4.1 Data

Our sample covers five countries in the MENA region for which we could collect data, namely Egypt (25 banks), Jordan (11 banks), Morocco (11 banks), Tunisia (15 banks) and Turkey (26 banks).

The data come from four main sources:

(1) The database Bankscope, a global database published by Bureau Van Dijk. Data are collected for a sample of 87 banks with data on annual reports (balance sheet and income statement) for bank institutions, with nearly 200 variables and 36 financial ratios already calculated. The panel of banks operate in 5 countries in the MENA region through a period from 2003 to 2011.

(2) The institutional data come from the base of researchers ICRG (International Country Risk Guide) (2011), which provides a comprehensive analysis of risk rates of developed and emerging countries, based on their financial, economic and political environment. This analysis began in 1984 and was published and sold by Political Risk Services (PRS). Variables derived from expert surveys conducted on the economic and political conditions in 140 countries.

(3) The index of economic freedom are collected from the database published by " Heritage Foundation " (2011) which ranks nations on 10 broad criteria based on the statistics of the World Bank, the IMF and the Economist intelligence Unit. These criteria assess the economic success of 185 countries around the world, and the overall score (Index of economic freedom) is an arithmetic average of the 10 indicators.

(4) The data regulation and supervision provide from the base of Barth et al. (2007) revised in 2008 which covers no less than 100 countries. This base is constructed from responses provided by regulators and supervisory official three studies worldwide: Barth et al. (2004, 2006 and 2008).

4.2 Variables

4.2.1 Variables of Input and Output

We use the intermediation approach (Sealey and Lindley, 1977) to define the input and output variables. This approach considers financial institutions as intermediaries between supply and demand of funds.

Consequently, deposits are considered as inputs, and interest on deposits is a component of total costs, as well as labor and capital. The two output variables used refer to the traditional activity of granting loans by banks that is to say, the total of credits and other activities not related to credit (Other earning assets).

Banking production costs: Total Cost (TC) capture the financial and operating costs. The "financial costs" are mainly interest charges. "Operating costs" are capital and labor expenditures, i.e. staff costs, general operating costs. The price of labor is measured by the ratio of the personnel costs - as a result of the summation of the salaries and other expenses - to the annual average of the Bank. The price of capital includes assets, depreciation expenses, rental costs, and other expenses. The price of financial capital is measured by the average cost of borrowed resources. This cost is measured by the ratio of interest expense to debt capital.

Inputs = Total costs = Interest expenses + Non-interest expenses (personnel expenses + other non-interest expenses)

Outputs = Total loans + Other earning assets

Table 2. Summary statistics of input and output variables

		Obs	Mean	St.dev	Min	Max
Egypt	Outputs:					
	Total loans	166	1993.21	3006.03	17.23	14479.28
	Other earning assets	166	3157.08	5646.50	31.06	33062.69
	Inputs:					
	Interest expenses	166	273.93	514.88	3.16	2855.62
	Non-interest expenses	166	88.61	130.09	1.93	1058.05
Jordan	Outputs:					
	Total loans	81	3791.92	6100.03	97.17	22510.9
	Other earning assets	81	3516.53	5567.32	37.23	22879.7
	Inputs:					
	Interest expenses	81	178.13	296.78	3.10	1254.1
	Non-interest expenses	81	149.85	216.42	6.34	787
Morocco	Outputs:					
	Total loans	63	7571.60	6377.13	2.3	28532.1
	Other earning assets	65	3660.80	3021.33	16.9	9729.35
	Inputs:					
	Interest expenses	64	230.27	198.49	0	707.85
	Non-interest expenses	64	252.36	226.85	0.1	890.82
Tunisia	Outputs:					
	Total loans	111	1333.16	1081.01	3.7	3708.71
	Other earning assets	111	413.12	407.48	0.97	2096.95
	Inputs:					
	Interest expenses	111	48.77	39.55	0.4	137.85
	Non-interest expenses	111	47.67	41.06	2.2	154.42
Turkey	Outputs:					
	Total loans	174	10132.18	13681.62	0.02	60319.37
	Other earning assets	174	8360.45	12540.19	17.47	53875.6
	Inputs:					
	Interest expenses	174	1103.34	1523.26	0.19	7180.69
	Non-interest expenses	174	566.31	667.39	7.90	2730.77
Mean	Outputs:					
	Total loans	310	3596.87	5218.37	2.3	28532.1
	Other earning assets	312	3355.34	5178.24	16.9	33062.69
	Inputs:					
	Interest expenses	311	239.99	416.50	0	2855.62
	Non-interest expenses	311	138.26	188.67	0.1	1058.05

Values are in Millions USD

Source: Bankscope and own calculations

4.2.2 Environmental Variables

We consider regression of the equation (2). Where $Bank_{i,t}$ represents the vector of variables related to the characteristics of the bank i in year t .

$$Bank_{i,t} = (EQTA_{i,t}, NETLOANS_{i,t}, LIQ_{i,t}, LNTA_{i,t}, ROAE_{i,t})$$

* *Equity / Tot Assets: EQTA*

This ratio controls the capital strength and measures the degree of risk taken by the bank executives. A high level of equity reduces the risk of insolvency and therefore the cost of borrowed funds (Berger and Mester, 1997; Flannery, 1998; Dietsch and Lozano-Vivas, 2000; Flannery et al., 2004). Banks with large capitalization are less

likely to become insolvent. We expect a positive relationship between efficiency and capitalization. However, the financial capital can also affect costs because of its use as a resource for loan financing (Berger and Mester, 1997). Since the increase in capital through the issuance of shares generally leads to higher costs by increasing deposits, a negative correlation between EQTA and efficiency can be expected. Therefore, the sign of the coefficient of EQTA prediction may be ambiguous due to the conflicting results of the work.

* *Net Loans / Tot Assets: NETLOANS*

This ratio measures the credit risk. Banks whose net values of loans relative to total assets face more credit risk which encourages banks to better manage to cope with these risks and improve their efficiencies. On the other hand, these banks are able to exploit economies of scale due to the size of their loan portfolio. Therefore, a positive relationship between NETLOANS and efficiency is expected. However, since banks in the MENA region, expertise in risk management is limited, this can lead to high costs in terms of non-performing loans which has a negative impact on efficiency.

* *Liquid Assets / Deposits & Short-term Funding: LIQ*

The liquidity ratio is the risk of not having sufficient liquidity to meet unexpected withdrawals significant or major credit requests. The lack of liquidity may also force banks to borrow money at excessive costs. On the other hand, excess liquidity may reflect poor management of the banks and thus may result in a low efficiency. Therefore, the sign of the coefficient of this variable is ambiguous.

* *Size: Logarithm of Total Assets: LNTA*

LNTA variable is included in the regression to measure the influence of the size of the bank on its efficiency. The size of the bank can positively influence efficiency levels since large banks are able to hold less capital than small banks and may be able to have larger portfolios and diversification of loans that allow them to take advantage of the size (Hughes et al., 2001; Yildirim and Philippatos 2007 Altunbas et al., 2007).

* *Return On Average Equity: ROAE*

To take account of the profitability of banks, we identify the variable returns on equity which reflects the efficiency with which the Bank uses the funds provided by the shareholders. This ratio is often used in the banking literature as a measure of performance (for example Mester, 1996; Pastor et al., 1997; and Casu and Molyneux, 2003). This ratio expresses more great are the higher profits are scores of efficiency of each Bank (positive relationship). This can be explained by the fact that the most successful banks are preferred by custodians which allows to create a favourable environment for banks to exercise their market power and thus lower their operational costs.

$Governance_{i,t}$ represents the vector of institutional variables or variables of governance of the Bank i in the year t . It is constructed from six dimensions of governance that vary between 0 and 1 where 1 represents a maximum governance.

$$Governance_{i,t} = (VA_{i,t}, PV_{i,t}, GE_{i,t}, RQ_{i,t}, RL_{i,t}, CC_{i,t})$$

* $VA_{i,t}$: *Voice and Accountability*

This variable indicates the extent to which a country's citizens can participate in selecting their government, but also enjoy the freedom of expression, association and freedom of the press.

* $PV_{i,t}$: *Political stability and absence of Violence*

This index estimates the probability that the government will be destabilized by unconstitutional or violent acts, including political violence and terrorism.

* $GE_{i,t}$: *Government Effectiveness*

This variable refers to the quality of public services, the civil service and the degree of his independence with political pressures, the quality of the formulation and implementation of policies and the credibility of the government's commitment to respect these policies.

* $RQ_{i,t}$: *Regulatory Quality*

This index reflects the ability of the government to formulate and implement policies and regulations to promote the development of the private sector.

* $RL_{i,t}$: *Rule of Law*

This index indicates how agents rely on the rules of the society and respect them, and reflects in particular the quality of execution of contracts, property rights, the police, the courts, as well as the probability of crime and

violence.

**CC_{i,t}: Control of Corruption*

This variable expresses the extent to which public power is exercised for private gain and interests, including both petty and grand forms of corruption.

It has been shown that in emerging markets, governance index have a positive effect on financial development (Detragiache et al. (2005); Ayyagari et al. (2005)). Consequently, it is expected that a stable political environment, an effective control of corruption and a developed legal system improve the efficiency of banking institutions (positive sign).

Liberty_{i,t} represents the vector of variables of economic freedom for the bank i in year t. This freedom is measured from the ten components of each value from a scale of 0 to 100, where 100 represents the maximum freedom.

$$Liberty_{i,t} = (FF_{i,t}, GS_{i,t}, PR_{i,t}, FC_{i,t}, EF_{i,t})$$

** FF: Financial Freedom*

This variable takes values between 0 and 100, with higher values indicating greater independence on the financial and banking markets over government control. It is measured from the determination of the extent of government regulation of financial services, the extent of state intervention in banks and other financial services, the difficulty of opening and operating financial services companies (domestic and foreign), and government influence over the allocation of credit. A score of 100 indicates a negligible influence of the government, while a score of 0 a repressive approach.

** GS: Government Spending*

This variable reflects the level of public spending as a percentage of GDP. The total government expenditures include both consumption and transfer payments. The rating scale for this variable is non-linear and is measured using the following equation: $GS_i = 100 - a \text{ expenditures}_i^2$, où GS_i represents the score of public expenditures in the country i, expenditures_i represent the ratio of total amount of public expenses to GDP (between 0 and 100), and a is a coefficient of variation for control change scores (set at 0.03) . The minimum value is 0 and higher values indicate excessive government spending.

** PR: Property Rights*

This variable measures the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It assesses the degree to which a country's laws protect private property rights and the degree to which the government enforces these laws, and the probability that private property will be expropriated; analyze the independence of the judiciary, the existence of corruption within the judiciary, the ability of individuals and businesses to enforce contracts. This variable takes values between 0 and 100, with higher values indicating greater legal protection of the property.

** FC: Freedom from Corruption*

This variable is used to measure the integrity of the system and distortion by which individuals are able to gain at the expense of the whole. The score of this variable is derived from the index "Transparency International's Corruption Perceptions Index (CPI)." The score is based on a 100-point scale where 0 indicates a highly corrupt government and 100 very little corruption. Higher the level of corruption is, the higher the overall level of economic freedom is low and the lower the score the country.

In addition, an overall indicator is also considered in our analysis:

** EF: Index of Economic Freedom* which represents the average of 10 indicators published by the Heritage Foundation, namely (1) (Business Freedom), (2) (Trade Freedom), (3) (Fiscal Freedom), (4) (Government spending), (5) (Monetary Freedom), (6) (Investment Freedom), (7) (Financial Freedom), (8) (Property Rights), (9) (Freedom from Corruption), (10) (Labor Freedom).

Regulation_{i,t} represents the vector of variables of regulation and supervision of the bank i in year t. This indicator does not change from one bank to another within the same country. These variables are obtained from the database of Barth et al., 2004 (version I) as updated in 2006 (version II) and updated again in 2008 (version III).

$$Regulation_{i,t} = (AR_{i,t}, CS_{i,t}, SP_{i,t}, SI_{i,t})$$

** AR_{i,t}: Activities Restrictions*

This index is the sum of 4 indices that reflect the restriction of activities:

- Index of regulation in the financial market which can measure the degree of freedom for banks to intervene in the financial markets. Higher this index is stronger restrictions on this activity are. It takes the value of 1 = no restriction, 2 = permitted activity, 3 = restricted activity, 4 = activity prohibited
- Index of regulation on the insurance market which measures the possibility of intervention in the insurance market. It also takes the value of 1 to 4 with a high index indicates a strong restriction.
- Index of regulation on the real estate market which measures restrictions on the banking sector in his intervention on the real estate market. It also takes the value of 1 to 4 with a high index indicates a strong restriction.
- Index of legislation on the acquisition by banks non-financial firms. This index is used to determine the possibilities of banks to own firms.

Therefore, the overall restriction is a value that varies between 4 (min) and 16 (max). A high value indicates that the country is experiencing a very strong restriction of the activities on the banking sector that is to say, it is highly regulated.

** CS_{i,t}: Overall Capital Stringency*

This index indicates whether the minimum capital requirements incorporate some elements of risk and deducts certain market value losses if this requirement is met. More precisely, it is based on the sum of the following questions (with yes = 1, no = 0)

- Does the minimum ratio "Equity / Assets" is risk-weighted in accordance with the guidelines Bales?
- Does the minimum ratio vary with credit risk?
- Does the minimum ratio vary as a function of market risk?
- Before minimum capital requirement is determined, which items are deducted from the book value of equity? (A) unrealized losses credit? (B) unrealized losses in the portfolios of financial assets? (C) unrealized losses of exchange?

Therefore, the overall index takes a value from 0 to 6 with a high value indicates a high level of regulatory capital requirements. In addition to the regulatory indicators, Barth et al. (2006) developed indices of supervisory summarized in the power of supervision on the one hand and the independence of supervision on the other hand, because they consider that increasing the supervisory authority cannot be positively associated with the efficiency of banks in countries where the supervisory authorities aren't independent. While a large independent supervision is itself positively correlated with improved efficiency.

** SP_{i,t}: Official Supervisory Power*

This index measures the degree of power exercised supervisory authority over banks. We chose three questions that measure this authority:

- Are there one or more institutions that control the banking sector? 1 = more, 0 = one.
- The supervisory authority must declare any offense she found with respect to prudential regulations?
- In this case, there mandatory sanction measures to take?

The answer to these 2 questions takes the value of 1 if yes and 0 otherwise.

The sum of the indexes 3 takes a value of 0 to 3 with a high value indicates a strong supervision.

**SI_{i,t}: Supervisory Independence*

This index measures the degree of independence of the supervisory authority in relation to the government. It is built based on three questions:

- To whom are the supervisory bodies responsible? (a) Prime Minister (b) Finance Minister or other cabinet level official, (c) a legislative body such as parliament or congress, (d) other. This variable is equal to 1 if the answer is (c) and 0 otherwise.
- Are the supervisors legally liable for their actions (i.e., if a supervisor takes actions against a bank, can the supervisor be sued)? This variable takes the value of 1 if the answer is no and 0 otherwise.
- Does the direction of the supervising agency have a fixed term and if so how many years? This index takes the value of 1 if the mandate is ≥ 4 years and 0 otherwise.

The aggregate index takes the value from 0 to 3 with a high number indicates a greater independence of supervisory agencies.

Regarding the prediction of the signs of coefficients of regulatory variables, literature is not unanimous because there are two points of view. The first called the public interest view considers that government acts in the public interest and regulates banks in order to promote their efficiencies and improve market failures by boosting competition between banks and encouraging governance managers. Against the second called private interest view considers that regulation is often used to promote the interests of some particular rather than the general public. It leads to constrain banks to meet political or other regulations and therefore it not play an active role in improving efficiency.

Therefore the effect of regulation and supervision on efficiency is ambiguous in light of these two opposing views. Empirical studies such our study could help to enrich the literature.

Table 3 presents descriptive statistics of sample variables described above.

Table 3. Summary statistics of environmental variables

		Obs	Mean	St.dev	Min	Max
Banks	<i>EQTA</i>	597	11.71	7.87	-51.77	82.22
	<i>NETLOANS</i>	595	49.51	18.56	0.068	95.45
	<i>LIQ</i>	596	40.93	37.14	2.98	658.62
	<i>LNTA</i>	597	8.03	1.61	2.83	11.61
	<i>ROAE</i>	596	9.95	30.75	-304.36	263.95
Governance	<i>VA</i>	597	0.55	0.13	0.25	0.79
	<i>PV</i>	597	0.74	0.11	0.55	0.90
	<i>GE</i>	597	0.5	0	0.5	0.5
	<i>RQ</i>	597	0.63	0.11	0.45	0.81
	<i>RL</i>	597	0.71	0.10	0.5	0.83
	<i>CC</i>	597	0.39	0.07	0.25	0.5
Economic Freedom	<i>FF</i>	597	44.9	12.03	30	70
	<i>GS</i>	597	71.27	8.62	45	83.6
	<i>PR</i>	597	46.91	6.10	30	55
	<i>FC</i>	597	39.10	7.93	28	57
	<i>EF</i>	597	58.94	3.96	50.6	68.9
Regulation	<i>AR</i>	597	9.73	1.29	8	12
	<i>CS</i>	597	2.73	1.16	1	4
	<i>SP</i>	597	1.97	0.32	1	3
	<i>SI</i>	597	1.53	0.89	0	3

Source: Bankscope, ICRG, Heritage Foundation, Barth et al. (2006) and own calculations.

5. Empirical Results

This section presents the results of the application of DEA to evaluate the efficiency of the banks in the countries from the MENA region as well as the results of the second stage of analysis, which is to determine the impact of different environmental variables on the calculated efficiency scores.

5.1 Efficiency Measures Results

The scores of efficiency for each Bank and each country are obtained using the DEAP 2.1 (Coelli, 1996). We used Input orientation and Variable Returns Scale (VRS).

Table 4 reports descriptive statistics of the efficiency scores for each country in our sample: Egypt, Jordan, Morocco, Turkey and the Tunisia and for each year of study (2003-2011).

Table 4. Technical Efficiency (TE)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Mean
Egypt	0.922	0.895	0.823	0.714	0.870	0.874	0.971	0.886	0.960	0.879
	(0.19)	(0.18)	(0.29)	(0.29)	(0.19)	(0.19)	(0.09)	(0.18)	(0.21)	(0.07)
Jordan	1.000	0.961	0.877	0.928	0.960	0.906	0.912	0.920	0.908	0.930
	(0.00)	(0.08)	(0.20)	(0.27)	(0.08)	(0.20)	(0.11)	(0.13)	(0.15)	(0.03)
Morocco	1.000	0.932	1.000	0.964	0.895	0.811	0.848	0.885	0.894	0.914
	(0.00)	(0.11)	(0.00)	(0.07)	(0.17)	(0.30)	(0.22)	(0.18)	(0.20)	(0.06)
Tunisia	0.885	0.753	0.875	0.890	0.753	0.816	0.798	0.726	1.000	0.833
	(0.18)	(0.34)	(0.20)	(0.21)	(0.34)	(0.25)	(0.24)	(0.26)	(0.00)	(0.08)
Turkey	1.000	0.841	0.761	0.884	0.776	0.864	0.870	0.902	0.817	0.857
	(0.00)	(0.28)	(0.28)	(0.19)	(0.27)	(0.23)	(0.22)	(0.17)	(0.22)	(0.07)

St.dev in brackets

Dependent variable	Mean	St.dev	Min	Max
TE	0.882	0.075	0.714	1

The results show relatively high scores (above 70%) for the five studied countries with a maximum efficiency of 100% and a minimum of 71.4%. As highlighted in Table 4, the magnitude of the standard deviation of different measures of efficiency in each country is low, which shows that in each country there is no significant variation between the efficiency of different banks within a country for each year studied.

We note that the mean efficiency score of Jordanian banks is the highest (93%) followed by Moroccan banks (91.4%). These efficiency levels are within the range of the scores achieved by banks in developed countries according to the literature (between 55% and 95%). However, it is important to note that these calculated efficiencies are relative to each frontier of the country. These boundaries correspond to the set of technologies and the available infrastructure and other features of the production environment. Therefore, high efficiency levels found are related to the technology of production of a given country. It is for this reason that recent literature focuses instead on the efficiency relative to a frontier to all countries without restrictions on the technology called 'metafrontier'.

5.2 Second Stage Results

Alternative regression methods are employed in the literature for examining the sources of bank efficiency such as Least Squares, censored regressions, Monte Carlo simulations (Simar and Wilson, 2007), and so on.

Tables 5, 6 and 7 report the main results of the regression of equation (2), the dependent variable is the efficiency scores of banks. We use the censored regression model (Tobit regression) which is among the limited dependent variable models (technical efficiency scores *TE* take values between zero and unity).

We can analyze these data using OLS regression. A limitation of this approach is that when the variable is censored, OLS provides inconsistent estimates of the parameters, meaning that the coefficients from the analysis will not necessarily approach the "true" population parameters as the sample size increases. See Long (1997, chapter 7) for a more detailed discussion of problems of using OLS regression with censored data.

To preserve the degree of freedom and avoid problems of multicollinearity between variables, it was decided to introduce the indicators one by one with specific parameters banks.

With regard to the specific characteristics of banks, we note that the impact of the ratio Equity / Total Assets (EQTA) is significantly positive for the six specifications indicating that banks with high capital have a higher efficiency. This is consistent with the literature (Berger and Mester, 1997; Reda and Isik, 2006). The coefficients of the ratio of Nets Loans / Total assets (NETLOANS) are positive and significant for all estimates, showing that banks that have a high credit risk control better their costs because of the pressure to improve their efficiency. On the other hand, the liquidity variable is also positively linked with efficiency which shows that more liquid banks face the risk of non-performing loans. However, the size of the bank (logarithm of total assets) seems to be not significantly associated with bank efficiency at 10%, which indicates a small bank is not necessarily less efficient than a large bank. Regarding the performance indicator (ROE), we show that the relationship is positively significant which is consistent with existing results in the literature (Miller and Noulas 1996; Casu and Molyneux, 2003; Stavarek, 2004).

The impact of institutional variables is shown in columns 1-6 of Table 5. Due to the fact that the institutional country variables are highly correlated we do not run a regression of all these variables together, to avoid

problems of multicollinearity.

Table 5. Bank efficiency and governance indicators

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0,821	1,045	1,304	1,096	1,337	0,801
Bank characteristics						
EQTA	0,003*	0,004*	0,003*	0,003*	0,004*	0,003*
NETLOANS	0,004**	0,004**	0,004**	0,005**	0,005***	0,004**
LIQ	0,001*	0,001*	0,001*	0,001*	0,001*	0,001*
LNTA	0,012	0,005	0,012	0,011	0,003	0,009
ROAE	0,001**	0,001**	0,001**	0,001**	0,001*	0,001**
Governance indicators						
VA	0,048*					
PV		0,175*				
GE			0,632*			
RQ				0,413*		
RL					0,661**	
CC						0,199*
Observations	593	593	593	593	593	593

* significant at level of 10% ($p < 0,1$), ** significant at level 5% ($p < 0,05$), *** significant at level 1% ($p < 0,01$).

Unsurprisingly, the results indicate a positive correlation between these variables including freedom of expression, political stability, control of corruption, regulation promote greater efficiency of banking institutions. This is shows that an environment with less governance and high corruption impede the ability of banks to operate efficiently. The obtained results broadly confirm that better quality of the institutional development in the country's financial climate lead to more efficient financial institutions.

Turning to the second vector of country specific variables, the impact of economic freedom indexes is analyzed in table 6.

Table 6. Bank efficiency and economic freedom indicators

	(1)	(2)	(3)	(4)	(5)
Constant	0,725	1,149	1,587	0,996	0,655
Bank characteristics					
EQTA	0,005*	0,004*	0,001*	0,003*	0,003*
NETLOANS	0,004**	0,005**	0,004**	0,005**	0,004**
LIQ	0,001*	0,001*	0,001*	0,001*	0,001*
LNTA	0,001	0,018	-0,002	0,011	0,01
ROAE	0,001**	0,001**	0,001**	0,001**	0,001**
Economic freedom indicators					
FF	0,005**				
GS		0,005*			
PR			0,013**		
FC				0,004*	
EF					0,003*
Observations	593	593	593	593	593

* significant at level of 10% ($p < 0,1$), ** significant at level 5% ($p < 0,05$), *** significant at level 1% ($p < 0,01$).

Table 6. reports strong statistical evidence that corroborates the thesis that shows that the restrictions in the economic opening decrease significantly the levels of technical efficiency. Indeed, economic freedom variables including financial freedom have positive and significant coefficients at the level of 5%. Thus, these results are consistent with the importance of the protection and respect for property rights, the effectiveness of regulation measures and the existence of free markets and their impact on the performance and efficiency for institutions operating in this environment and the economic growth in the large sense.

Finally, the impact of regulation indicators and the supervisory authority of the country built by Barth et al. (2008) is indicated in table 7.

Table 7. Bank efficiency and regulation indicators

	(1)	(2)	(3)	(4)
Constant	1,16	0,892	0,876	0,941
Bank characteristics				
EQTA	0,004*	0,003*	0,003*	0,003*
NETLOANS	0,004**	0,005**	0,004**	0,004**
LIQ	0,001*	0,001*	0,001*	0,001*
LNTA	0,008	0,012	-0,013	0,006
ROAE	0,001**	0,001**	0,001**	0,001**
Regulation indicators				
AR	-0,028*			
CS		-0,03*		
SP			-0,014	
SI				0,021*
Observations	593	593	593	593

* significant at level of 10% ($p < 0,1$), **significant at level 5% ($p < 0,05$), ***significant at level 1% ($p < 0,01$).

The results in column 1 report a negative coefficient of restriction activities variable that shows a strong restriction, which is related to bank regulation policy, does not promote greater efficiency of banks. This result is in accordance with previous findings in the banking literature (see among others, Barth et al., 2004, 2006; Demirguc-Kunt et al, 2004). On the other hand, capital requirements are negatively associated to efficiency, which is not necessarily consistent with the literature which states that this requirement reduces the credit risk (Barth et al., 2013). However, we find that the supervisory power variable is not significant at the 10% level in explaining efficiency, but the coefficient on the independence of the supervision is positive and significant. These results suggest that the supervisory power does not necessarily lead to greater efficiency but the independence condition of supervisory body should be checked at the same time. (Barth et al., 2013).

As a robustness check, OLS is used instead of the Tobit model to estimate equation (2) in order to see if the results substantially differ since we change the regression method.

The results obtained by the OLS specification are reported in table 8 and confirm the finding of the Tobit regression. Indeed, as indicated in table 8, the sign of the coefficients in all specifications remains the same, suggesting a significant influence of different sets of institutional and regulation variables on bank efficiency.

Table 8. Second-stage regression results for bank efficiency—OLS estimation

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0,676	0,675	0,678	0,695	0,937	0,655
Bank characteristics						
EQTA	0,001*	0,001*	0,001*	0,001*	0,001*	0,001*
NETLOANS	0,002**	0,002**	0,002**	0,002**	0,002**	0,002**
LIQ	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*
LNTA	0,012	0,012	0,012	0,012	0,012	0,012
ROAE	0,000**	0,000**	0,000**	0,000**	0,000**	0,000**
Governance indicators						
VA	0,003*					
PV		0,002*				
GE			0,205*			
RQ				0,032*		
RL					0,408***	
CC						0,096*
	(1)	(2)	(3)	(4)	(5)	
Constant	0,603	0,849	0,822	0,696	0,432	
Bank characteristics						
EQTA	0,002*	0,002*	0,001*	0,001*	0,002*	
NETLOANS	0,002**	0,002**	0,002**	0,002**	0,002**	
LIQ	0,000*	0,000*	0,000*	0,000*	0,000*	
LNTA	0,009	0,014	0,011	0,012	0,011	
ROAE	0,000**	0,000**	0,000**	0,000**	0,000**	
Economic freedom indicators						
FF	0,003**					
GS		0,003*				
PR			0,003**			
FC				0,000*		
EF					0,004*	
	(1)	(2)	(3)	(4)		
Constant	0,706	0,698	0,744	0,671		
Bank characteristics						
EQTA	0,002*	0,002*	0,002*	0,002*		
NETLOANS	0,002**	0,002**	0,002**	0,002**		
LIQ	0,000*	0,000*	0,000*	0,000*		
LNTA	0,012	0,012	0,012	0,012		
ROAE	0,000**	0,000**	0,000**	0,000**		
Regulation indicators						
AR	-0,002*					
CS		-0,019**				
SP			-0,036			
SI				0,002*		
Observations	593	593	593	593	593	593

6. Conclusion

This article contributes to the existing literature by examining empirically the role of economic freedom on the improvement of the operational efficiency of the banks. We focus on a sample of banks operating in 5 countries of the MENA region in the period of 2003-2011. We evaluate the technical efficiency of banks in Egypt, Jordan, Morocco, Tunisia and Turkey by using the non-parametric method (DEA). Results indicate that despite the existing similarities in economic and financial development and the reforms undertaken by these countries, we note differences in the observed levels of technical efficiency.

The second stage of analysis can give a clear idea of how the level of economic and financial freedom of a country (The Heritage Foundation) with indexes of governance (Kaufmann et al., 2006) may affect the bank operations. To support the impact of these variables on bank efficiency, we use indicators of regulation and

supervision established by the regulatory authorities of the country (Barth et al., 2006). This analysis is based on the Tobit regression technique by introducing the variables one by one to avoid problems of multicollinearity.

The results provide evidence in favor of economic freedom, which implies that excessive regulatory restrictions on banking and government interventions can increase the level of inefficiency. In other words, our results suggest that banks operating in more open and free countries tend to have relatively high levels of efficiency.

However, our results are not always consistent with the existing literature that supports the idea that with financial crises observed in the world, governments will seek to strengthen the regulation and to improve the legal system in which operate financial institutions. In this sense, restrict the activities of banks and require more capital will enable banks to manage risk and cope with potential crises and this regulation is not necessarily against the performance and efficiency of banks. Yet there is no doubt that the recent financial crisis and its effect that persists until today, the research remains incomplete and discussions are still without a satisfactory answer as to the role of governments in predicting crises.

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The Information Content of Sudden Removal of Corporate Chief Executives—Evidence from the Nigerian Banking Sector

Alex E. Osuala¹, Philip O. Nto¹ & Samuel F. Akpan¹

¹Department of Banking and Finance, Michael Okpara, University of Agriculture, Umudike, Nigeria

Correspondence: Dr. Alex E. Osuala, Department of Banking and Finance, Michael Okpara University of Agriculture, Umudike, Nigeria. Tel: 234-803-060-6878. E-mail: osuala.alex@mouau.edu.ng

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Abstract

This study investigates the information content of sudden removal of banks' chief executive officers (CEOs) in the Nigerian emerging stock market context. Mainly secondly data collected from the Nigerian Stock Exchange daily official list and those extracted from financial standard Newspapers were used. Event study methodology was employed in determining the impact of the unexpected removal of the bank executives on the prices of their banks' stocks. The data was analyzed using regression analysis with the E-views 7.0 econometric package. The findings show that the ouster of the bank CEOs did not significantly impact on the stock prices of Afribank Plc, FinBank Plc, Oceanic Bank Plc, Intercontinental Bank Plc and Union Bank of Nigeria Plc. The non-insignificance but positive information effect of the ouster could be as a result of the prompt intervention by the CBN via the injection of N420 billion intervention fund into the banking sector on one hand, and on the other hand, perhaps because trading on the stocks of the affected banks stopped with the ouster of the CEOs for close to a period of two weeks. The positivity of the average abnormal returns tend to suggest that investors in the Nigerian stock market saw the development as "a good riddance of old rubbish". The study therefore recommends that the CBN should maintain a closer surveillance on the banking sector so as to be able to detect in good time any rot in the system before it blossoms into a "financial epidemic".

Keywords: information content, ouster, event study methodology, stock market

1. Introduction

The global economic meltdown that trickled into Nigeria during the third quarter of 2008 gained root in 2009 with serious effects on the formal and informal sectors of the Nigerian economy. The effect in the capital market defied all measures put in place by regulators to boost the market during the year.

There were significant occurrences in the banking sector in the year 2009. However, the most striking occurrence in the sector during the year was the drastic reformation of the banking sector carried out by the Governor of the Central bank of Nigeria (CBN) Mallam Sanusi Lamido Sanusi which resulted in the sudden removal of the Managing Directors of eight Nigerian commercial banks. In the first exercise, five bank chief executives were sacked on Friday, the 14th of August 2009, namely: Mrs. Cecilia Ibru (Oceanic Bank International Plc), Mr. Sabastine Adigwe (Afribank Plc), Mr. Erastus Akingbola (Intercontinental Bank Plc), Mr. Bartholomew Ebong (Union Bank Plc) and Mr. Emeka Nwosu (FinBahk Plc). CBN replaced the Chief Executive officers (CEOs) and their management teams with interim management committees to supervise the affected banks pending the successful transfer of ownership to new investors.

It is pertinent to note that Sanusi's action resulted from reports of audits carried out on the banks by the apex bank. According to the CBN, the affected banks were in grave financial situation because of unsecured loans that were not repaid. A greater percentage of the loans turned out to be margin loans given to even people who did not apply for them. While addressing a press conference in Lagos on Friday, 14th August 2009, to announce the apex's bank decision, Sanusi said that CBN had to respond swiftly to tackle the glaring weakness in risk management and corporate governance in some of the banks and to stem possible systemic crisis and restore public confidence in the Nigerian banking sector. He further hinged the decision to remove the affected Managing Directors to excessively high level of non-performing loans in their loans portfolios, which he attributed to poor corporate governance practices, lax credit administration process and the banks' poor credit risk management.

The major criteria used for determining the status of the banks include the number of times the banks approached the Central Bank of Nigeria Expanded Discount Window (EDW) and the inter-bank market to shore up liquidity, the percentage of non-performing loans to total loan portfolio and relative share of non-performing loans to the entire industry.

With respect to the affected banks, the Central Bank of Nigeria gave the following statistics to back up its actions:

Table 1. Statistics from the Central Bank of Nigeria

Items	Amount
1. Total loan portfolio	N2.8 trillion
2. Total margin Loans	N456 billion
3. Exposure to Oil and Gas	N487 billion
4. Total non-performing Loan	N1.143 trillion (representing 40.18%)
5. Outstanding balance at EDW	N 127.85 billion (representing 89.81%)
6. Net guaranteed Interbank takings	N253.30 billion
7. Liquidity Ratio	N17.65% - 24% i.e., (below 25% minimum)
8. Capital Adequacy Ratio	Below 10% minimum (one had 1.01%)
9. Market share - Total Assets	31.47%
10. Market Share - Deposits	29.99%
11. Market Share – Loans	39.93%
12. Minimum Capital Required	N204.94 billion

Source: Akpan (2012)

However, as a bailout measure, the CBN injected N420 billion into the five banks.

According to the Central Bank of Nigeria, in exercise of its powers under section 33 and 35 of the Bank and other Financial Institutions Act 1991, as amended; the apex bank sacked the former CEOs. However, the CBN's action was greeted with mixed feelings and reactions. While most financial analysts said it was a right move to strengthen the banking industry, critics argued that the CBN was hasty to take such a sensitive action which could boomerang on the economy and therefore condemned it as unjust. However you may want to look at it, this was a significant development in the Nigerian banking sector.

Theoretically, Board changes, forced or voluntary resignation, are expected to convey information to the securities market, depending on how the market views such changes; that is, whether it is considered as being beneficial to the interest of the shareholders or not. Thus, the sudden or unexpected removal of a CEO conveys a signal to the stock market. In response to such changes, the stock market reacts. The reaction is measured through the abnormal returns experienced at the announcement of such sacks, which could be positive if the change is seen as a good development, or negative if otherwise.

This study appears unique in its focus in that there is no study known to the authors to date that has tried to investigate the information effect of the sudden removal of the five bank CEOs in Nigeria.

2. Theoretical Framework

Numerous studies have documented that the announcement of an unexpected change in corporate governance is associated with a change in a firm's stock price. Specifically, it is said that the stock market reacts positively to unexpected changes that are deemed to enhance shareholders' wealth, and negatively to such changes that are believed to have negative consequences on the wealth of shareholders. Understanding the relationship between unexpected news in the stock market and stock price changes consequent upon release of such news has been a key concern in stock market research.

Unexpected changes in corporate top managements are often associated with reactions in stock price. To measure the information effect of unexpected removal of the CEO of a big corporate entity, a number of studies have used the abnormal returns method. The abnormal return is the difference between the realized returns, R_{it} and the expected returns, $E(R_{it})$ given the level of systematic risk. This approach to event study was used by Ryan et al

(2000), Travlos et al (2001), Amihud and Li (2002), De Medeiros and Matsumoto (2004), among others.

The abnormal return can be calculated over a period of time before and after the ouster announcement, using the capital asset pricing model (CAPM), or the market model like Aharony and Swary (1980) did in their study. The market model tries to relate the individual security's return to the market return or its proxy linearly.

3. Research Methodology

The research method adopted for any research work is of utmost importance. This is because the accuracy, reliability and acceptability or otherwise of a study depends to a large extent on the methodology adopted. Methodology adopted provides the background against which a reader evaluates the findings and conclusions drawn from the study.

3.1 Types and Sources of Data

The study utilized mainly secondary data collected from the Nigerian Stock Exchange (NSE) over a period of 12 days which covers both the estimation and event window (Note that after the event day – 14th August 2009, the stocks of these banks disappeared from the market until 1st, September 2009). So, the data stream for the study consisted of the Nigeria Stock Exchange Daily Official list on the five affected banks. Other relevant pieces of information were extracted from the Nigeria Stock Exchange Fact Book and some national dailies.

3.2 Analytical Framework

The analytical method employed in this study is the standard event study methodology. As observed by Wirjanto (2005), the objective of an event study is to measure the effect of an economic event on the value of firms. Using financial market data, an event study measures the impact of a specific event on the value of a firm. The basis and usefulness of such a study stems from the belief that, given rationality in the market place, the effects of an event will be reflected instantaneously in security prices (Osuala, 2005). So, a measure of the event's economic impact can be constructed using security prices observed over a relatively short time period.

The basic steps in event study entail:

Clear definition of the event of interest and the period over which the security prices of the firms involved in the event would be examined.

Definition of the selection criteria

Definition of the event window and the estimation window

Calculation of the abnormal, actual and expected returns

Aggregation of the abnormal returns to obtain the cumulative abnormal returns

Designing a testing framework for the cumulative abnormal returns.

3.3 Calculating the Abnormal Returns

According to Osuala (2005) the abnormal return is the actual return of the security minus its expected rate of return over the event window. Expected return on the other hand is the return that would be expected if the event of interest did not take place. This implies that for each firm i and event date t , we have:

$$e_{it} = R_{it} - E(R_{it} / X_t) \quad (1)$$

e_{it} = the abnormal returns for the period, t

R_{it} = actual return

$E(R_{it})$ = normal (or Expected) returns for the period t

X_t = the conditional information for normal performance model.

For this research work the abnormal returns are calculated using the single factor market model which assumes that the return on each security is linearly related to the market portfolio return or its market proxy and it is given as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it} \quad (2)$$

R_{it} is realized rate of the i th security during period, t .

R_{mt} is rate of return on the equally weighted market index at period, t .

it is a random variable that is expected to have a value of zero.

α_i and β_i are the intercept and slope parameters for the firm i , respectively.

This implies that the abnormal return (AR) for the i th common stock on day t , is given by

$$AR_{it} = R_{it} - [\hat{\alpha}_i + \hat{\beta}_i R_{mt}] \quad (3)$$

where $[\hat{\alpha}_i + \hat{\beta}_i R_{mt}]$, is the expected rate of return, $E(R)$;

the coefficients $\hat{\alpha}$ and $\hat{\beta}$ are ordinary least squares estimates of α and β estimated from a regression of daily security returns on daily market returns from $t = -7$ to $t = -3$ (where $t = 0$ is the event date, and $t = -7$ to $t = -3$ is the estimation window).

The individual securities abnormal returns, AR $_i$ is aggregated and averaged across all the observations to obtain the average of the average abnormal returns using the formula below

$$AAR_t = \frac{\sum_{i=1}^N AR_{it}}{N} \quad (4)$$

Where N = is the number of events in the sample or in other words number of companies in the sample, AAR $_t$ = average abnormal return.

Next, the average abnormal returns are aggregated over the event window to give the cumulative average abnormal returns (CAAR), for any interval in the event window.

$$CAAR_t = \sum_{t-k}^t AAR_t \quad (5)$$

where $CAAR_t$ is the sample cumulative abnormal returns from $t-k$ day to t day of the event window (i.e., -2 to +4).

CAAR $_t$ and AAR $_t$ are then tested for their statistical significance using the standard event study t-test formula given as:

$$t_{(AAR_t)} = \frac{AAR_t^{EP}}{\sigma(AAR_t)} \quad (6)$$

for the average abnormal return, and

$$t_{(CAAR)} = \frac{CAAR}{(\sigma_{N,Pre} \sqrt{N_t})} \quad (7)$$

for the cumulative average abnormal return;

where $\sigma(AAR_t)$ = the standard deviation of the average abnormal return calculated from the pre-event window, AAR_t^{EP} = average abnormal return in the event period, EP.

$\sigma_{N,Pre}$ = aggregate of pre-event standard deviation of abnormal returns across all securities.

N_t = the absolute value of the event day, t , plus 1 (e.g. for event day -2, the absolute value is 2, and $N_t = 3$);

and

$$\sigma(AAR_t) = \sqrt{\frac{\sum_{-7}^{-4} (AR_{it} - AAR_{pre})^2}{n-1}} \quad (8)$$

where AAR_{pre} = average of abnormal returns of each security estimated from the pre-event period; n = number of days in the pre-event period.

If CAAR $_t$ and AAR $_t$ are significant, it can then be said that the information caused by the event has had an impact on the share prices of the five affected Banks.

4. Data Presentation, Analysis of Data and Discussion of the Research Findings

4.1 Data Presentation and Analysis

Following the sample selection criteria as discussed earlier in section three, we present here data on the estimated abnormal returns for the five banks.

Table 2. Calculated abnormal return for the event period for the five banks

AfriBank (AR)	First-In Land (AR)	Intercontinental (Bank (AR)	Oceanic (AR)	UBN (AR)	Date
0.033	-0.001	0.031	0.017	0.013	12/8/09
0.036	0.008	0.010	0.003	0.083	13/8/09
0.061	0.008	0.014	0.037	0.089	14/8/09
-0.010	0.019	0.010	0.057	0.085	1/9/09
0.071	0.019	0.007	0.067	0.125	2/9/09
0.091	0.003	0.027	0.077	0.154	3/9/09
-0.010	0.019	0.037	0.087	0.175	4/9/09

From Table 2 it is observed that the abnormal return of AfriBank Nig Plc within the event window varies within the range of -0.010 to 0.091; First Inland Bank Plc from -0.001 to 0.019; Intercontinental Bank Plc from 0.010 to 0.037; Oceanic Bank Nig Plc from 0.003 to 0.087 while UBA abnormal return within the period varies between 0.013 to 0.175.

The averaged abnormal returns are as presented Table 3 together with the cumulative of the averaged abnormal return.

Table 3. Averaged abnormal return and cumulative abnormal return for the event period

Date	$AAR_t^{EP} = \frac{\sum_{i=1}^N AR_{it}^{EP}}{N}$	$CAAR_t = \sum_{t-k}^t AAR_t$
12/8	0.0186	0.0186
13/8	0.0280	0.0466
14/8	0.0362	0.0828
1/9	0.0322	0.1150
2/9	0.0578	0.1728
3/9	0.0706	0.2434
4/9	0.0616	0.3050

The estimation period abnormal return is presented in the table below.

Table 4. Abnormal return for the estimation period

Date	Afribnak (AR)	First Inland (AR)	Intercontinental (AR)	Oceanic (AR)	UBN (AR)
5/8/09	0.047	0.003	-0.005	0.017	-0.046
6/8/09	0.001	0.002	0.084	0.567	0.029
7/8/09	0.031	-0.001	0.152	0.023	-0.003
10/8/09	0.036	0.000	0.017	-0.007	-0.017
11/8/09	-0.012	-0.001	0.009	-0.019	0.025

The abnormal returns over all securities are now averaged for all the estimation period; the result is as presented in the Table 5 below.

Table 5. Average abnormal returns for the estimation period

Date	$AAR_t = \frac{\sum_{i=1}^N AR_{it}}{N}$
5/8/09	-0.0156
6/8/09	0.1206
7/8/09	0.0404
10/8/09	0.0058
11/8/09	-0.0032
	=0.148

EsP = estimation period.

Then, the average abnormal return across all firms for the whole estimation period is the average of the average abnormal return in the estimation period.

Therefore

$$\overline{AAR}_t^{EsP} = \frac{0.148}{5} = 0.0296$$

Table 6. Calculation of standard deviation

AAR_t	\overline{AAR}_t^{EsP}	$(AAR_t - \overline{AAR})^2$	$(AAR_t - \overline{AAR})^2$
-0.0156	0.0296	-0.0452	0.002
0.1206	0.0296	0.091	0.0083
0.0404	0.0296	0.0108	0.0001
0.0056	0.0296	-0.0238	0.0238
-0.0032	0.0296	-0.0328	0.0010

$$(AAR_t - \overline{AAR})^2 = 0.0343$$

$$\sigma(AR_t) = \sqrt{\frac{0.0343}{5-1}} = 0.0927$$

Lastly, we test each average abnormal return in the event period for significance. This is simply done by dividing each average abnormal return in the event period by the standard deviation estimate calculated; using the formula

$$t = \frac{\overline{AR}_t^{EP}}{\sigma(AR_{it})}. \text{ The result of this is presented in Table 7.}$$

Table 7. Calculation of t-test

\overline{AR}_t^{EP}	$\sigma(AR_{it})$	Calculated t	Tabular t - Value
0.0186	0.0927	0.2006	(2.36)
0.0280	0.0927	0.3020	(2.36)
0.0362	0.0927	0.3905	(2.36)
0.0322	0.0927	0.3474	(2.36)
0.0578	0.0927	0.6235	(2.36)
0.0706	0.0927	0.7616	(2.36)
0.0616	0.0927	0.6645	(2.36)

4.2 Discussion of the Research Findings

From the t-test as shown in Table 7, the t values ranging from 0.2006 to 0.7616 are not statistically significant at 5% level. The abnormal returns are therefore not significantly different from zero. It can therefore be concluded that the sudden removal of the bank chief executive directors did not significantly impact on the share prices of Afribank Nigeria plc, FinBank Plc, Oceanic Bank Plc, Intercontinental Bank Plc and Union Bank Nigeria Plc.

The non-insignificance of the information effect of the ouster could be as a result of instant intervention by the CBN via the injection of N420 billion intervention fund into the banking sector on one hand, and on the other hand, perhaps because trading on the stocks of the affected banks stopped with the ouster of the chief bank executives for close to a period of two weeks.

It is important to note however that since there was positive abnormal average returns, which though were insignificant, it implies that investors in the Nigerian stock market saw the development as “a good riddance of old rubbish”.

5. Conclusions & Recommendations

5.1 Conclusion

In this study, we examined the information content of the sudden removal of the chief executive directors of five Nigerian banks. Following the research findings, we conclude that:

- The information contents of the sudden removal had no significant impact on share market price.
- The CBN lead by its governor Lamido Sanusi cushioned the would-have-been effect of the ouster through the injection of N420 billion which was later increase to N620 billion into the bank sector.
- Again, since there were positive abnormal average returns, which though were insignificant, it implies that investors in the Nigerian stock market saw the development as a good riddance.

5.2 Recommendations

Following the findings of this research which reveals that the sudden removal of chief executive directors of the five banks had non-significant but positive impact on the market share prices of the affected stocks, which as observed earlier is sequel to the prompt intervention of the CBN through the injection of N420 billion into the banking industry, the study recommends that the CBN should maintain a closer surveillance on the banking sector so as to be able to detect in good time any rot in the system before it blossoms into a “financial epidemic”.

Secondly, considering the importance of adequate and affordable data stream in empirical research works, it is highly recommended that the federal Government of Nigeria should as a matter of urgency set up a body that would (or through the agency of already established organizations) ensure that a good data bank is in place, similar to what obtains in developed markets of the world, to encourage research efforts. What obtains presently at the Nigeria stock Exchange, which amounts to passing through the eyes of the needle to collect necessary data is all but cheering.

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Optimal Investment Behavior for Regret-Averse Competitive Firms under Price Uncertainty

Jinwu Huang¹

¹School of Finance, Shanghai University of Finance and Economics, Shanghai, China

Correspondence: Jinwu Huang, School of Finance, Shanghai University of Finance and Economics, 200433 Shanghai, China. E-mail: eyesonme_hmily@msn.com

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Abstract

In this paper, we try to analyze the optimal capital and labor input of a competitive firm under price uncertainty from the perspective of regret aversion rather than of risk aversion. We show that the optimal input of capital and labor for the competitive firm under certain price are higher than those for the regret-averse competitive firm under price uncertainty. Moreover, we prove that the optimal input will increase or decrease with the movement of the regret factor. Besides, we find that the higher the expected probability of the output price turns out to be high and sales turn to be good, the less impacts of the changes of the weight of regret aversion relative to risk aversion would on the optimal capital and labor input.

Keywords: competitive firm, optimal input, price uncertainty, regret aversion

1. Introduction

Decision making under uncertainty has been appealing to many scholars in many fields such as general equilibrium theory, monetary economics, public economics, investment theory and so on. Regarding these applications, one can read Sandmo (1971), Leland (1972) and etc at length. Within these papers, the authors assume that the preferences of a firm are defined only on the foundation of profits, and that a Von Neumann-Morgenstern (Hereafter VNM) type utility functions can be used to describe these preferences. As we all know, utility theory has been proved to be adequate for describing the behavior of decision makers. Nevertheless, there are some cases in the real world, in which the VNM type utility theory yields poor results due to the uni-criterion assumption. In view of this point, Landsberger and Subotnik (1976) attempted to define the objective of a firm by a utility function based on firm's profits and some other factors. They just studied, however, the decision making process without uncertainty in their paper.

In this paper, we will apply a bi-criterion utility function to express the objective of a competitive firm, and will focus on the firm's behavior under uncertainty of output price. To this end, we introduce regret, which implies that a decision maker may seek to minimize it that he will feel if it would turn out that he has made the wrong decision, as another factor into the utility function of the firm in addition to the profit. Of course, it's sensible to consider regret in practice not only because decision makers indeed take regret into account in decision making process, but also because regret consideration can explain some interesting economic phenomena. Many researchers have analyzed this criterion in the past, and it has been argued that regret is important in determining the behavior of junior executives and is a reasonable criterion to statisticians. Additionally, it has been suggested that regret is viewed as a possible explanation for Allais' paradox and is the only criterion to make a hedging strategy optimal. Regarding the issues expressed above, we can refer to Marschak (1974), Paroush and Venezia (1979), and so on.

Generally, we assume the VNM type utility functions are risk-averse, but some researches offered evidence that violates the conventional expected utility theory with risk aversion. By contrary, they proposed there were alternative choices for utility functions other than risk aversion. Of which, Paroush and Venezia is the first to apply a regret-averse model to the competitive firm by considering the firm with a regret utility function, Loomes and Sugden (1982) showed that regret aversion is an alternative theory and is a rational choice under uncertainty. In particular, Loomes and Sugden, and Bell (1983) presented a formal analysis of regret theory. In recent years, considerable literatures studied firm's behavior by supposing firms are regret-averse instead of supposing firms are risk-averse. Notice that they define regret in their papers as the disutility of not selecting the

ex-post optimal alternative. That is, firms might regret producing less if the output price turns out to be very high and sales turn out to be very good, and firms might regret producing more if the output price turns out to be low and sales turn out to be poor. Again, we recall that Paroush and Venezia derived the conditions under which the optimal output in certain framework is higher than that under uncertainty in an equivalent case, although the shortage of the paper is that their results rely on the relative importance of the regret term and the firm's profits. Luckily, with the development of research, more specific and tractable regret-averse functions than that presented by Paroush and Venezia have been proposed in many works such as in Braun and Muermann (2004), Muermann et al. (2006), Mulandzi et al. (2008) and so forth. Specifically, using such type of more specific and tractable regret-averse functions, Braun and Muermann (2004) examined optimal insurance purchase decisions of individuals and found that individuals with regret-theoretical preferences adjust away from the extremes of full insurance and no insurance coverage. This prediction not only holds for both coinsurance and deductible contracts, but also can explain the frequently observed preferences for low deductibles in markets for personal insurance. Muermann et al. (2006) studied the portfolio's optimal allocation problem in a defined contribution pension plan for a regret-averse investor, who confronts with a risky and a risk-free asset at the same time. The results demonstrate that anticipated disutility from regret has potent effects on investment choices. Relative to investors with risk aversion, investors who take regret into account will hold more stock when the equity premium is low but less stock when the equity premium is high. Moreover, regret increases the regret-averse investor's willingness to pay for a guarantee when the portfolio is relatively risky, but decreases it when the portfolio is relatively safe. Mulandzi et al. (2008) analyzed the optimal allocation between loans and treasuries for a regret-averse bank and investigated the investment of bank funds in loans and Treasuries with the aim of generating an optimal final fund level. Taking risk and regret into account in the utility function and applying optimization theory, they provide a comparison between risk- and regret-averse banks in terms of optimal asset allocation between loans and Treasuries. Furthermore, they comment on the claim that an investment away from loans towards Treasuries is responsible for credit crunches in the banking industry. As to more references, one can refer to Stoltz and Lugosi (2005), Michenaud and Solink (2008), Hayashi (2009), Ma and Xu (2009), Petersen (2010), Renou and Schlag (2010), Stoye (2011), Sheng (2012), Tsai (2012), Wong (2011, 2012) and some references therein.

By adopting the more specific and tractable regret-averse function, we discuss the properties of firm's behavior when optimal input is invested for the regret-averse competitive firm under uncertain price of output. What's more important, our paper makes a few slight contributions to existing literatures. Above all, our paper is the first to apply the two-attribute utility function to study the investment behavior of competitive firms with regret aversion as well as risk aversion under price uncertainty. Then, our model enables different firms to possess different regrets if their utility functions on regret terms are different, which circumvent the limitation that utility functions of regret-averse firms with different regret terms possesses the same regret. The last but not the least, our framework allows us to make comparative statics of the optimal input by changing the parameter of the regret term. By the way, our setup not only represents the production theory for competitive firms with risk aversion, but also represents the production theory for competitive firms with regret aversion.

The remaining of this paper is organized as follows. In Section 2, we introduce the preliminaries for our model in detail. Applying a more specific and tractable regret-averse function, Section 3 analyzes the behavior of competitive firm with regret aversion under price uncertainty. An illustration for our model is shown in Section 4. Finally, Section 5 presents the conclusions.

2. Preliminaries

In this paper, we will introduce the decision making process elaborately of a regret-averse competitive firm under uncertainty of output price. For our purpose, we present the hypotheses explicitly as below.

(H1) The competitive firm's production function is defined as

$$Q = F(K, L)$$

where, Q is the quantity of the products, K and L are respectively capital and labor input, function F is continuous, twice differentiable, and strictly quasi-concave, *i.e.*, $F_{KK} < 0$, $F_{LL} < 0$, and $F_{KK}F_{LL} \geq F_{KL}^2$ with $F_{KL} > 0$. Certainly, the production function F is increasing with respect to K and L , *i.e.*, $F_K, F_L > 0$.

(H2) The competitive firm sells its output at an uncertain price p , which follows

$$p = \hat{p} + \sigma\varepsilon, \quad (1)$$

\hat{p} is the expected price, *i.e.*, $\hat{p} = E(p)$, σ is the standard deviation of price p , and ε is a random variable that satisfies

$$E(\varepsilon) = 0, \quad \text{Var}(\varepsilon) = 1, \quad \text{Prob}(\varepsilon > -\hat{p} / \sigma) = 1.$$

(H3) We define the two-attribute utility function $u(\pi, R)$ of the regret-averse competitive firm under price uncertainty by

$$u(\pi, R) = v(\pi) - \lambda g(R) \quad (2)$$

Herein, v is a utility function such that $v' > 0$, $v'' < 0$ to reflect the risk aversion that accounts for the first attribute, while the second attribute that reflects regret aversion is explained by an increasing and strictly convex function g with $g(0) = 0$ and $g' > 0$, $g'' > 0$ on interval $(0, +\infty)$, λ is a nonnegative parameter to measure the weight of regret-averse attribute relative to risk-averse attribute. Notice that the two-attribute utility function $u(\pi, R)$ will collapse to the conventional VNM type utility function when $\lambda = 0$, and then the firm would be a maximizer of expected utility under risk aversion only.

(H4) The firm's profit function π and the regret function R are denoted respectively by

$$\pi = pQ - rK - wL \quad (3)$$

$$R = v(\pi^{max}) - v(\pi) \quad (4)$$

where, w in expression (3) represents the wage rate and r therein represents the capital rent, π^{max} in formula (4) is the ex-post optimal profit without price uncertainty. Moreover, the value of the regret term R is nonnegative since v is increasing. Notice that we dropped the fixed cost in the firm's profit function, because doing this will not make any influence to our results.

Obviously, from hypothesis (H3), there holds $u_\pi > 0$, $u_R < 0$, which means the firm likes profit but dislikes regret. And furthermore, $u_{\pi\pi} < 0$, $u_{RR} < 0$, which implies the utility function $u(\pi, R)$ is concave on the profit π and the regret R to reflect risk and regret aversion, respectively.

At the end, according to the definitions of $u(\pi, R)$ and R that shown in expressions (2) and (4), we claim that $u(\pi, R)$ is a function of π in essence because π^{max} is the ex-post optimal profit under certain price. Hence, we can rewrite the two-attribute regret-averse utility function as

$$u(\pi) = v(\pi) - \lambda g(v(\pi^{max}) - v(\pi)) \quad (5)$$

which suggests the pleasant experience of possessing the profit π depends not only on $v(\pi)$ but also on regret term $R = v(\pi^{max}) - v(\pi)$, i.e., the difference between the value the firm assigns to the ex-post optimal profit level π^{max} that could have achieved and the value it assigns to its actual final level of profit π . Exactly speaking, possess the maximal profit π^{max} is better off possessing profit π and suffering regret experience as well. To this sense, the attribute of regret aversion depicted by function g indicates that the more pleasurable the consequence might have been, the more regret will be undergone.

3. Behavior of Competitive Firms with Regret Aversion

To begin, we declare that the objective of the competitive firm with regret aversion under price uncertainty is to maximize the expectation of $u(\pi)$ by selecting the capital and labor input. Mathematically, we can write our problem as

$$\max_{K, L} E u(\pi). \quad (6)$$

Here, E is the linear expectation operator, $u(\pi)$ is defined as in expression (5), and π is subject to constraint (3). It's clear that the objective proposed for regret-averse competitive firm under uncertainty here is different from the one for risk-averse competitive firm under uncertainty, since the latter's objective is to maximize the expectation of utility function only for the profit, but the former's objective that shown above is to maximize the expectation of utility function on the profit and regret as well.

There are many merits to take advantage of such a model setting. For one thing, both the theory for competitive firms with risk aversion ($\lambda = 0$) and the theory for competitive firms with regret aversion ($\lambda > 0$) are involved. For another thing, we use $v(\pi^{max}) - v(\pi)$ rather than $\pi^{max} - \pi$ to index the regret term in the model setting, which enables different firms to own different regret as long as their utility functions on the regret term are different, and circumvents the shortage that different firms possess the same regret though their utility functions on regret are different. Besides, we can see that the bigger the value of λ , the stronger the attitude of regret. And so on.

Subsequently, we will adopt the more specific and tractable regret-averse utility function $u(\pi)$ to investigate the optimal behavior of competitive firms with regret aversion under price uncertainty.

For our purpose, differentiating $E u(\pi)$ with respect to K and L , respectively, and taking equalities (3) and (5) into account, we see the first-order conditions are

$$\frac{\partial Eu(\pi)}{\partial K} = E\{u'(\pi)(pF_K - r)\}, \quad (7)$$

$$\frac{\partial Eu(\pi)}{\partial L} = E\{u'(\pi)(pF_L - w)\}, \quad (8)$$

and the second-order conditions are

$$\frac{\partial^2 Eu}{\partial K^2} = E\{u''(\pi)(pF_K - r)^2 + u'(\pi)pF_{KK}\},$$

$$\frac{\partial^2 Eu}{\partial L^2} = E\{u''(\pi)(pF_L - w)^2 + u'(\pi)pF_{LL}\},$$

where, $u'(\pi) = v'(\pi) - \lambda g'(v(\pi^{max}) - v(\pi))v'(\pi)$, while $u''(\pi) = v'' - \lambda g''v'^2 + \lambda g'v''$.

Reminding that $F_{KK}, F_{LL} < 0, v' > 0, v'' < 0$ and $g', g'' > 0, \lambda \geq 0$, it's evident to see $\partial^2 Eu / \partial K^2, \partial^2 Eu / \partial L^2 < 0$. Therefore, we can claim that K^* and L^* are the optimal capital and labor input for the maximal expected utility of the competitive firm with regret aversion under price uncertainty, provided that there holds $\partial Eu / \partial K = 0$ at $K = K^*$ and $\partial Eu / \partial L = 0$ at $L = L^*$. As a matter of fact, we have the following Lemma.

Lemma. Let K^* and L^* be the optimal capital and labor input chosen to maximize the objective of the regret-averse competitive firm with uncertain price that defined in the optimal problem (6), then under the hypotheses (H1)- (H4), we see

$$F_K(K^*, L^*) < \frac{r}{Ep}, \quad F_L(K^*, L^*) < \frac{w}{Ep}, \quad \text{if } Cov(u'(\pi), p) > 0,$$

$$F_K(K^*, L^*) > \frac{r}{Ep}, \quad F_L(K^*, L^*) > \frac{w}{Ep}, \quad \text{if } Cov(u'(\pi), p) < 0,$$

$$F_K(K^*, L^*) = \frac{r}{Ep}, \quad F_L(K^*, L^*) = \frac{w}{Ep}, \quad \text{if } Cov(u'(\pi), p) = 0.$$

Put differently, if $u'(\pi)$ is increasing with P , then $F_K(K^*, L^*) < \frac{r}{Ep}, F_L(K^*, L^*) < \frac{w}{Ep}$; if $u'(\pi)$ is decreasing with P , then $F_K(K^*, L^*) > \frac{r}{Ep}, F_L(K^*, L^*) > \frac{w}{Ep}$; and if $u'(\pi)$ is uncorrelated with P , then $F_K(K^*, L^*) = \frac{r}{Ep}, F_L(K^*, L^*) = \frac{w}{Ep}$, which is equivalent to the case without price uncertainty.

Proof. Actually, by simple computation, it's easy to rewrite equations (7)-(8) as

$$\frac{\partial Eu}{\partial K} = F_K Cov(u'(\pi), p) + (\hat{p}F_K - r)Eu'(\pi), \quad (9)$$

$$\frac{\partial Eu}{\partial L} = F_L Cov(u'(\pi), p) + (\hat{p}F_L - w)Eu'(\pi). \quad (10)$$

Thus, by setting $\partial Eu / \partial K = 0, \partial Eu / \partial L = 0$, and considering $F_K, F_L > 0$ as well as $u'(\pi) > 0, \hat{p} > 0$, the results shown in the Lemma is obtained. The proof is completed.

We remark that $F_K(K^*, L^*) = \frac{r}{Ep}, F_L(K^*, L^*) = \frac{w}{Ep}$ just hold under the price without uncertainty,

i.e., $p = \hat{p}$. While under price with uncertainty, $F_K(K^*, L^*) < \frac{r}{Ep}, F_L(K^*, L^*) < \frac{w}{Ep}$ will hardly happen in reality. To elaborate the reasons in detail, we present the Theorem 1 below.

Theorem 1. Let K^* and L^* be the optimal capital and labor input chosen to maximize the objective of the regret-averse competitive firm with uncertain price that defined in optimal problem (6), then under the hypotheses (H1)- (H4), there must hold $F_K(K^*, L^*) > \frac{r}{Ep}$, $F_L(K^*, L^*) > \frac{w}{Ep}$, which implies that both the optimal input of capital and labor under price uncertainty are less than those under certain price.

Proof. Letting $\partial E u / \partial K = 0$, then by equality (7), it yields

$$E\{u'(\pi)(p - \hat{p})\} = E\{u'(\pi)(r / F_K - \hat{p})\}. \quad (11)$$

Taking equations (1) and (3) into account, we have

$$\pi - E\pi = (p - \hat{p})Q. \quad (12)$$

Reminding that $u(\pi)$ is a concave function, so following formula (12) above, we obtain

$$\begin{cases} u'(\pi) \leq u'(E\pi), & p \geq \hat{p}, \\ u'(\pi) > u'(E\pi), & p < \hat{p}. \end{cases}$$

Directly, we can get

$$u'(\pi)(p - \hat{p}) \leq u'(E\pi)(p - \hat{p}). \quad (13)$$

Taking expectation on both sides of inequality (13), and noting that $u'(E\pi)$ is a given value, there holds

$$E\{u'(\pi)(p - \hat{p})\} \leq u'(E\pi)E(p - \hat{p}) = 0. \quad (14)$$

Observing formulae (11) and (14), we can see

$$E\{u'(\pi)(r / F_K - \hat{p})\} \leq 0.$$

And then, we have

$$F_K(K^*, L^*) \geq r / \hat{p},$$

because $u'(\pi) > 0$, $r / F_K - \hat{p}$ is a determined number.

Repeating the same argument, we can obtain

$$F_L(K^*, L^*) \geq w / \hat{p}.$$

Especially, we should notice that $F_K(K^*, L^*) = r / \hat{p}$, $F_L(K^*, L^*) = w / \hat{p}$ hold just under the condition

$p = \hat{p} = Ep$, i.e., p is a constant variable. In other words, under price uncertainty, there only holds

$F_K(K^*, L^*) > r / \hat{p}$, $F_L(K^*, L^*) > w / \hat{p}$, which means that both the optimal input of capital and labor under

price uncertainty are less than those under certain price since F_K and F_L are decreasing functions with

respect to K and L , respectively. The proof is completed.

Finally, we continue to examine the question that how the optimal behavior changes with the movement of the regret factor. To this end, Theorem 2 is proposed straightforwardly.

Theorem 2. Let K^* and L^* be the optimal capital and labor input chosen to maximize the objective of the regret-averse competitive firm with uncertain price that defined in optimal problem (6), then under the hypotheses (H1)- (H4), there yields

$$\begin{aligned} \partial K^* / \partial \lambda &> 0, & \text{if } (\hat{p}F_K - r) / F_K > \text{Cov}(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\}, \\ \partial K^* / \partial \lambda &< 0, & \text{if } (\hat{p}F_K - r) / F_K < \text{Cov}(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\}; \\ \partial L^* / \partial \lambda &> 0, & \text{if } (\hat{p}F_L - w) / F_L > \text{Cov}(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\}, \\ \partial L^* / \partial \lambda &< 0, & \text{if } (\hat{p}F_L - w) / F_L < \text{Cov}(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\}. \end{aligned}$$

Particularly, neither the sign of $\partial K^* / \partial \lambda$ nor of $\partial L^* / \partial \lambda$ can be determined definitely if

$$\begin{aligned} (\hat{p}F_K - r) / F_K &= Cov(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\} && \text{and} \\ (\hat{p}F_L - w) / F_L &= Cov(u'(\pi) - v'(\pi), -p) / E\{u'(\pi) - v'(\pi)\}. \end{aligned}$$

Proof. Since $\partial^2 Eu / \partial K^2 < 0$, $\partial^2 Eu / \partial L^2 < 0$, thus, the optimal capital input K^* and labor input L^* can be obtained by solving equations $\partial Eu / \partial K = 0$, $\partial Eu / \partial L = 0$. By equations (7)-(8), we see that K^* , L^* satisfy

$$\begin{aligned} E\{u'(\pi)(pF_K - r)\} &= 0, \\ E\{u'(\pi)(pF_L - w)\} &= 0. \end{aligned}$$

Naturally, K^* , L^* are the solutions for equations

$$E\{(v'(\pi) + \lambda g'v'(\pi))(pF_K - r)\} = 0, \quad (15)$$

$$E\{(v'(\pi) + \lambda g'v'(\pi))(pF_L - w)\} = 0, \quad (16)$$

because $u'(\pi) = v'(\pi) + \lambda g'(v(\pi^{\max}) - v(\pi))v'(\pi)$. Evidently, the two equations indicate λ can be expressed by K^* , L^* . That is, λ is a function of K^* , L^* .

We next examine the dynamic relationships between K^* and λ , L^* and λ .

Differentiating both sides of equation (15) with respect to K^* and equation (16) with respect to L^* , we have

$$\begin{aligned} \frac{\partial \lambda}{\partial K^*} \cdot E\{g'v'(pF_K - r)\} &= -E\{(v'' + \lambda(g'v'' - g''v'^2))(pF_K - r)^2\} - E\{(v' + \lambda g'v')pF_{KK}\}, \\ \frac{\partial \lambda}{\partial L^*} \cdot E\{g'v'(pF_L - w)\} &= -E\{(v'' + \lambda(g'v'' - g''v'^2))(pF_L - w)^2\} - E\{(v' + \lambda g'v')pF_{LL}\}. \end{aligned}$$

Applying $u' = v' + \lambda g'v'$, and $u'' = v'' + \lambda(g'v'' - g''v'^2)$, we get

$$\begin{aligned} \frac{\partial \lambda}{\partial K^*} \cdot E\{g'v'(pF_K - r)\} &= -E\{u''(pF_K - r)^2\} - E\{u'pF_{KK}\} > 0, \\ \frac{\partial \lambda}{\partial L^*} \cdot E\{g'v'(pF_L - w)\} &= -E\{u''(pF_L - w)^2\} - E\{u'pF_{LL}\} > 0, \end{aligned}$$

since $u' > 0$, $u'' < 0$, $F_{KK}, F_{LL} < 0$ and $p > 0$.

To judge the signs of $\partial \lambda / \partial K^*$, $\partial \lambda / \partial L^*$ definitely, we only need to judge the signs of $E\{g'v'(pF_K - r)\}$, $E\{g'v'(pF_L - w)\}$, respectively. Actually, we know

$$\begin{aligned} E\{g'v'(pF_K - r)\} &= Cov(g'v', pF_K - r) + E\{g'v'\}(\hat{p}F_K - r) \\ &= F_K Cov(g'v', p) + E\{g'v'\}(\hat{p}F_K - r) \\ &= \frac{F_K}{\lambda} Cov(u' - v', p) + \frac{1}{\lambda} E\{u' - v'\}(\hat{p}F_K - r). \end{aligned}$$

Similarly, we obtain

$$E\{g'v'(pF_L - w)\} = \frac{F_L}{\lambda} Cov(u' - v', p) + \frac{1}{\lambda} E\{u' - v'\}(\hat{p}F_L - w).$$

At this point, we see

$$\begin{aligned} \partial \lambda / \partial K^* &> 0, & \text{if } (\hat{p}F_K - r) / F_K > \text{Cov}(u' - v', -p) / E\{u' - v'\}, \\ \partial \lambda / \partial K^* &< 0, & \text{if } (\hat{p}F_K - r) / F_K < \text{Cov}(u' - v', -p) / E\{u' - v'\}, \\ \partial \lambda / \partial L^* &> 0, & \text{if } (\hat{p}F_L - w) / F_L > \text{Cov}(u' - v', -p) / E\{u' - v'\}, \\ \partial \lambda / \partial L^* &< 0, & \text{if } (\hat{p}F_L - w) / F_L < \text{Cov}(u' - v', -p) / E\{u' - v'\}. \end{aligned}$$

In particular, the signs of $\partial \lambda / \partial K^*$, $\partial \lambda / \partial L^*$ are undetermined if $(\hat{p}F_K - r) / F_K = \text{Cov}(u' - v', -p) / E\{u' - v'\}$, $(\hat{p}F_L - w) / F_L = \text{Cov}(u' - v', -p) / E\{u' - v'\}$. The proof is completed.

4. Illustration

In this section, we illustrate the findings we obtained in Theorems 1-2 in Section 3.

For simplicity and operability, the production function $F(K, L)$ of the regret-averse competitive firm is adopted by Cobb-Douglas type function, namely

$$F(K, L) = AK^\alpha L^\beta, \quad 0 < \alpha, \beta < 1, \quad A > 0.$$

It's clear to see that $F(K, L) = AK^\alpha L^\beta$ satisfies the quasi-concave conditions. Without loss of generality, we set $\alpha = 1/2$, $\beta = 1/4$ and normalize the technology A to unit one hereafter, *i.e.*, $A = 1$. Secondly, we assume function $v(x) = x^{1/2}$ and function $g(x) = x^{6/5}$, which satisfy the hypothesis (H3). Lastly, we suppose the price $p = 4$ with expected probability q or $p = 8$ with expected probability $1 - q$, and $w = 1/4$, $r = 1/2$.

Under the theory developed in this paper, the competitive firm with regret aversion under price uncertainty will choose optimal input by maximizing the expected utility $Eu(\pi)$, that is

$$\begin{aligned} \max_{K, L} Eu(\pi) &= \max_{K, L} \left\{ q \left[\sqrt{4K^{1/2}L^{1/4} - K/2 - L/4} - \lambda \left(8 - \sqrt{4K^{1/2}L^{1/4} - K/2 - L/4} \right)^{6/5} \right] \right. \\ &\left. + (1 - q) \left[\sqrt{8K^{1/2}L^{1/4} - K/2 - L/4} - \lambda \left(32 - \sqrt{8K^{1/2}L^{1/4} - K/2 - L/4} \right)^{6/5} \right] \right\}. \end{aligned}$$

Setting $\partial Eu(\pi) / \partial K = 0$, $\partial Eu(\pi) / \partial L = 0$, we have

$$\begin{aligned} \frac{1 - q}{\sqrt{B_1}} (4K^{-1/2}L^{1/4} - \frac{1}{2}) \left(\frac{1}{2} + \frac{3\lambda}{5} (32 - \sqrt{B_1})^{1/5} \right) &= \frac{q}{\sqrt{B_2}} \left(\frac{1}{2} - 2K^{-1/2}L^{1/4} \right) \left(\frac{1}{2} + \frac{3\lambda}{5} (8 - \sqrt{B_2})^{1/5} \right), \\ \frac{1 - q}{\sqrt{B_1}} (2K^{1/2}L^{-3/4} - \frac{1}{4}) \left(\frac{1}{2} + \frac{3\lambda}{5} (32 - \sqrt{B_1})^{1/5} \right) &= \frac{q}{\sqrt{B_2}} \left(\frac{1}{4} - K^{1/2}L^{-3/4} \right) \left(\frac{1}{2} + \frac{3\lambda}{5} (8 - \sqrt{B_2})^{1/5} \right), \end{aligned}$$

where, $B_1 = 8K^{1/2}L^{1/4} - K/2 - L/4$, $B_2 = 4K^{1/2}L^{1/4} - K/2 - L/4$, then we get $K^* = L^*$.

Under price uncertainty, it's easy to obtain

Case I. The expected probability of $p = 4$ is $q = 1/2$

$$\begin{cases} K^* = L^* = 565.683, \text{ if } \lambda = 0 \\ K^* = L^* = 582.887, \text{ if } \lambda = 0.25 \\ K^* = L^* = 591.496, \text{ if } \lambda = 0.5 \\ K^* = L^* = 596.643, \text{ if } \lambda = 0.75 \\ K^* = L^* = 600.032, \text{ if } \lambda = 1 \\ K^* = L^* = 706.324, \text{ if } \lambda = 2 \end{cases}$$

Note that, the competitive firm is just risk-averse when $\lambda = 0$, while is regret-averse as well as risk-averse when $\lambda > 0$.

From the findings of Case I, it's easy to verify $F_K(K^*, L^*) > \frac{r}{Ep}$, $F_L(K^*, L^*) > \frac{w}{Ep}$. In fact, we notice that the optimal capital and labor input under certain price, *i.e.*, $p = \hat{p} = (4 + 8) / 2 = 6$, are $K^{**} = L^{**} = 1296$, which are much larger than those under uncertain price. Therefore, the results we get from the illustration is in accordance with Theorem 1. Simultaneously, we get that the optimal input for the competitive firm with regret aversion under uncertainty are changing with the variation of λ that is the weight of regret aversion relative to risk aversion. In this example, the optimal capital input and labor input are increasing with λ , put differently, that is $\partial K^* / \partial \lambda, \partial L^* / \partial \lambda > 0$, which are in line with our result suggested in Theorem 2 because it can be shown that $(\hat{p}F_K - r) / F_K < Cov(v'(\pi), -p) / Ev'(\pi)$, $(\hat{p}F_L - w) / F_L < Cov(v'(\pi), -p) / Ev'(\pi)$.

In addition, by using $K^* = L^*$, we can plot the expected utility of profits, and the optimal input for λ (See Figures 1-2 corresponding to Case I at length). Within them, Figure 1 confirms that for $\lambda = 1$, $Eu(\pi)$ achieves to the maximum at $K^* = 600.032 = L^*$. Figure 2. shows that the optimal input are increasing with λ . Of course, we can also plot the expected utility of profits, $Eu(\pi)$, for other values of λ , but to avoid giving unnecessary details, we omit them in this paper.

Case I. The expected probability of $p = 4$ is $q=1/3$.

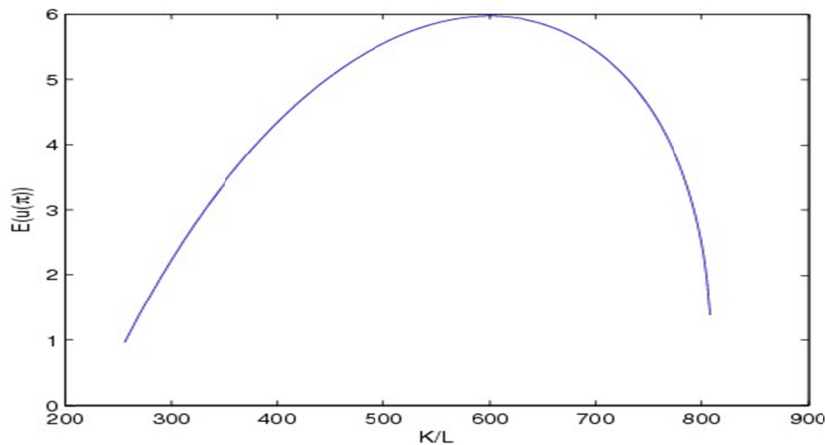


Figure 1. Expected utility of profits for $\lambda = 1$

Note: K/L herein indicates K or L (Hereafter the same).

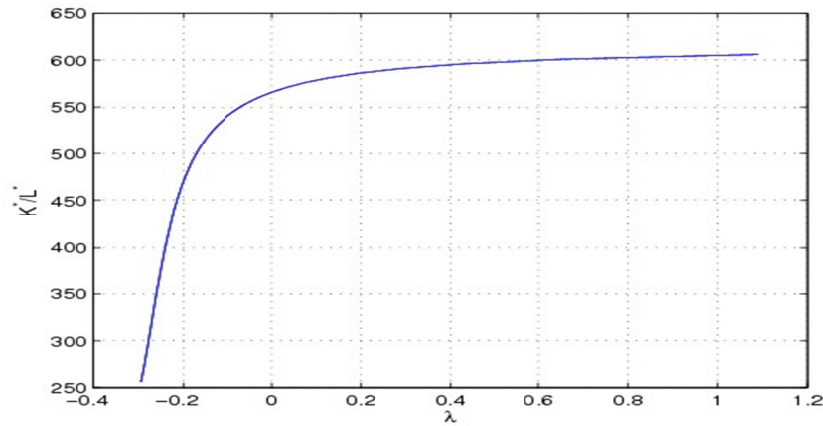


Figure 2. The dynamic relationships between optimal input and λ

In this example, $\partial K^* / \partial \lambda, \partial L^* / \partial \lambda > 0$ imply that the optimal capital and labor input for the regret-averse competitive firm ($\lambda > 0$) under price uncertainty are larger than the optimal capital and labor input for the risk-averse competitive firm ($\lambda = 0$) under price uncertainty.

For different values of the expected probability q , we have the following consequences.

Case II. The expected probability of $p=4$ is $q=1/3$.

$$\left\{ \begin{array}{l} K^* = L^* = 688.538, \text{ if } \lambda = 0 \\ K^* = L^* = 696.102, \text{ if } \lambda = 0.25 \\ K^* = L^* = 699.805, \text{ if } \lambda = 0.5 \\ K^* = L^* = 702.004, \text{ if } \lambda = 0.75 \\ K^* = L^* = 703.454, \text{ if } \lambda = 1 \\ K^* = L^* = 770.375, \text{ if } \lambda = 2 \end{array} \right.$$

Case III. The expected probability of $p=4$ is $q=1/4$.

$$\left\{ \begin{array}{l} K^* = L^* = 741.054, \text{ if } \lambda = 0 \\ K^* = L^* = 744.390, \text{ if } \lambda = 0.25 \\ K^* = L^* = 746.052, \text{ if } \lambda = 0.5 \\ K^* = L^* = 747.042, \text{ if } \lambda = 0.75 \\ K^* = L^* = 747.699, \text{ if } \lambda = 1 \\ K^* = L^* = 789.603, \text{ if } \lambda = 2 \end{array} \right.$$

Analogously, corresponding to Case II and Case III, we can plot the expected utility of profits for $\lambda=1$ (See Figures 3-4. associated with Case II and Case III in detail).

Case II. The expected probability of $p=4$ is $q=1/3$.

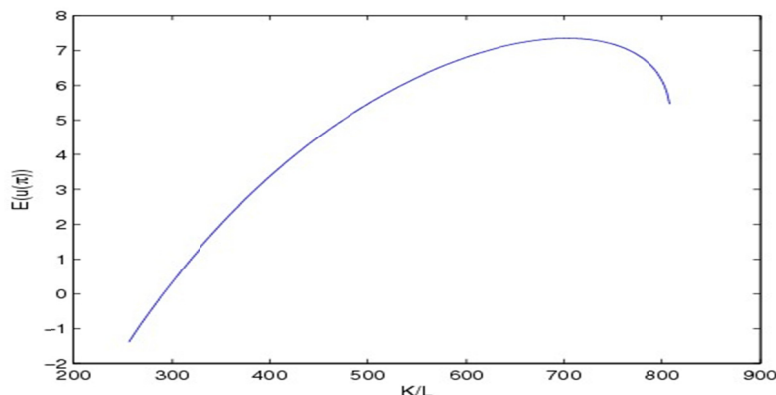


Figure 3. Expected utility of profits for $\lambda=1$

Case III. The expected probability of $p=4$ is $q=1/4$

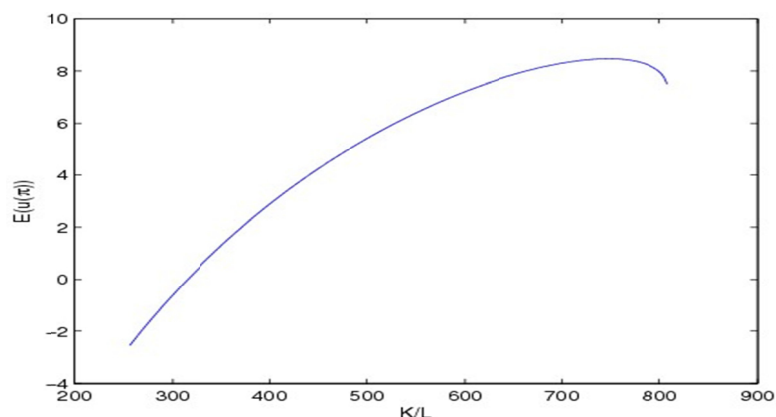


Figure 4. Expected utility of profits for $\lambda=1$

From the numerical results of Case I to Case III, we see that for the same λ , the optimal capital and labor input for the regret-averse competitive firm under price uncertainty are increasing with the decreasing of the expected probability of the bad case (The output price turns out to be low and sales turn out to be poor). Certainly, the expected utility of profits are increasing either. For example, given $\lambda=1$, we can see the $Eu(\pi)$ in Figure 1. ($q=1/2$) is the lowest, and $Eu(\pi)$ in Figure 4 ($q=1/4$) is the highest, while $Eu(\pi)$ in Figure 3. ($q=1/3$) is between these two extremes. The consequence is not difficult to understand, because the lower the expected probability of the bad case, then the higher the expected probability of the good case (The output price turns out to be high and sales turn out to be good), which means the more positive the attitude of decision-maker toward the future, thereby, it's reasonable for the decision-maker to invest more.

Again, from the numerical results of Case I to Case III, we see that for the same scope of λ such as $\lambda \in [0, 2]$, the changes of optimal capital and labor input are more smoothing with the decreasing of the expected probability of the bad case ($p=4$). In other words, the higher the expected probability of the good case ($p=8$), the less impacts of the changes of λ , that is, the weight of regret-averse attribute relative to risk-averse attribute, would on the optimal capital and labor input.

5. Conclusion

During the past decades, many papers such as Kahneman and Tversky (1979) pointed out the conventional expected utility theory is invalid or non-universal in the real world. In other words, some important factors that can affect people's choices have been overlooked or misspecified by the conventional expected utility theory. In view of this point, Paroush and Venezia improved the traditional production theory by introducing a regret aversion factor. There exists, however, some limitations in the regret function they constructed.

To circumvent those limitations in Paroush and Venezia's paper, a more specific and tractable regret-averse

function that can consider feelings of both regret and rejoicing at the same time is set up to study our problem in this paper. Fortunately, many results that are consistent with the behavior of regret-averse managers are obtained from the model we established in the paper. For instance, both the optimal capital and labor input of a competitive firm with regret aversion under price uncertainty are small relative to those of a competitive firm under certain price. Also, we show that the optimal input will change with the movement of the weight of regret aversion relative to risk aversion. Furthermore, the lower the expected probability of the bad case (The output price turns out to be low and sales turn out to be poor), then the higher the expected probability of the good case (The output price turns out to be high and sales turn out to be good), which means the more positive the attitude of decision-maker toward the future, thereby, the more investment would be made by the decision-maker. Lastly, the higher the expected probability of the good case, the less impacts of the changes of the regret aversion weight relative to risk aversion would have on the optimal capital and labor input.

In short, to assume that a firm is only risk-averse may not always be correct or appropriate though it is common in economic theory. That is why we extend the traditional production theory by introducing a regret aversion factor to a competitive firm under uncertainty. Put differently, we assume that a decision maker of a competitive firm under uncertain output price is not only risk-averse, but also regret-averse. Furthermore, our assumptions are consistent with some cases in the reality, which means our extension is sensible and reasonable, instead of taking it for granted.

The last but not the least, the major contribution of this paper can be concluded as below. First of all, this paper is the first to apply the two-attribute utility function to study the properties of a competitive firm's investment behavior with regret aversion and risk aversion under price uncertainty. Secondly, the model enables different firms to possess different regrets provided that their utility functions on the regret term are different, which circumvents the limitation that utility functions of regret-averse firms with different regret terms possess the same regret. Finally, the framework allows us to make comparative statics of the optimal input by changing the parameter of the regret term. Certainly, the model not only represents the production theory for competitive firms with risk aversion, but also represents the production theory for competitive firms with regret aversion.

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Lobbies: Another Dose for Protectionism

Montej Abida¹

¹ School of Business, University of Sfax, Tunisia

Correspondence: Montej Abida, School of Business, University of Sfax, BP 1081 Sfax 3018, Tunisia. Tel: 216-98-487-913. E-mail: montejabida@gmail.com

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Abstract

The objective of this paper is to examine the influence of lobbies on the choice of a country's trade policy. The existence of several illegal financings of electoral campaigns has led us to ask questions about the proliferation of protectionist trade practices. Indeed, there are sources of illegal financing such as bribes for granting a commitment to a tariff protection of a lobby's interests.

A new conception attempts to show that the political players are the main responsible for the adoption of a protectionist trade policy: the political players, who are financed by companies during their electoral campaigns, should keep their promises vis-à-vis these companies by raising excise duties or adopting unfair trade policies such as export subsidies.

Lobbying is able to disrupt international trade negotiations by exerting pressure on its government and obliging it to take a decision that does not comply with the rules of international trade. International trade negotiations taking place within the GATT are often disturbed by political issues: the political and social pressures have continued ravaging the international trade negotiations. The best known example is the problem of agricultural subsidies between the EU and the United States.

To solve the problems related the control of political spending, we assumed the existence of a monitoring body that is called (ICCERGI) (Independent Commission for the Control of Elections and Research of General Interest) which plays the role of "Principal". The aim of the latter is to control the operations that take place between political parties and interest groups, that we called the "Agents".

Keywords: lobbying, political parties, election campaigns, protectionism, WTO, Principal-Agent model

1. Introduction

In this paper, we are going to develop a model that explains the effect of the political process on the determination of trade policy. Political issues have a great influence on the choice of the business strategy that the government has to follow. A new conception attempts to show that the political players are the main responsible for the adoption of a protectionist trade policy: the political players, who are financed by lobbies (or interest groups or pressure groups) during their election campaigns, must keep their promises vis-à-vis these lobbies by raising customs duties or adopting unfair trade policies such as export subsidies.

There are several kinds of lobbies which exert pressure on the government (Libaert and Bardon, 2012). The question is: who are really these lobbyists and how do they influence public decisions (Daridan and Luneau, 2012). Among these lobbies there are the trade unions, religious groups and associations that deal with, for example, environmental issues, poverty and exclusion. Brugvin (2009) adds other types of lobby such as the numerous research offices, consulting firms, public-relation as well as public-affair agencies. According to this author, professional associations contribute to the development of international policies. Similarly, Koutroubas and Lits (2011) show that many pressure groups have professionalized their contracts with policy-makers and interfere with the political choice processes.

Indeed, several models are interested in analyzing the interaction between economic and social interests which are often represented by "lobbyists" and the particular interests of the political players. Among the authors who have invested in this area, we can state Brock and Magee (1978), Findlay and Wellisz (1982), Feenstra and Bhagwati (1982). " Instead of a benevolent government, we must model rational politicians eager to maximize a certain objective function with election-like elements, reelection or other more direct gains" (Laussel and Montet,

1994). Similarly, Guillochon (2006) showed that a country's protection degree depends mainly on pressures exerted by the producers on political bodies either by votes or by lobbying.

There is a strong relationship between the political parties and the lobbies. We often refer to a pressure group belonging to a political party. For example, in France, the GCL (General Confederation of Labour) is a very close union to the Communist Party. In contrast, the CNPF (National Confederation of French Employers) is a traditionally sympathizing union of right-wing parties. As the election campaigns of politicians are funded, in part, by companies, it is then obvious that the political players, in their turn, defend these companies when they are in difficulty.

Our model examines the interactions between the interests of political players and those of pressure groups, we are going to study the interactions between the political players seeking to influence the public opinion by adopting protectionist trade policies. The political players who are supported by some companies during their election campaigns, are forced to defend the economic interests of these companies. This obligation may disrupt the international trade negotiations because we can not talk about free trade by following purely protectionist strategies. The political climate of a country may be responsible for the success or failure of international trade negotiations.

The trade negotiations of the Uruguay Round have demonstrated the existence of political pressure when the government in power wants to take a decision on any business problem. Lobbies have their say in the business strategy that the government will follow in international trade negotiations. This is the case of the French farmers in the Euro-American conflict over export subsidies, for example. The International trade negotiations of the Uruguay Round have been influenced by the protests of the French pressure groups that wanted at any cost to protect the interests of their farmers.

The Common Agricultural Policy (CAP) represents about 40% of the European Union budget. The agricultural conflict between the European Union and the United States has shown the influence degree of lobbies on the progress of the Uruguay Round trade negotiations. It should be noted that trade in agricultural products is largely dominated by the European Union and the United States. Indeed, in 2010, according to the World Trade Organization (WTO), the European Union represented 9.5% of the world exports in agricultural products. During the same year, the United States share is 10.1%.

The agricultural problem between the European Union and the United States is based mainly on production aid. Indeed, the production subsidy is the most important strategy of the CAP, "the aid per hectare or head of livestock for producers to compensate for the reduction in agricultural prices to make them closer to world prices" (CAP 2013 Group, page 23). Through rounds of negotiations, the WTO is seeking solutions to the problem of agricultural subsidies by asking the European Union to review of the CAP in a more liberal direction (European Council for Agricultural Law, 2011).

This article will analyze the importance of lobbying in the choice of the country's trade policy: the lobby discusses major economic and strategic issues facing the country. It now seems difficult to analyze the issues of international trade without taking into account explicitly the influence of interest groups and the political players in each country. The government, the opposition players and the lobby groups are the main players. We will show that lobbies that participate greatly in the adoption of a protectionist trade policy. Under the direct or indirect influence of the lobby, the policymaker must consider this pressure when he has to make a decision about a business problem negotiated world wide.

Because the real reason for the pressure of the lobby is not perfectly observable, we assumed that the existence of a committee called "Independent Commission for the Control of Elections and Research of General Interest (ICCERGI)". The commission's task is to control illegal practices used by the lobbies and the political parties during the election campaign. We used the Principal-Agent model to avoid the interference of the lobby in the political game. The objective of (ICCERGI), which plays the role of "Principal" is to create an incentive mechanism able to solve primarily the problem of asymmetric information and to control, on the other hand, the operations that take place between the political parties and the lobbies (the latter play the role of "Agents").

2. The Importance of the Lobby

The lobby plays an important role in the choice of trade policy. According to Polere (2007), lobbying has been booming in France and in Europe since the mid-1990s, mainly because of the European integration and the evolution of society and types of governance. Interest groups can potentially influence the policy makers by providing contributions and relevant information to sway the decision in favor of the group (Bennedsena and Feldmann 2006). Brugvin (2009) analyzes the different political and economic types of lobby which are

undemocratic, unequal and illegal.

Unlike the existing system in the United States, Debouzy (2003) argues that lobbying in France is, by definition, a "discrete, obscure and underground" activity. According to Garault and Fretwell (2012), lobbying in France is poorly defined and misunderstood. Lobbying often remains seen as an element which negatively affects that decision. However, lobbying is an important contribution of civil society to the development of law if it is based on expertise in accordance with the rules of transparency and ethics. The negative face attributed to lobbying in France is put into question to discover the benefits of this practice (and Libaert Bardon, 2012).

3. The Terms of Election Campaign Financing

For most countries, the campaign is funded in two ways: a public funding and a private one. The problem that always arises is in private funding. Indeed, there are several illegal private financings of election campaigns. For example, during the French 2007 presidential election, the candidate Sarkozy is suspected of illegally financing his election campaign. Normally, the funding sources of political parties come from contributions and private individuals.

According to the French law, each candidate must meet three requirements. The first is holding a campaign account that sets very precisely the origin of income and the nature of the expenditure. Since the Organic Law of 05 April 2006, the account must be submitted to the National Commission of Audit and Financial Policies (NCAFP) not later than the ninth Friday after the second round of voting in order to check the regularity. The second rule is related to setting spending limits the amount of which rose in 2007 to 16,160,000 Euros for the candidates in the first round and to 21.59 million for those in the second round. Reimbursement of campaign expenses is expected. The third rule is to limit donations from private persons to 4600 Euros. Any donation less than 150 Euros cannot be made in cash. In 1995, donations from private companies were banned.

For example, during the U.S. presidential campaign in 2012, the candidate Barack Obama and Mitt Romney, spent about six billion dollars. This campaign is the most expensive in the history of the United States. Indeed, the "Super PAC: Political Action Committee," (political action committees of both parties) allowed both candidates to circumvent the laws of finance.

4. The Politico-Commercial Model as a Principal-Agent Model

The theory of contracts and that of incentives highly take a great part in the resolution of agency problems. Indeed, in these recent decades, the economic analysis of the contract theory has been highly developed. It has been applied in many fields such as finance, the labor market, the insurance industry, Salanié (1994) presented the basic models of contract theory by analyzing three main models that are based on self-selection, signals and moral hazard.

The principal-agent model is developed by the agency theory. Indeed, the general shape of the agency relationship is defined as "a contract by which one or more people (the principal) engage another person (the agent) to perform an action on their behalf, which implies giving the delegation to an agent to take certain decisions" (Jensen and Meckling 1976, p. 313).

The existence of a conflict of interest between the principal and agents has greatly led many economists to consider this problem. Indeed, the presence of information asymmetry is at the basis of the existence of conflicting interests between the principal and agents. The asymmetric information problems come in two forms depending on the nature of the information: the first form is related to the adverse or adverse selection and the second one illustrates the problem of moral hazard or risk.

The anti-selection problem is based on uncertainty about the type of agent: during the signature of the contract, the principal does not know the hidden information by the agent. Therefore, the agent conceals private information about an exogenous variable. On the contrary, the problem of moral hazard is a situation of hidden action after the signature of the contract: it is the behavior of the agent which is unknown. Thus, the Principal does not observe the action of the agent that is an endogenous variable. The principal-agent models can unify between the case of adverse selection and the moral hazard: the Principal has no idea about the exogenous and endogenous variables.

Laffont and Martimort (2002) presented a more detailed introduction on the theory of incentives through the analysis of principal-agent models. Indeed, these two provided the methodological tools to set up institutions that can assure the right incentives for economic agents. According to Laffont (1993, 2006), the incentive theory studies "the development of rules and institutions that encourage economic agents to make great efforts to transmit correctly any private information that is socially relevant" (Laffont (2006), p.177).

In our model, the role of the "Principal" can not be detained by any political player. Indeed, we have seen that the political player and the lobbies get on well with each other. We will then assume, in the manner envisioned by the auctioneer Walras, the existence of a player who is looking for the public interest. So, we call it "Independent Commission for the Control of Elections and Research of General Interest (ICCERGI)" the "Principal" in this game and the political parties and lobbies, "Peripheral Agents". The ideal is to find a body that can remove lobbies from the political game. The supervisory body must control the illegal operations well by prohibiting the lobby from making deals with the political players. The supervisory body should be honest and should not interfere in the political game.

It is possible to admit that the "ICCERGI" can create an incentive mechanism to prevent the lobby from intervening in the political game. The elimination of high pressure on the "ICCERGI" makes the political game much more transparent. The lobby should just deal with the legal protection of the interests of its companies and must move away from politics by not doing business illegally. Our goal is to make the lobby get away from politics.

The "ICCERGI" should encourage the lobby to reveal its private information. It must try to protect the economic interests of all domestic firms so that some lobbies do not exert pressure. Seeking the public interest is a top priority that "ICCERGI" must achieve. Without this goal, "ICCERGI" cannot induce the lobby not to participate in politics. The "ICCERGI" should encourage the lobby to cooperate and look for the welfare of the whole country.

We assume that the "ICCERGI" has the power to prohibit the lobby to intervene in the political game. The "ICCERGI" should set the rules that apply to each lobby (where there is a constraint in participation). For the interests of the country, there is no point in changing the rules which are the same for all exogenous signals.

4.1 The Information Structure

The lack of visibility on the real reason for the funding of a political party shows that there is a hidden information held by lobbies. Similarly, the intensity of the pressure that lobbies exert on the player in power is often exaggerated: the information about the real reason for the protests of lobbies is certainly misleading. It is not clear whether the lobby defends only the economic interests of some people or he is also involved in the political issues. The existence of pressure groups in favor of the political parties plays an important role in the intensity of the pressure exerted on the player in power. So, ignorance of the true characteristic of the relationship between lobbies and political parties obliges us to find a mechanism capable of encouraging the lobby to reveal the true characteristic of this relationship.

4.1.1 Pressure Groups Transmit Information

The reaction of lobbies against any decision of the player in power plays an important role in the transmission of information (This idea has been developed by Mayer 1993 Reizman and Wilson 1993). Indeed, if we take the example of international trade issues, we notice clearly that the lobbies' protests give us an idea of the international trade environment and more exactly the atmosphere of international trade negotiations. The lobbies, therefore, help us find out the strategies and trade policies used by each country.

The lobbies also give us information on trade policy that the player in power will follow during international trade negotiations. By their aggressive methods and events that they organize, lobbies make the public aware of what is happening in international trade negotiations. The violent protests of French farmers against their government helped the public to be close in following the outcome of trade negotiations of the Uruguay Round, especially the agricultural problem that happened between the European Union and the United States. So, the lobbies transmit information, even if it is often amplified.

4.1.2 The Existence of Asymmetric Information

Information play an important role in the politico-commercial game. Thus, the existence of information asymmetry between the "ICCERGI" and the political parties and lobbies leads us to use the theory of incentives in order to encourage lobbyists to disclose accurate information concerning the real reason for financing political parties. The "ICCERGI" must also know the main cause of discontent among lobbies towards any commercial problem. Indeed, lobbies can be influenced by the players in opposition who try to sabotage only the player in power and do not try to find the best solution to the commercial problem at hand. The principle of "give and take" that exists between political players and lobbies is the first source of information asymmetry.

4.1.3 The Influence of Asymmetric Information on the Choice of Trade Policy

Information asymmetries between the player in power and lobbies are a systematic source of inefficiency in the

choice of trade policy. If the lobbies are excluded from the political game, we are certain that the player in power can choose a decision that protects the public interest and not the interest of individuals. Lobbies exploit political players at the expense of the economic efficiency of a country in particular, and free trade in general. The player in power may not be able to negotiate appropriately with other countries as long as there is a strong pressure on him.

The Information about the real reason for the pressure of the lobby is very important in the game of international trade negotiations. Indeed, the lobby is a threat to the game of free trade. The pressure of the lobby on the player in power can disrupt international trade negotiations and create a non-cooperative environment worldwide.

4.1.4 Lobbies Have Private Information

In the politico-commercial game, they are lobbies that are responsible for the existence of information asymmetries. Indeed, the pressure exerted by the lobby on the player in power is often exaggerated only the lobbies can get along with the players in the opposition to sabotage the player in power. This asymmetric information and strategic behavior of political players and lobbies are the main problems that the "ICCERGI" has to resolve.

The atmosphere of the politico-economic game depends on the private information held by the lobbies. This information is not observable by the "ICCERGI" because it is costly for lobbies. These latter are still trying to deny the existence of an agreement between them and the political players. They are especially the lobbies that have not helped the player in power during his election campaign that will hold this private information. As a precaution, each lobby prefers to keep the agreement secret between them and the political players. The "ICCERGI" cannot perfectly observe the strategy of lobbies. They have an advantage in terms of information about the pressure they exert on the player in power.

Thus, we assume that trade policies depend on the information θ that lobbies transmit ($\theta \in \Theta$). The exact value of θ is a private information of L (Lobbies). The variable θ represents the actions of lobbyists when they knew the decision of the "ICCERGI". For example, if the player in power can choose a commercial policy of free trade, the lobby representing farmers will protest and demand that the player in power can follow a protectionist trade policy. So, the action of the lobby depends on the decision that the player in power will be able to take on any business problem. Thus, regardless of the decision that the player in power will take, there will always be a reaction of the lobbies since these latter are numerous and represent a number of activities that do not have the same objectives.

4.2 The Principal Is Represented by "ICCERGI" and the Lobbies Are Represented by Agents

The goal of "ICCERGI" is to encourage the lobby to reveal accurate information about the pressure it exerts. To achieve this goal, we will use a model of principal-agent which consists in considering the "ICCERGI" as the Principal and lobbies as Agents. The Principal-Agent models can be useful for us in the resolution of conflicts arising between "ICCERGI" and lobbies. For the "ICCERGI" there is ignorance of the characteristics of the pressure exerted by the lobby. The lack of observation of the true reason for of this pressure led the "ICCERGI" to find a mechanism that reveals the private information.

4.2.1 The Politico-Commercial Game Is a Model of an Adverse Selection-Type

The lobby has private information about the true reason for the pressure it exerts. This case shows that the lobby has an informational rent. The "ICCERGI" should create a mechanism of self-selection so that the announcement of the real reason for the pressure should be advantageous to the lobby. This mechanism is to protect the economic interests of the whole country, while maintaining good relations with other countries participating in the game of international trade. When "ICCERGI" proves that seeks to protect the interests of the lobby, the latter will have no reason to intervene in the political game.

Ensuring adequate protection of the interests of domestic enterprises must eliminate any agreement between the lobby and the political players. Thus, the "ICCERGI" has every opportunity to get the lobby away from politics. The lobby has no interest in meddling in the affairs of political players. It must deal with the protection of the economic interests of domestic firms by using legal means.

In this model, we will assume that the "ICCERGI" as the Principal and lobbies as peripheral Agents identified by ($i = 1, \dots, n$). We call θ the variable of adverse selection, which represents the characteristic of the lobby. This characteristic is based on the amplitude of the pressure of the lobby on the player in power.

$$\theta = [\theta_1, \dots, \theta_i, \dots, \theta_n] ; \theta \in \Theta \quad (1)$$

θ : vector called profile of the characteristics of the lobby.

Θ : set of the characteristics of lobbies.

$$\theta = \prod_{i=1}^n \theta_i \quad (2)$$

So, each lobby "i" has private information $\theta_i \in \Theta_i$, which represents the real reason for the pressure it exerts on the player in power. θ segment belonging to a convex set: $[\underline{\theta}, \bar{\theta}] \subset \mathfrak{R}$. Each lobby knows its own characteristic, the "ICCERGI" does not know it.

4.2.2 Creating a Revealing Mechanism

When the player in power participates in international trade negotiations of the WTO, he should expect pressure from the contracting parties. This pressure will be accompanied by the pressure of the lobby (L) which is often exaggerated. For this, the "ICCERGI" must impose a mechanism $(g(\cdot), M_1, \dots, M_n)$ which consists of a space of messages M_i for each lobby "i" and a function $g(\cdot)$ de $M_1 \times \dots \times M_n$ in the space of allocations.

The function $g(\cdot) = (g_1(\cdot), \dots, g_n(\cdot))$ determines the allocations of n lobbies based on the messages they had sent.

At the equilibrium of this game, the lobby "i" chooses a message m_i^* in M and sends it to "ICCERGI" which then imposes the allocation $g(m_1^*, \dots, m_n^*)$.

The player will be able to pursue international trade negotiations based on the message m_i^* of the lobby. Thereafter, we will assume the existence of a single agricultural lobby (L_1). So we have $n = 1$.

Considering the mechanism $(g(\cdot), M)$, the agricultural lobby chooses its announcement in order to maximize its usefulness $u(g, \theta)$:

$$m^*(\theta) \in \arg \max_{m \in M} u(g(m), \theta) \quad (3)$$

So he gets the allocation:

$$g^*(\theta) = g(m^*(\theta)) \quad (4)$$

The revelation principle shows that we may be limited to direct and revealing mechanisms. It is in the interest of agricultural lobby to reveal the real reason for the pressure it exerts on the player in power. So you have the messages sent by the agricultural lobby have to coincide with its features. The announcement of the real reason for the pressure is an optimal strategy.

The allocation $g^*(\theta)$ can be implemented by protecting the economic interests of the agricultural lobby. This latter should no longer participate in politics since the "ICCERGI" will make a decision that maximizes the welfare of the whole country. The revealing mechanism should encourage the agricultural lobby to reveal the real reason for the pressure it exerts on the "ICCERGI".

If the mechanism that "ICCERGI" has created is not revealing, then the agricultural lobby of the characteristic θ would take advantage of lying by announcing θ' that does not match with the real θ characteristic and thus we would have this:

$$u(g^*(\theta), \theta) < u(g^*(\theta'), \theta) \quad (5)$$

We are going now to assume that the preferences of "ICCERGI" are represented by a weighted sum of welfare, which in this case is the sum of surplus of producers and consumers.

4.2.3 The Consumer Surplus

We assume that the quantity q can take any value in \mathfrak{R}^+ , and that the price $P(q)$ that the consumer is ready to pay is a function which is continuous and decreasing. The total value for the consumer of a quantity q is the area under the curve of demand, given by:

$$z(q) = \int_0^q P(\tilde{q}) d\tilde{q} \quad (6)$$

We assume that the subsidies granted to farmers are financed by the tax receipts collected by the government. Although the value of Taxes (T) paid by the consumers equals that of the subsidy (S). Then we consider that if the consumers do not pay these taxes, the French farmers can not benefit from subsidies. However, the consumers prefer not to give taxes to increase their surplus.

Consumer surplus can be written as follows:

$$K = \int_0^q P(\tilde{q}) d\tilde{q} - T \quad (7)$$

By replacing $(\int_0^q P(\tilde{q}) d\tilde{q})$ by $z(q)$ and T by S , the value of the surplus then becomes:

$$K = z(q) - S \quad (8)$$

4.2.4 The "Principal" Preferences

Thus, when the "ICCERGI" pays attention to consumers through the import of foreign goods and wants to avoid a trade war with the other countries, it will indirectly provide more gains to foreign producers.

$$W = K + \alpha \pi^N \quad (9)$$

With: - W : Welfare of the whole country.

- K : National consumer surplus.

- π^N : Profit of the domestic producer. The value of π^N gives us an idea about the atmosphere of the negotiations within the country. That is to say, it indicates the degree of pressure exerted by the lobby on the player in power.

We assume that: $\pi^N = B - C = R + S - C$

With: S : Subsidy awarded to French farmers.

B : Revenue of the domestic producer which is equal to the revenue (R) and the subsidy (S).

C : Cost of domestic producer.

Since: $K = z(q) - S$, then the function of welfare becomes:

$$W = z(q) - S + \alpha(R + S - C) \quad (10)$$

If $0 < \alpha < 1$: selected by "ICCERGI" and represents the weighting it gives to each profit monetary unit of the domestic producer.

(2) If $\alpha = 1$: we pay as much importance to a national monetary unit of a local producer as to the consumer. This case eliminates the subsidy that "ICCERGI" gives to its farmers ($W = z(q) + R - C$). The Contracting Parties to the WTO prefer this case because it complies with the rules of free trade.

(3) If α decreases: it gives more importance to the domestic producer ($\pi^N = \frac{1}{\alpha}(W - K)$, so R increases when α decreases). The pressure groups adopting a protectionist policy always try to approach this situation in order to protect the interests of domestic producers. The candidate for an election, who devotes a great importance to financing his election campaign, ensures that α is as small as possible.

(4) If α grows, it gives more importance to the consumer. The Contracting Parties to the WTO like this situation a lot.

Every candidate for election will play on α in international trade negotiations. Indeed, if he wants to get funds for his election campaign, he must ensure that the maximum α decreases, even if the tension increases in international trade negotiations.

Thus, "ICCERGI" preferences depend on the profit of the domestic producer (π^N), the consumer surplus (K)

and the subsidy (S) that will be offered to the domestic producer.

$$W^G \equiv W(K, \pi^N, S) = z(q) - S(\theta) + \alpha \pi^N(\theta) \quad (11)$$

4.3 The resolution of Political and Commercial Model

The "ICCERGI" will maximize the expectancy of social surplus under the two incentive constraints and participation that we will analyze in the following section.

4.3.1 The Incentive Constraints

We will assume that the preferences of the lobby depend on its income (B), cost of production (C) and its characteristic θ .

$$U^L \equiv U(B, C, \theta) = R(\theta) + S(\theta) - C(\theta) \quad (12)$$

The agricultural lobby chooses $(B(\theta), C(\theta))$ which is assigned by the "ICCERGI". We suppose that $U^L(\theta, \hat{\theta})$ the obtained utility by the agricultural lobby of θ characteristic which states that its characteristic is $\hat{\theta}$ and then receives the utility:

$$U^L(\theta, \hat{\theta}) = U(B(\hat{\theta}), C(\hat{\theta}), \theta) \quad (13)$$

The mechanism (B, C) checks the incentive constraint if and only if:

$$(IC) \quad U^L(\theta, \theta) \geq U^L(\theta, \hat{\theta}), \quad \forall \theta \in \Theta \quad \text{and} \quad \forall \hat{\theta} \in \Theta \quad (14)$$

We assume that the utility of this lobby takes the following form:

$$U(B, C, \theta) = u(B, \theta) - C \quad (15)$$

For the (B, C) to be compatible with the incentive constraint, we must, by the conditions of the first and second order, that:

$$\forall \theta \in \Theta, \quad \frac{\partial U^L}{\partial \hat{\theta}}(\theta, \theta) = 0 \quad (16)$$

And

$$\forall \theta \in \Theta, \quad \frac{\partial^2 U^L}{\partial \hat{\theta}^2}(\theta, \theta) \leq 0 \quad (17)$$

The first order condition is:

$$\frac{dC}{d\theta}(\theta) = \frac{\partial u}{\partial B}(B(\theta), \theta) \frac{dB}{d\theta}(\theta) \quad (18)$$

The second order condition is:

$$\frac{d^2C}{d\theta^2}(\theta) \geq \frac{\partial^2 u}{\partial B^2}(B(\theta), \theta) \left(\frac{dB}{d\theta}(\theta) \right)^2 + \frac{\partial u}{\partial B}(B(\theta), \theta) \frac{d^2B}{d\theta^2}(\theta) \quad (19)$$

We can simplify the second order condition by deriving (18):

$$\int \frac{d^2C}{d\theta^2}(\theta) = \frac{\partial^2}{\partial B^2}(B(\theta), \theta) \left(\frac{dB}{d\theta}(\theta) \right)^2 + \frac{\partial^2 u}{\partial B \partial \theta}(B(\theta), \theta) \frac{dB}{d\theta}(\theta) + \frac{\partial u}{\partial B}(B(\theta), \theta) \frac{d^2B}{d\theta^2}(\theta) \quad (20)$$

By substituting in (9), we obtain:

$$\frac{\partial^2 \mathbf{u}}{\partial \mathbf{B} \partial \theta}(\mathbf{B}(\theta), \theta) \frac{d\mathbf{B}}{d\theta}(\theta) \geq 0 \quad (21)$$

For simplicity, we will use the Spence-Mirrlees condition by assuming that $\left(\frac{\partial^2 \mathbf{u}}{\partial \mathbf{B} \partial \theta}\right)$ keeps a constant sign

$\forall \theta \in \Theta$. We will continue the calculations by assuming that this derivative is positive:

$$\forall \theta, \forall \mathbf{B}, \frac{\partial^2 \mathbf{u}}{\partial \mathbf{B} \partial \theta}(\mathbf{B}, \theta) > 0 \quad (22)$$

The political and commercial significance that we have adapted to the condition of Spence-Mirrlees is that the lobbies of θ with higher characteristic are ready to leave the political game more than the low θ for an additional unit of income \mathbf{B} or more exactly for an additional unit of subsidy \mathbf{S} . The "ICCERGI" can therefore separate lobbies by offering incomes \mathbf{B} (that is to say subsidies \mathbf{S}) higher to the high θ . The Spence-Mirrlees condition gives us a clear idea about the characteristics of lobbies. That is to say, this condition allows us to make a selection of different types of lobby.

We can show that \mathbf{B} is part of a direct revealing mechanism (\mathbf{B}, \mathbf{C}) if and only if the income \mathbf{B} is increasing.

$$\frac{\partial U^L}{\partial \hat{\theta}}(\theta, \hat{\theta}) = \frac{\partial \mathbf{u}}{\partial \mathbf{B}}(\mathbf{B}(\hat{\theta}), \theta) \frac{d\mathbf{B}}{d\theta}(\hat{\theta}) - \frac{d\mathbf{C}}{d\theta}(\hat{\theta}) \quad (23)$$

By writing the equation (18) into $\hat{\theta}$, we obtain:

$$\frac{\partial \mathbf{u}}{\partial \mathbf{B}}(\mathbf{B}(\hat{\theta}), \hat{\theta}) \frac{d\mathbf{B}}{d\theta}(\hat{\theta}) = \frac{d\mathbf{C}}{d\theta}(\hat{\theta}) \quad (24)$$

We then obtain:

$$\frac{\partial U^L}{\partial \hat{\theta}}(\theta, \hat{\theta}) = \left(\frac{\partial \mathbf{u}}{\partial \mathbf{B}}(\mathbf{B}(\hat{\theta}), \theta) - \frac{\partial \mathbf{u}}{\partial \mathbf{B}}(\mathbf{B}(\hat{\theta}), \hat{\theta}) \right) \frac{d\mathbf{B}}{d\theta}(\hat{\theta}) \quad (25)$$

But with the Spence-Mirrlees condition, the sign of the term on the right is that

$\frac{\partial^2 \mathbf{u}}{\partial \mathbf{B} \partial \theta}(\mathbf{B}(\hat{\theta}), \theta^*) (\theta - \hat{\theta}) \frac{d\mathbf{B}}{d\theta}(\hat{\theta})$ for θ^* between θ and $\hat{\theta}$. This term has the sign of $(\theta - \hat{\theta})$, from the

equation (19). The function $\hat{\theta} \longrightarrow U^L(\theta, \hat{\theta})$ is then increasing until $\hat{\theta} = \theta$, and then decreasing. We then

deduce that $\hat{\theta} = \theta$ reaches the global maximum of $U^L(\theta, \hat{\theta})$.

Thus, thanks to the Spence-Mirrlees condition, the equations (18) and (19) can replace the global incentive constraints. Without this condition, the analysis of the problem of incentives would be more complex. So, we assume that the Spence-Mirrlees condition is checked.

4.3.2 The Individual Rationality Constraint

For the individual rationality constraint to be checked, it is necessary that the agricultural lobby receives a utility greater than or equal to its reservation utility, that is to say, it could get the best out of its exchange with the "ICCERGI". The individual rationality constraint expresses that agricultural lobbies accept their contract.

$$(\text{IR}) \quad U^L(\theta) \geq 0 \quad (26)$$

The agricultural lobby agrees not to participate in the political game anymore if "ICCERGI" properly defends the economic interests of French farmers by facing the pressure of the contracting parties to the WTO. The agricultural lobby has to see its income increase as it agrees with the "ICCERGI". The increase in income can be done, for example, by distributing subsidies among the French farmers.

4.3.3 Maximization of Welfare Expectancy

The "ICCERGI" must maximize the welfare expectancy of the whole countries under the incentive constraints and participation contract with the condition $B(\theta)$ that is non-decreasing in θ .

$$W = [z(q) - S(\theta)] + \alpha [R(\theta) + S(\theta) - C(\theta)] \quad (27)$$

To have expectancy, we integrate between $\bar{\theta}_0$. The maximization program then becomes:

$$\text{Max } E(W) = \text{Max } \int_{\bar{\theta}_0}^{\bar{\theta}} [[z(q) - S(\theta)] + \alpha [R(\theta) + S(\theta) - C(\theta)]] \mu(\theta) d\theta \quad (28)$$

Under the following constraints:

$$(IC) \quad U^L(\theta, \theta) \geq U^L(\theta, \hat{\theta})$$

$$(IR) \quad U^L(\theta) \geq 0$$

$$\frac{dB(\theta)}{d\theta} \geq 0$$

$$\text{Max } E(W) = \text{Max } \int_{\bar{\theta}_0}^{\bar{\theta}} [z(q) + (\alpha - 1)S(\theta) + \alpha (R(\theta) - C(\theta))] \mu(\theta) d\theta \quad (29)$$

$z(q)$: Gross Consumer Surplus.

$S(\theta)$: subsidy that depends on the characteristic θ .

$R(\theta) - C(\theta)$: This is the benefit of French farmers without the help of the state. This is the profit made under free trade.

Determining the function of the welfare of the country is to maximize $E(W)$ with respect to the function of subsidy.

$$\frac{\partial E(W)}{\partial S} = (\alpha - 1)\mu(\theta) = 0 \quad (30)$$

This implies that $\alpha = 1$.

So the "ICCERGI" protects both the economic interests of consumers and farmers. Neither party will have an advantage over the other. Thus, we see that if we can defend the economic interests correctly, we can easily maximize the welfare of the whole country. The balance of economic interests of both parties helps the player in power to be able to make good decisions in international trade negotiations. The WTO is seeking to get this situation because it is consistent with the principles of free trade.

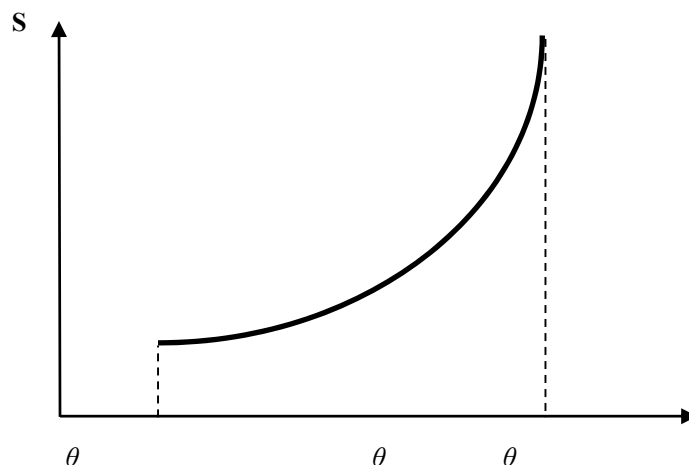
In addition to the incentive constraint of the second order, we can deduce that $\frac{dB(\theta)}{d\theta} \geq 0$. The lobbies of characteristic θ receive a higher budget B and therefore higher subsidies S .

4.3.4 Conclusion of the Model

In this model, we introduced the political interests in international trade negotiations. We demonstrated how the lobby can intervene in the choice of trade policy that the political player must follow: lobbies finance election campaigns of political players in order to obtain the trade policy that defends the economic interests of some people.

This game has allowed us to show the divergence of interests between the political and economic players and more precisely between the player in power and lobbies. The player in power is solely responsible for the commercial policy of the country and for this reason he must be firm in defending the public interest in all

matters. In contrast, the pressure groups seek only their own interests without considering the interests of the country. We understood that the player in power, who is looking for the interests of the country may take reasonable positions if he is not under pressure from lobby. But the problem is to find someone who can remove the lobbies from the political and economic sphere. This entity which is called the "ICCERGI" must find an incentive mechanism which guarantees to lobbies the protection of their economic interests.



The experience of international trade negotiations of the Uruguay Round showed that the French government chose to assist its farmers despite the threats from Americans. This proves that in general each political player tries to maximize the economic interests of his producers since he is obliged to be grateful to lobbies. The adoption of protectionist trade policies is linked by the agreement between the political players and lobbies. The political stakes are the first responsible for all trade policy, whatever its nature is.

As long as the farm lobby is involved in political game, the "ICCERGI" removes its subsidy. The most rational lobbies leave the political game to increase the protection of their economic interests. So, the lobbies that do not participate in the political game must obtain a positive surplus: it is their informational rent. Lobbies involved in the political game must be punished by imposing sanctions such as the removal of subsidies or payment of fines.

The agricultural lobby cannot leave the political game unless it sees its income rise, that is to say when the "ICCERGI" protects the interests of farmers well. Similarly, the consumers must see their surplus upward either through lowering taxes or through lowering the prices obtained by the reduction of trade barriers. Achieving a balance of economic interests of both parties seems to be the right strategy for maximizing the well-being of the country.

The "ICCERGI" must properly manage the national and international pressure. It should play on both fronts by giving each party what it deserves. The "ICCERGI" should not then elicit aggression from either of the two parties as there is a risk that may lead to violent protests or even on an international trade war. It must ensure that both parties find satisfaction in the resolution of a given commercial problem.

5. The Other Incentive Mechanisms that We Can Suggest

The existence of some lapses in the political game obliges us to create some incentive mechanisms. The first thing to do is to give the player in power more time to be able to present his political strategy. Most players in power are not able to complete their projects because the working time is short and there are problems that cannot be resolved in the short term. The second thing we must do is to find an incentive mechanism to avoid giving voters wrong information. Voters should have the information needed to move towards the political player who best responds to their preferences.

5.1 The Prohibition of Financing Political Parties by Lobbies

The best mechanism which can make the political game much more transparent is to avoid any agreement that may exist between political players and lobbies. The failure that exists in the political game is that voters are not aware of the tricks that exist between political players and companies. The voter has no accurate information about the true tactics of each political player.

To make the political game more loyal, we need to create a law that prohibits the financing of political parties by

lobbies or more precisely by the companies. This law should encourage political players to seek the economic and social interests of the whole country. During the election period, the political players had better not cheat by creating an agreement with the companies: the law should exclude or legally pursue the political player who is illegally funded by some companies.

The creation of this law is then an incentive mechanism that seeks to avoid falling into the problems of corruption. The tricks between political players and businesses cause a disruption of the political game because all political players will not have the same chance of being equally funded. That is to say that some political players have much larger financial aids than those granted to other political players. For example, pro-protectionist companies will give maximum financial aid to the political player that ensures tariff protection against foreign products. In contrast, the political player who is in favor of a commercial policy of free trade will not have the same financial assistance that is offered by the pro-protectionist companies.

The financial aids that are offered by companies must be replaced by public assistance. The government should provide the political players with the same financial assistance so that everyone can have the same chance to play in the elections. A part of the taxes paid by companies and citizens to the government must be devoted to the financing of the political players. The control of financial aid of the political player by an independent organism is needed in the political game. The audit should be present in any election period and in any election campaign.

5.2 Extending the Period of Work of the Player in Power

The first mechanism which must be created is the one that gives the player in power the necessary time to achieve his political strategy. We noted that the period of work devoted to the player in power is often short and does not allow him to collect the fruit of his policy. In the short term, the elected political player has no time to solve the most serious economic and social problems such as unemployment or social exclusion. In the United States, the period of four years is not enough for the President to achieve the end of his projects.

The short time given to the player in power has a negative impact on the unrolling of international trade negotiations. Trade problems are sometimes negotiated with one president and sometimes with another. We will not have the same commercial policy if the two presidents do not have the same ideology. During the trade negotiations of the Uruguay Round, there were three types of political players who rule France: the beginning of the Uruguay Round, which corresponds to the phase of power sharing (1986-1988), was ruled by the right-wing party. In the midst of this cycle, we saw the socialists who ruled the country. The end of this cycle, which also corresponds to the phase of power sharing, was given back again to the right-wing party. So the team change in government may not be favorable to operate in international trade negotiations. Each team cannot finish its projects. There are always some breaking off.

Thus, the player must remain long enough in power to be able to solve economic and social problems. The most serious problems cannot be solved in the short term. By taking again the example of French politics, we notice that the non-coincidence between the presidential and legislative period is the main cause of the disturbance of the strategies of the player in power. " To rectify this state of affairs, it is necessary to couple the presidential and legislative elections, by adopting the same term of office and the same election date. The likelihood of ideological divergence between the president and the parliamentary majority would be considerably reduced and the decision horizon of power significantly expanded" (Genereux, 1995, p 254).

5.3 Avoiding Providing Voters with Wrong Information

The second mechanism to be built is the transmission of information. Indeed, we need to find an incentive mechanism that avoids giving voters wrong information: the manipulation of information is a strategy used by most political players to influence voters. Taking advantage of information to attract voters does not give the true value of the political player. We need deep information about the political players so that voters can vote for the most reliable candidate and who has a good project for the country.

So, the political players must avoid the misleading advertising. Each political player must offer feasible and better quality policy products. Genereux (1995) thinks that " to limit natural duplicity of political speech and discourage the abuse of systematic confidence, could the citizen's right be included in the constitution to honest information about politicians and action of the government? The implementation of this right would require a recourse of citizens to be against political lies; a recourse the sanction of which would be a formal finding by the competent jurisdiction that the power lied" (Genereux 1995, p 262). This law encourages political players to announce the true characteristic of their political strategies. Each political player will change his behavior by trying to be honest towards voters. He does not have to promise a political product which is difficult to achieve.

We must also find a way that can convey accurate information about the political players. This can be only the media that can distribute the information to all voters. Television news is the primary source of information that can reach all voters. In France, the Superior Audiovisual Council (SAC) must give each political player the chance to present his program for all political players in a definite period of time. This special program for political players is evidence that can be used against those who make false promises.

Political players will have to distrust what they present as a promise and should present a perfect study on the fulfillment of their promises. Each political player must take the threat of punishment seriously if the program fails. The punishment should be severe for political players who exaggerate the promises that are impossible to carry out. This punishment may be temporary or permanent expulsion from the political game. The threat of eviction is an incentive mechanism able to guide the policy players towards finding workable and effective political programs. The political players cannot, at this point, lie or cheat in the political game because they will be judged on the results of their political strategies.

6. Conclusion

To conclude, it should be noted that it is only in recent decades that economists have begun to be interested seriously in the impact of political issues on the choice of a trade policy to follow. The adoption of protectionist trade policies is largely related to the involvement of lobbyists in any decision made by the player in power. The lobbies promise to contribute to the campaign of political players in exchange for tariff protection for their industries. So the principle of "give and take" applied between the candidates in the election and the lobbying forces oblige the elected candidate to protect the economic interests of domestic industries by setting tariffs on foreign goods.

The political issues play an important role in determining the trade policy that the government must follow in international trade negotiations. Indeed, "politically speaking, a better knowledge of interactions between the economic interests and the political behavior can help to define better institutional rules to favor the international cooperative solutions" (Laussel and Montet, 1994).

Each political player is supposed to be supported by lobbies. All industries which participated in the election campaigns wish their political players were elected. Indeed, the political player protects his industries from international competition, which contributed to his election, by taxing foreign products of interest to these industries, or by following a business policy of subsidy. So these are the industries that supported the elected political player which will be the most favored.

International trade negotiations have been influenced by the intervention of political issues and national interest groups. International trade agreements cannot be reached anymore without considering the lobbies. The player in power is all the time influenced by the opposition players and lobbies when he wants to take a decision on any business problem. The trade negotiations of the Uruguay Round were often disturbed by the pressure of lobbies exerted on the players in power of each country involved in the agricultural conflict.

The policy makers should distrust the commercial issues affecting the sectors with intensive labor force. These problems can disturb the social life of a country and cause a crisis within a modest social class. It is clear, however, that we establish a social imbalance if we conclude a trade agreement contrary to the fundamental interests of a number of citizens. For example, a Multi-fiber Arrangement (MFA) which disfavors the economic interests of developing countries will have a negative impact on labor force known as abundant in this area. The Multi-fiber Arrangement is very important for the developing countries and the least negative decision leads necessarily to an increase in unemployment.

The policymakers must also distrust the new form of pressure that is social media. These latter, which use the new forms of information and communication based on the Internet, have become a new form of serious pressure on policymakers. The millions of tweets, the thousands of article blogs and the numerous videos on YouTube are the drivers of the Arab revolts. Indeed, in recent years, there have been several waves of protests in the "Arab Spring countries" (Tunisia, Egypt, Libya, Yemen, Bahrain and Syria). These national revolutionary movements aim to provide better living conditions especially regarding employment and dignity: the political and social struggles have largely been related to the issue of unemployment. The citizens have the freedom to express and defend their views freely.

The policymakers should now distrust not only the lobby, but also the social media. These latter use more efficient and faster strategies than the lobbies: the information regarding any problem will be gathered through the Facebook, for example, which is a tool for rapid and anonymous mobilization.

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Centralization of Activities in Multinational Banks, with an Application to a European Banking Group

Leonor S. Uva¹ & Margarida Catalão-Lopes²

¹ Galp Energia, Drilling-Exploration and Production Department, Lisbon, Portugal

² CEG-IST, Instituto Superior Técnico, Technical University of Lisbon, Portugal

Correspondence: Margarida Catalão-Lopes, CEG-IST, Engineering and Management Department, Instituto Superior Técnico, Technical University of Lisbon, Av. Rovisco Pais, 1049-001 Lisbon, Portugal. Tel: 351-21-841-8177. E-mail: mcatalao@ist.utl.pt

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Abstract

Most banks operate at a multinational level. Since the diversity of geographies implies repeated operations, multinational banks are starting to centralize some functions into shared-services centres. This paper proposes a classification of the core banking areas according to their potential of centralization. As an illustration, we provide an application to a European multinational bank with important international operations. The focus is on the Card Operations Department, which is found to have high centralization potential. The results of this study show that main opportunities of centralization occur for physical card production, stock management and quality control, and fraud prevention.

Keywords: multi-domestic units, centralization potential, operational costs, efficiency, payment cards

1. Introduction

Technological progress facilitates the expansion of businesses across geographies. For the specific case of the banking industry, the increase in control over affiliates and the reduction in agency costs are pointed as determinants of the important geographic expansion that occurred over the past years (Berger and Deyoung, 2006). Multinational banks, however, by developing their operations across countries, with different teams and different methods, are usually faced with a duplication of operations and thus unnecessary costs. In order to avoid this situation, a possible trend is to centralize operations into one location, to achieve cost-efficiencies while taking advantage of the increased scale and cross border synergies.

However, there are issues arising from geographic diversity that pose barriers to the consolidation of operations. At a micro level, differences in language and culture across countries, as well as the existence of diverse regulatory environments, are commonly identified as the main obstacles to overcome. As we will see, they prove to be especially binding for some banking activities, in particular those which involve direct contact with clients, or dealing with procedures that are differently ruled in the various countries where the bank operates. Additionally, the potential of centralization of each banking area depends on the nature of the services delivered, meaning that only those functions whose centralization leads to added economic value, without jeopardizing quality, should be consolidated. Therefore, in order to successfully achieve the benefits of centralization, the definition of a strong strategy concerning the specifications of the countries involved, as well as the features of the areas to be merged, is required. From a macroeconomic perspective, centralization may threaten the adequate transmission of monetary policy across heterogeneous regions (e.g. Fratantoni et al., 2003), and worsen financing for small firms (Klagge & Martin, 2005).

In this paper we propose a classification of bank operations in terms of centralization potential - high, medium or low. This taxonomy is an innovative contribution to existing literature on banking operations. As an illustration, we provide an evaluation of the potential benefits from centralization for a European banking group (Note 1). We choose an area with a high centralization potential - card operations -, and provide an analysis of the efficiency gains to be achieved by our banking group if centralization is pursued. We find that significant savings can be achieved for three sub-areas: physical card production, stock management and quality control, and fraud prevention. This paper is thus a contribution to both the literature on payment services and the literature on the

efficiency of financial institutions (see e.g. Berger & Humphrey, 1997 for a survey on studies addressing the efficiency of financial institutions).

As electronic payments, including card transactions, allow much lower costs than cash or paper payments, their use has become more and more widespread. This fact reinforces the importance for banks of achieving high efficiency levels in card operations. In 2010 there were approximately 1.45 payment cards per inhabitant in the European Union; card payments accounted for 39 per cent of all transactions and the ratio of paper-based to non-paper-based transactions was around one to five (<http://www.ecb.int/press/pr/date/2011/html/pr110912.en.html>).

As Humphrey et al. (1996) argue, shifting to electronics allows a substantial reduction in the social cost of a country's payment system, which accounts for 2 to 3 per cent of Gross Domestic Product (GDP). Debit cards, in particular, are close substitutes for cash. The incentives banks have to innovate in the payments market are addressed e.g. by Milne (2005), who provides a comparison of payments services in three Scandinavian countries, the UK and the USA. Innovation seems to have gone further in the small countries, with more concentrated banking structures, due to network effects which are stronger intra-bank than inter-bank. According to Hasan et al. (2009), the adoption of retail payment technologies actually enhances bank performance and bank stability, an aspect which may be rather important in the context of the current financial and economic crisis.

To the best of our knowledge, the current paper is the first attempt to quantify centralization gains. The existing literature on centralization is scarce (Note 2). Moreover, and in spite of the previous references, debit and credit card activities are a rather overlooked area in finance and business research. Beijnen & Bolt (2008) is another interesting exception. The authors investigate the existence and extent of scale economies in the European payment processing industry. Their findings point to significant economies of scale for European payment processors. The same occurs in Bolt & Humphrey (2007). These results are particularly relevant given the emergence of the Single European Payments Area (SEPA – see for instance ECB Bluebook, 2007), aimed at making cross-border payments as easy as domestic ones, besides cheaper. As Beijnen & Bolt (2008) state, “Being cost-effective might prove to be the only viable business strategy in a competitive, intra-European payment processing market when SEPA has arrived.”

The rest of the article is structured as follows. Next section brings together the distribution of banking areas according to their centralization potential, based on existing references reporting European and worldwide banks' best practices. In section 3 a brief description of the main sub-areas within the Card Operations Department is presented. Section 4 endeavours to quantify the achievable gains of operations centralization for the banking group analysed and namely in the Card Operations Department. Some conclusions and recommendations are presented in section 5. Finally, the paper ends with a section devoted to lines for future research.

2. The Centralization Potential of Banking Areas

Extensive know-how allied to best practices reduces activity costs. Moreover, the dimension enlargement creates the possibility of scale economies. However, not every area benefits from such an enlargement, meaning “one-size-does-not-fit-all” and, therefore, only those functions whose centralization leads to the creation of economic value and to higher control levels must be consolidated (Operations Council, 2005). The potential of centralization along banking areas can be classified as high, medium, and low or inexistent. The following subsections describe this classification in more detail.

2.1 High Centralization Potential

a) Call centres revealed high potential of centralization not only within the banking services, but also across other industries. Its increased importance within a company's environment, especially in terms of Customer Relationship Management (CRM) policies and of boosting cross-selling (Batt, 2002; Eichfeld et al., 2006), have led organizations to consolidate this function, so as to achieve better global results. Some of the benefits that arise are the better staff management and scheduling; the shrinkage time reduction and also the avoidance of management board duplications (Mitchell, 2001).

For the banking industry in a narrow perspective, the following distribution of the levels of centralization can be proposed, according to figure 1: i) Medium, for either operations centralization or data consolidation; ii) Intense, for the combination of the latter consolidated functions, in a virtual environment; and iii) Total, when centralization implies a physical single call centre, covering all the countries' operations, data and services (Note 3).

Santander is a good example of total centralization. In 2009, the Group consolidated all the call center functions into a single facility in México, where services to the clients of eight Latin American countries are delivered.

b) Internet Banking is usually also regarded as highly central, considering the growing importance of this service within the banking industry and the similarity in the way that it is delivered to the client. The advantages found in such centralization are not only in terms of IT security systems, namely cost reductions and increased reliability (since it is cheaper and easier to audit a single facility rather than several), but also in terms of ease of adaptation to new software. ING bank centralized its internet banking systems for the eastern and central European operations (eight) into a single one in Poland and is a successful example of this strategy.

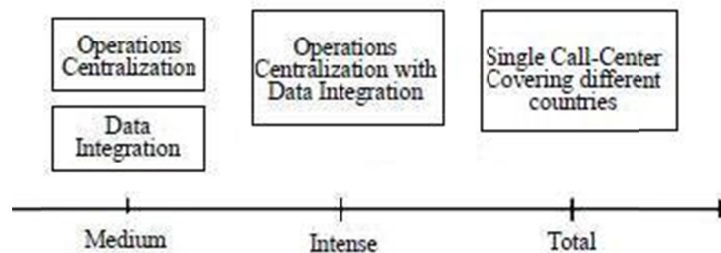


Figure 1. Degree of call centre centralization in a multinational bank

c) As far as Information Technology (IT) is concerned, evidence suggests that it also has one of the highest centralization potentials. The wide spectrum of benefits ranges from complexity reduction and increased control, to customer service improvement and integration simplification after Mergers and Acquisitions (M&A). However, IT is run along all the banking areas and its centralization process is a very complex one. Therefore, the benefits are only achievable at the cost of some downturns like the long period of implementation (3-5 years), the training costs that stem from the staff adaptation to a new platform and, of course, the high investment costs that are related. According to Bahadur et al. (2005), the strategy defined needs to attempt to coordinate IT and senior management to guarantee the alignment between the strategic goals of the company and the technological requirements. When successfully implemented, platform integration indeed enables efficiency to improve. To prove it, there is the case of Santander's global IT platform –Parténon– responsible for improving the efficiency of Abbey Bank in 30 per cent, three years after it was acquired by Santander (Levine, 2010). BBVA and Citigroup are two other banks that already benefit from the platform integration.

d) Debit and Credit cards, also known as payment cards, reveal a high potential to be centralized due to the similarity of processes across countries, even with different portfolios. This centralization has a greater cost reduction impact on physical card production, due to eventual scale economies achieved at the producer. “*The greater the volumes being processed, the lower the individual transaction cost*” (Yeomans, 2004). Moreover, cost reductions are linked to the shrinkage of employee costs (both salaries and training costs). The easier global adaptation to a new development is also one of the advantages of payment cards integration. These were some of the benefits Barclays faced when it centralized the administration of the card portfolio worldwide, creating a multi-country card, to enable easier product-to-product transfers, as well as speed up new product introduction and development.

e) Human resources have been growing in importance within companies over the past decades. Therefore, banks are centralizing some of this area's activities, like training, the task consolidated at Santander's centre in Madrid. The centralization of the Human Resources data management also brings added ease in an M&A scenario, like the Barclays case shows. After automating employee data, Barclays began handling these documents on a large scale, which was crucial by the time Woolwich Bank was integrated: the 11.000 staff files of the latter bank were automatically transferred to the Barclays' system.

f) An effective management of Purchases and Logistics can also become a competitive advantage, especially in the supply management area. Banks should try to acquire goods and services at the best total price, guaranteeing the quality and fulfilling deadlines. The registered benefits include the simplification of back office systems for supply management, easing the integration of the M&A; and increased efficiency in choosing the right supplier through e-source based systems. On the other hand, having a decentralized supply management stems from the wish of fostering domestic economies, avoiding investment concentration in a single geographical area. Regardless of the strategy chosen, the fact is that this activity has a high centralization potential. Also within the

Purchases and Logistics Department, evidence was found of the benefits of centralizing the management of the thousands of common documents between branches.

g) Whether in a domestic or foreign environment, all the business areas and group's activities must guarantee quality. Therefore the Quality Department has a high centralization potential since best practices, as well as standards, matrices and regulations, should be applied across countries, due to strategic concerns.

2.2 Medium Centralization Potential

This labelling stems from one of two reasons: i) the area apparently has potential but the best practices are still vague and limited to a small set of banks, or ii) although the area's potential is theoretically high, no evidence of banks that had centralized that area was found. The first scenario includes the payments area and mid and long term loans, while the second applies to Mobile Banking.

a) Corporate and private payment systems became complex with the banking multichannel development (internet, call centres, phone, branches, etc.), since clients can reach the bank through different means (Hunkele & Cronenweth, 2008). The boost in the number of connections increased payment times, and real-time information became almost non-existent. To overcome customer dissatisfaction, banks started to centralize payments internally, through Service Oriented Architectures, seeking to eliminate inefficiencies. This internal centralization aligns banks across-countries for a global approach, in order to simplify international payments as well. The major hurdles that arose from this latter type of payments concern the exchange rate difference and diversity, the constant currency conversions and the dissimilar regulations. The accomplishment of SEPA aims to standardize the European regulation and eventually overcome the regulation diversity. Consequently, one can conclude that the payments area has potential of centralization across borders, but it is still unclear which implementation strategy is the best.

b) Mid and long term loans were labelled as having medium potential of centralization as well. Actually, according to the amount involved or the contract specifications, banks act differently.

c) Although Mobile Banking apparently encompasses a high centralization potential, which relies on low labour needs, centralization would only be possible through the support of centralized IT.

2.3 Low to Non-existent Centralization Potential

a) This is the case of branches. The majority of top executives consider branches a tactical point of contact with the client (Lippis, 2010), and so service levels must be notably high. As far as multinational banks are concerned, branches need to adapt to different requirements, inherent to customers' habits and culture, if they want to achieve high service levels. Hence, branch centralization does not seem to make much sense. Customer service-delivery differentiation is a key factor of success in banks and can only be optimized if it is managed locally, in order to be adapted to each country's culture.

Other functions revealed low potential of centralization:

b) mortgage loans, due to each country's real estate market;

c) auditing and compliance, two areas that are applied to different subjects - to the bank employees or to the bank as a whole, accordingly. Each country has different policies and regulations to be followed and therefore centralizing this department would not be rewarding.

2.4 Synthesis

Figure 2 presents a synthesis of the main functional areas within a bank, according to their centralization potential. In the "high" category we include the areas in which the advantages of proceeding to centralization are far greater than the disadvantages and/or obstacles, and for which there is already evidence of banks that did it. Belonging to the "medium" category can be justified by one of two reasons: either its centralizing potential exists but the best practices are still vague and limited to a few restricted set of banks (the case of payments or mid and long term loans) or, although having a high centralization potential, there is no real evidence of banks that have centralized that area/function (such as Mobile Banking for example). Finally, the areas included in "low or inexistent" category are those for which centralization, in the full meaning of the term, is not feasible.

3. Card Business Department

Given its high centralization potential, the payment card area is a strong candidate to be further analyzed within the framework of our banking Group, in order to detect and quantify potential efficiency gains arising from centralization among the European operations in the four countries where it operates, as well as provide a real-world illustration of the previous analysis. In this section the various subareas of the card business

department are presented.

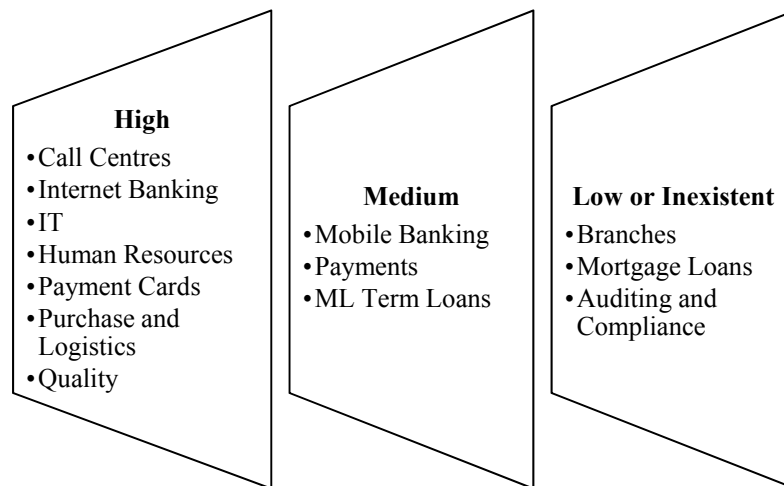


Figure 2. Labelling of banking areas, according to centralization potential

Besides being both made of plastic and used to pay for goods and services, credit and debit cards have quite distinctive features. Annual fees, grace periods or fraud protection are some of the differences between the two types of cards. Nevertheless, both types are managed similarly. At our banking Group the management is divided into the five sub-areas below, according to the different activities involved. The description that follows is useful to understand this division.

The Issuing sub-area, as the name implies, refers to the process of issuing new credit and debit cards. The processes are slightly different across countries but the core steps are the same: client's approach, credit analysis, PIN Block creation and delivery, card validation, activation, production and delivery. Three of the countries outsource their card production, while one of them opts for producing them internally.

The Pre and Post Card Production comprises stock management and quality control. The former can be either done at the outsourcer or by the bank itself. Quality control assumes three different types: i) external, when it is exclusively done at the card producer; ii) external and internal, when the bank opts to do a second analysis to guarantee the previous control done at the card processor; or iii) exclusively internal, when the card production is also internal instead of outsourced. In our Group, three countries opt for the first type, while one relies on both internal and external control.

The Servicing sub-area includes all the activities related to card functioning, namely credit limit and payment mode maintenance, card replacement, cancellation and renewal. The performance of these activities depends on the development of each platform, so some of the countries have faster services than others.

Claims Management is pursued similarly along the Group's operations – a process is triggered after a claim is received to assess responsibilities or to activate insurance. The exception is the way in which each claim is directed to the responsible area: in some countries a written document is required every time a claim cannot be handled via contact centre, while others have a central team that manages all the claims inserted in the system and just distributes them accordingly.

Finally, the Fraud Prevention sub-area is where the systems to detect fraudulent transactions are managed. The set of tools used by the bank is provided by the main international brands, including VISOR from VISA, and Riskfinder from Mastercard, among other domestic tools. These systems' functioning is based on real-time scoring, to rank transactions according to their fraudulent potential. The scoring is based on parameters like the country of origin of the card and the country where it is being used, or the transaction's amount, and each one will be treated once it gets to the top of the list – the higher the score, the greater the probability of it being a fraudulent operation. Depending on the country's regulations, the bank can either i) block the card immediately after detecting a fraudulent move, and only then contact the client; or ii) the other way around, when blocking the card is only allowed after contacting the client and, therefore, it takes longer to stop the fraudulent user.

4. Quantitative Analysis of the Centralization Potential in the Card Business Department

After understanding the core of Card Operations Departments across countries, we restrict our presentation to high centralization potential sub-areas. For these we aimed at quantifying the centralization gains that may arise from such process. For the sake of comparability of the different centralization possibilities, the parameters under analysis must be standardized. Cost per employee was found to be the most adequate parameter.

The per employee cost encompasses four different cost types: i) *Payments*, that refers to wages, bonus and other monetary benefits; ii) *Physical Space*, that, as the name implies, comprises the costs spent with the physical space per employee; iii) *IT and Communication*, that include those costs with technological equipment (internet, applications, phone, software, etc.); and iv) *Others*, that refer to a wide spectrum of expenses, from office materials to cleaning products.

Since each employee is usually a multi tasked individual, it is difficult to measure the exact time that each one spends in each activity. Therefore, the cost per FTE – Full Time Equivalent – parameter was used, to determine the exact allocation of costs within each sub-area. FTEs measure the contribution of an employee working in full time (eight hours per day) for a specific task. In our Group the relative allocation of FTEs is done as presented in table 1.

Table 1. Relative distribution of FTEs across sub-areas (2008)

	Country A	Country B	Country C	Country D
Issuing	4.4%	13.4%	1.9%	8.3%
Servicing	2.4%	10.4%	1.2%	1.3%
Card production	1.6%	11.9%	0.1%	0.7%
Claims Management	19.2%	4.4%	3.6 %	2.8%
Fraud Prevention	5.2 %	5.9%	0.6%	0.7%
Global	32.7%	45.9%	7.4%	13.9%

4.1 Card Production and Delivery

Although this activity is commonly included in the Issuing sub-area (because of the inherent need to produce a card in every issuing process), one must take into consideration that it also involves the Servicing sub-area, in terms of replacements and renewals. Therefore, we considered the card production and delivery costs as the ones imputed to new cards, to renewals and to replacements.

In order to obtain global costs in each country (G_{Ci}), different approaches were used, according to the type of production. When it is outsourced, global card production costs depend on the card prices charged by the outsourcer for credit and debit cards— p_{cc} and p_{dc} —and on the volume of new credit and debit cards produced— v_{ncc} and v_{ndc} . These variables are related through equation 1, for country i:

$$G_{Ci} = \sum (p_{cc,i} * v_{ncc,i} + p_{dc,i} * v_{ndc,i}) \quad (1)$$

In turn, if card production is internal to the bank, i.e., no external processors intervene, G_{Ci} depend on in-house costs such as: embossing machine depreciation (D_m), cost of plastics and personalization (C_{pp}), costs with card delivery (C_d) and costs with mail and marketing materials (C_{mm}). In this case, global production costs (G_{Ci}) are given by equation (2), for country i:

$$G_{Ci} = \sum (D_m + C_{pp} + C_d + C_{mm}) \quad (2)$$

The global card production and delivery costs reveal a distribution of 59 per cent in terms of issuing (new cards) and 41 per cent concerning servicing (renewals and replacements).

We want to analyze the impacts of centralizing the card production activity along our Group's European operations – countries A, B, C and D. Such consolidation encompasses the merging of the Group's five outsourcers (in country A the Group has two outsourcers) into a single one. However, since choosing the central outsourcer location is a cost-related decision, the added transportation needs of sending cards across countries must be taken into consideration. In fact, the major downside of having a central outsourcer in country A is the impact on delivery cost and delivery time for countries B, C and D. The former disadvantage can be diminished if the increase in delivery costs does not exceed the cost reductions gained with scale economies; the latter can only be surpassed so far: some cards should be issued locally to fulfil the urgent requests. To overcome the

hurdle of urgent requests (that represent approximately 4 per cent of the global card production) we propose a mix of central and domestic card production, in a 96 per cent–4 per cent proportion.

The proposal implies some benefits and disadvantages from which the following should be enhanced:

a) Decrease in the unit card price charged by the central outsourcer located in country A, since it would benefit from a volume increase of 96 per cent of the global production in countries B, C and D. The current outsourcers were invited to tender for the discounts they would make if centralization was in the outsourcer's country, according to the new volume of production for the case when centralization is in each country. The offers considered are presented in table 2.

Table 2. Outsourcers discount offers (%)

Outsourcer	A ₁	A ₂	B	C	D
Discount (%)	17.5	19	15	17.2	15

b) Increase of the unit card price charged by the domestic outsourcers, since each would pass from a volume production of 100 per cent to 4 per cent. According to our Group Experts', this would imply a duplication (+100 per cent) of the current unit cost;

c) Added transportation costs linked to the need of sending, via international mail, all the cards produced centrally with destination other than the country where the central outsourcer is located. International mail costs (measured in €/kg) are higher than national's.

From the analysis of the volumes of cards produced in each country, the expected result is for the central outsourcer to be located in our Group's headquarters (country A), since it has the highest volume of cards produced. Therefore, centralizing production in any other country would imply the international transport of 96 per cent of that volume (plus 96 per cent of the other two countries' volume), leading to high transportation costs. Moreover according to the outsourcers' proposals it is rational to say that the chosen outsourcer is likely to be A₂ since it offered a more competitive unit cost reduction when compared to A₁ (19 per cent vs. 17.5 per cent), or even compared to any of the others. Nevertheless, an exhaustive analysis was done to quantify exactly the cost reductions achievable, based on information on current prices and volumes in each country, as well as estimated transportation costs and proposed discounts. For each of the eligible outsourcers, the results are presented in table 3.

Table 3. Savings achievable due to operations centralization (%)

Outsourcer	A ₁	A ₂	B	C	D
Reductions Achievable (%)	10	11.5	6.3	3.5	-3.8

From table 3 we can conclude that centralizing operations would be most valid if the outsourcer is located in country A, since centralization in any of the other countries would lead to almost no cost reductions or even to a cost increase (country D). These results corroborate the previous expectations and stem mainly from the difference of card volumes to be produced: although unit transportation costs (in EUR per kg of cards) are higher for the other countries involved, the volume of cards to be sent to headquarters is so high that overcomes that difference of prices. Moreover, the unit prices of this country's outsourcers (A₁ and A₂) are more competitive than the ones abroad.

Summing up, the most profitable option is to centralize 96 per cent of the global production in a single country at outsourcer A₂, with which the Group can achieve a reduction of 11.5 per cent in the global card production and delivery costs. This country's card volume (and 96 per cent of the volume of the other countries) should be produced at outsourcer A₂. The 4 per cent left of each country's card volume should be produced at domestic outsourcers, namely at B, C and D.

Regarding outsourcers A₁ and A₂ results, it is also interesting to discuss its slight difference from a competition perspective. This difference is clearly justified by the more competitive proposal presented by outsourcer A₂ (19 per cent vs. 17.5 per cent) in terms of the total cost reduction achievable. These outsourcers' proposals, however,

were done without one being aware of the other's, and in a merely informative context. If that was not the case, a competitive environment could be triggered between outsourcers and, in the limit, we would have a sort of a Bertrand paradox, with these two duopolists decreasing price until marginal cost. In this situation the client (the banking Group, in this case) would be the winner. This is especially relevant given that having a single supplier represents a loss of bargaining power and hence a potential profitability reduction.

4.2 Pre and Post Card Production

As far as stock management and quality control are concerned, their execution can be done either internally or in outsourcing. In the former, deciding upon either method can be controversial since one's benefits are the other's disadvantages: internal stock management enables access to more accurate information in terms of products, while having this activity outsourced frees bank employees for their core functions and the stock management is executed by those who are more informed on the best methods and practices—the producers. Within the framework of a central outsourcer, we support the advantages of external stock management and recommend its centralization. Each bank only needs to ensure that the file with the volume of cards to be issued is produced under the same template across countries, to avoid having different file models.

In turn, although quality control can be either internal or external, we support the latter, considering that the outsourcer has the capacity to perform quality control on all the cards produced, while internal control is limited to a small number of verifications that are not indexed to the global volume of cards produced. Therefore, and also as a consequence of the outsourcers' consolidation, we propose the centralization of the quality control activity.

4.3 Fraud Prevention

Fraud is a global threat. Aware of this reality, the Group is developing a fraud prevention centralization project that aims to consolidate this activity for its European operations. The project is based on a common platform whose functioning is similar to VISOR's, with real time scoring of transactions. However, the Group's common platform brings a new set of advantages that may overcome some of the main barriers in a centralization process. From the advantages, the following should be highlighted: i) collecting the information from different systems in different languages, to then present it in English; ii) having the full workload available on the screen, instead of having only the highest scored transaction - this allows better information regarding the number of FTEs needed to fulfil the daily workload, that otherwise is impossible; iii) having support 24/7, which increases fraud detection out of hours and respects each time zone and iv) since a common platform defines standard procedures across countries, the best practices will be applied everywhere.

The theoretical benefits are evident; however, we intended to quantify the achievable gains. The actual global fraud costs encompasses the following parameters and respective index values: i) the costs with FTEs allocated to fraud prevention across operations (6); ii) the current costs with the software licenses (23) and iii) the global fraud volume, referring to the amount associated to the fraudulent transactions (71). Hence the current global fraud costs at the Group are 100, in index values.

Since we intend to identify the impact of (i) having a centralized team (ii) working in a single platform, (iii) with higher effectiveness, we need to quantify (a) the post centralization FTEs costs, (b) the new platform software license price and (c) the global fraud volume with increased effectiveness. As some of these parameters, namely (a) and (c), are not yet certain, a sensitivity analysis was done, for different scenarios.

Concerning (a), since the exact number of FTEs required for the central team is not yet known, neither are the FTEs costs. We therefore assumed three scenarios, where the base structure is the sum of the current FTEs allocated to fraud prevention across countries, and the other two refer to a positive and negative variation of two FTEs. Concerning (c), the global expectable fraud volume is hard to measure since the platform's increased effectiveness is not certain until it is actually implemented or a Prototype Test is done – the platform analyzes the same set of transactions that the operations once had during the same period of time, to measure the difference of fraudulent transactions detected. Due to such uncertainty, we considered four different possibilities of increased effectiveness (5 per cent, 10 per cent, 15 per cent and 20 per cent) and an extra possibility of a 22 per cent lower effectiveness to understand the limits of feasibility of this project. The sensitivity analysis results are presented in table 4.

Table 4. Sensitivity analysis to the future global fraud costs (in index values)

FTEs Effectiveness	Plus 2	Base Structure	Less 2
Unlikely (+ 5%)	81	79	77
Weak (+10%)	77	75	73
Satisfactory (+15%)	74	72	70
Optimistic (+20%)	70	68	66
-22%	100	98	96

From the sensitivity analysis one can conclude that implementing the new platform will always be profitable to the Group even in the unlikely scenario where its effectiveness is only 5 per cent greater than the present systems and required FTEs increase by two—global fraud costs will decrease 19 per cent. However, in the best case scenario—20 per cent effectiveness increase and a central team with less 2 FTEs—cost reductions can achieve up to 34 per cent.

The fraud prevention centralization project would only not be feasible if the new platform detects 22 per cent less fraud volume than the actual systems and if the central team requires two more FTEs. In that case, the gains will be zero, since the new global fraud costs would be 100 as well.

5. Conclusions and Implications

In order to achieve significant cost reductions and hence higher efficiency levels to remain competitive, multinational banks are improving their management practices and pursuing a growing trend of operations' centralization across countries. This article aimed firstly to identify the centralization potential of the banking areas, based on the best practices of European and worldwide banks. Call centres, internet banking, IT, human resources, payment cards, purchase and logistics, and quality were found to have the highest centralization potential. Afterwards, a specific application was done to a European banking group, focused on the centralization of the payment card area, along the Group's European operations. Results showed that the Group can achieve up to 11.5 per cent card production and delivery cost reduction, if this centralization occurs. Pre and post card production activities should also be centralized. Regarding fraud prevention, the activity consolidation into a single platform can lead the Group to a global fraud volume reduction of 34 per cent, if the best case scenario is accomplished.

To the best of our knowledge, this was the first attempt made in the literature to quantify centralization gains. The present paper demonstrated that there may be room for improved efficiency in the banking sector, particularly for those institutions that operate in multiple geographies, provided that culture and regulation asymmetries are not a too serious obstacle. Clearly, an immediate managerial implication of our results is that multinational banks may be able to improve their efficiency ratios and hence their competitiveness in the global market by simply centralizing some multi-domestic activities. More efficiency means less need for financing and improved solvability ratios, which may be particularly important in times of economic and financial crisis. In the current adverse macroeconomic scenario, the gains achieved in fraud prevention may be quite relevant for those institutions more severely faced with overdue credit.

From a theoretical perspective, this paper calls the attention to a somewhat new competition variable, the degree of centralization. We expect investments in centralization to be strategic complements, in the sense that increased centralization by a given institution triggers a new or an additional centralization effort by rivals (Fudenberg & Tirole, 1984). This leads to overall efficiency gains, the possibility of lower prices and improved welfare. Although we concentrated our analysis on the banks' perspective, it seems that there exist positive externalities associated with an institution's centralization effort.

6. Limitations and Lines for Future Research

Future investigation on this topic should consider the competition issue. To start with, an identical study could be conducted for those banking groups that directly compete with the one being analysed here, in order to compare achievable centralization gains. If they are of similar magnitude, one can expect competition to be fiercer with respect to this variable than if they substantially differ and/or are almost irrelevant for one of the competitors.

Taking for instance two extreme samples, one including the top 10 European banks (the largest) as compared with the bottom 10, could also allow some interesting insights.

Importantly too, and since this paper was mainly focused on centralization advantages, future research should try to evaluate possible losses from centralization, namely those arising from differences in language, culture or regulation, to be balanced with quantified gains in banking areas where advantages and disadvantages do coexist. Another relevant extension would consider evaluating increased banks' efficiency benefits to consumers and to society as a whole. Finally, future research could also, of course, be extended to other industries—financial and nonfinancial—with multi-domestic operations, in order to compare sectors in terms of potential efficiency gains.

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Notes

Note 1. For confidentiality reasons, the name of the Group is not mentioned and all the information that could enable identification has been suppressed throughout the paper.

Note 2. Hunt (2009) presents a case study on the implementation of a centralized core system by the State Bank of India. Finansbank, a Turkish bank, centralized more than 65 per cent of its operation transactions in a platform called FOMER and intends to centralize the entirety, except for those that can only be provided by the branches, such as counter and similar transactions (<http://www.finansbank.com.tr/en/about-finansbank/departments/operations.aspx>).

Note 3. The financial crisis that emerged in 2007-2008 calls for a critical view on CRM and cross-selling in banking, taking into account the miss-selling and predatory lending facilitated by financial services marketing.

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The Impact of Political Risk on Foreign Direct Investment

Mashrur M. Khan¹ & Mashfique Ibne Akbar²

¹International Food Policy Research Institute, Bangladesh

²Centre for Policy Dialogue, Bangladesh

Correspondence: Mashrur M. Khan, International Food Policy Research Institute, House: 10A, Road: 35, Gulshan 2, Dhaka 1212, Bangladesh. Tel: 880-177-611-1158. E-mail: mashrur.m.khan@gmail.com

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Abstract

Political risk, like all other risks, has an adverse effect on any economy. Even though other forms of risk, such as economic risk and financial risk have been studied quite extensively, political risk has not received much attention owing primarily to lack of data. The current paper attempts to study a negative and significant relationship between political risk and Foreign Direct Investment (FDI), accounting for 94 countries over a span of 24 years from 1986-2009. It was found that most of the political risk indicators have a negative relationship with FDI for the world as a whole and also, the high-income countries but the relationship was the strongest for the upper middle-income countries.

Keywords: political risk, foreign direct investment, panel data analysis

1. Introduction

Foreign Direct Investment (FDI) has been a subject of interest for decades. The influx of FDI surged primarily in the 1980s when lending by commercial banks to the developing economies dried up, which forced most countries to ease restrictions and offer tax incentives and subsidies to attract foreign capital (Aitken and Harrison, 1999; World Bank, 1997a, b). Consequently, FDI contributes positively to the Gross Domestic Product (GDP) of the host countries by bringing in foreign exchange reserves and improvement of the Balance of Payment (BoP) for the local economies. The rate of technological progress enhances with FDI since foreign firms bring in more advanced technology and management practices to the host countries (Findlay, 1978). Romer (1993) further adds that FDI can ease the transfer of technological and business know-how to the less developed economies with the consequent reduction of the 'idea gaps' between rich and poor countries. In addition, the new ideas can 'spill over' to other sectors and segments of the economy which are not FDI recipients; thereby, boosting the productivity of more firms in the process (Rappaport, 2000).

Theoretically, the two most important determinants of FDI are the size and growth of the host country and cost competitiveness. Empirical studies determined market size, wages and political stability to affect the location decisions of FDI (Dunning 1993). Taking the case of Western Europe in the 1950s, Reuber et al. (1973) found that the determinants of US FDI depended mainly on liberal host government policies, technological infrastructure, skilled labour and cultural proximity. Additionally, Froot and Stein (1991) found real exchange rate to be a significant factor affecting FDI. The O (ownership) L (location) I (internalization) paradigm regarding a firm's motivation for investment in foreign countries, Dunning (1998) states that the ownership and internalization advantages are derived using firm-specific resources and capabilities, in conjunction with reduction in transaction costs, while location advantages refer to the ability to capture broader markets and resources.

Despite numerous studies identifying determinants of FDI, one factor remains to receive much attention owing primarily to high quality data – political risk (Note 1). Logically, it should be the case that political risk would have a significant negative impact on FDI. Political instability increases uncertainty in the economic environment, thereby lowering the incentives for foreign investors to invest in the host country.

International Country Risk Guide (ICRG) has disseminated separate financial, economic, and political ratings over the period 1984-2009 and has identified twelve different political risk indices. Theoretically, there seems to be a relationship between FDI and political risks, which is precisely the analysis undertaken in the current study.

The next section reviews the existing literature on the subject and evidence from the results. Section 3 discusses the underlying theory and specifies the models to be employed in the study along with the estimation techniques. Section 4 provides the regression results with interpretations, and section 5 concludes the paper.

2. Literature Review

It should be noted at the outset that very few authors have tried to measure the impact of risk factors on FDI. The primary hindrance associated with risks is their quantitative measurements. Click (2005), in an attempt to measure political risk, deducted financial risks from total country risks to calculate political risks. The standard deviation of each country's regression residuals was assumed to provide a measure of the unexplained country risk, i.e. the unobserved political risk. The study showed differences in Return on Assets (ROA) related to measurable financial risk variables. To further examine whether country risk captured political risk, correlations of residual deviations were computed by the author with other country and political risk indicators. Consequently, it was revealed that the correlation between residual deviations and average Euro money, Institutional Investor and ICRG ratings was moderately high, establishing the notion of a significant correlated relationship. The author concluded that political risk is unrelated to ROA of the companies.

Hayakawa et al. (2011) examined the impact of various components of political as well as financial risk on inward FDI, from both long- and short-run perspectives, using risk indices from PRS. The paper employs the dynamic Generalized Method of Moments (GMM) estimator with data from 90 countries for the period 1985-2007 and focused most of their findings on developing countries. They found that among the political risk components, government stability, socioeconomic conditions, investment profile, internal and external conflict, corruption, religious tensions, democratic accountability, and ethnic tensions are closely associated and positively related with FDI flows. Among the financial risk components, only exchange rate stability yields statistically significant positive coefficients when estimated only for developing countries, implying that greater exchange rate stability leads to greater FDI into the host countries. Interestingly, most financial risk indicators yielded a negative or statistically insignificant relationship with FDI flows.

Busse and Hefeker (2005) explore the linkages between political risk, institutions and foreign direct investment inflows using data from 83 countries for the period 1984–2003 using different econometric techniques such as fixed effects and GMM estimator. They found that government stability, law and order, quality of the bureaucracy investment profile, internal and external conflict, ethnic tensions and democratic accountability are statistically significant determinants of foreign investment flows. Across different econometric models, the relative magnitude of the coefficients are largest for government stability and law and order, indicating that changes in these components of political risk and institutions are highly relevant for investment decisions of multinationals.

Other studies have deployed "corruption" as a measure of political risk and calculated its impact on FDI. Corruption has a disincentive effect on investment since it increases the risk and uncertainty encountered by potential investors (Getz and Volkema, 2001), thereby, discouraging investors to make further investments in such political risky economies. Habib and Zurawicki (2002) examined the impact of corruption on FDI and found a negative impact of corruption on FDI. The results suggest that foreign investors generally avoid corruption because of moral obligations and also the operational inefficiencies that arise due to corruption. Wei (2000) analyzed data on FDI in the early 1990s from 12 source countries and 45 host countries. Corruption revealed to have a significant and negative effect on FDI. Mauro (1995) also found corruption to have a negative impact on investment, thus resulting in diminished economic growth. However, studies such as Nye (1979), found that corruption has a positive impact on economic growth and development while Hines (1995) derived a non-significant relationship. Thus, the present study aims to explore the political risk indices and learn the respective indicators' impact on FDI.

3. Theoretical Estimations and Modelling

The present study attempts to capture the effect of political risk on FDI controlling for GDP, which is taken to account for the economic growth of a country. FDI stocks have been considered as the dependent variable for all the countries considered in the study (Note 2). We measure the FDI stocks in terms of USD in current prices and current exchange rates. Data was collected for 94 countries over a span of 24 years from 1986-2009. The countries were then classified into four groups based on GDP per capita (Appendix A-1).

Theoretically, the larger the size of the market and more the overall GDP, the more profits are to be made by foreign investors and, hence, the higher the FDI (Note 3). Therefore, one of the control variables for the current paper is GDP (Note 4). Another important factor affecting FDI is the openness of the economy (openness is denoted by the amount of exports and imports over GDP (Note 5)). Both GDP and openness are expected to have

a positive relationship with FDI leading to higher economic growth and better standards of living.

It is the case that higher political risk might arise in different circumstances such as, political instability, poor law and order, etc. The higher the political risk, the higher the probability that the investment in the host economy will decrease. Hence, political risk can be stated to be a significant factor affecting FDI.

Thus, the model (unadjusted for individual and/or time specific effects) is:

$$FDI_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + e_{it} \quad (1)$$

where,

FDI = Log of FDI measured in current prices and current exchange rates

GDP = Log of GDP measured in current USD

$Openness$ = Log of $Openness$ measured in current prices

PR_k = Log of the Political Risk Component k of country i (PR_{ki})

(PR_k), where k refers to one of twelve different indices viz. Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religion in Politics, Law & Order, Ethnic Tensions, Democratic Accountability and Bureaucracy Quality. To eliminate zero values so that logarithm exists, 1 has been added to all the political risk indices; and

it = country i , year t .

3.1 Estimation Techniques

Log is taken of all the four variables (FDI , GDP , $Openness$ and Political Risk indices) with an aim to stabilize variance and make symmetric distributions so that the respective coefficients are not influenced by extreme values. It is to be noted that one political risk component is examined at a time to measure the effects of individual political risk indices and evade the high correlation between them. Moreover, the original indices indicated that the higher the index, the lower the political risk. However, to ease the interpretation of results, the maximum value of each of the indicator was deducted from the existing values to ensure that higher indices reflected higher political risks.

Since the study examines a range of countries over a span of time, panel data is a more appropriate methodology for the study. Five different estimation techniques have been used, namely, Pooled OLS, One-Way and Two-Way Fixed Effects Model and One-Way and Two-Way Random Effects Model.

Pooled OLS runs a simple OLS regression by stacking the time series data of the cross-sections, one above another. Thus, we estimate the following model:

$$FDI_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + e_{it} \quad (2)$$

where the symbols represent the same elements as mentioned before.

In order to explore if country-specific factors (like government policy, investment climate, etc.) affect FDI , we use the One-Way Fixed Effects Model. This model recognizes that different cross-sectional elements will have different attributes not captured in the model but assumes that for a given cross section, they will remain time-invariant. The effect of these attributes is captured in the intercepts. Thus, the model we estimate through this approach is:

$$FDI_{it} = \alpha_i + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + e_{it} \quad (3)$$

where the i of the intercept indicates the unobserved individual country-specific factors which is assumed to remain fixed over time (the other variables representing the same variables as before).

Two-Way Fixed Effects Model examines both country-specific and time-specific (exchange rates, oil prices, etc.) dimensions. It considers the effects of both individual-variant and time-variant attributes, thereby leading to better parameter estimates (Gujarati 2003).

Also, the model eliminates omitted variable bias. Hence, the model for this approach is:

$$FDI_{it} = \alpha_{it} + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + e_{it} \quad (4)$$

where the i and t of the intercept capture both the country-specific and time-specific attributes (the other variables representing the same elements as before).

Moving on, the Random Effects models capture individual or time-specific effects through the random error term. In the Random-Effects model, the intercept represents the mean value of the cross-section intercepts and the

error component represents the random deviation of individual intercept from the mean value (Gujarati 2003). One-Way Random Effects model captures only the individual-specific effects and assumes them to be time-invariant.

The model estimated here is:

$$FDI_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + u_i + e_{it} \quad (5)$$

where u_i captures individual-specific random effects (and the other variables represent the same elements as before). Two-Way Random Effects model captures both country and time-specific effects. Therefore, another error component v_t is added to the regular error term in the model to capture time-specific random effects. Therefore, the model is:

$$FDI_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 openness_{it} + \beta_3 PR_{kit} + u_i + v_t + e_{it} \quad (6)$$

where v_t captures the time-specific effects (the other variables representing the same elements as mentioned previously).

With an array of models available for estimation, the best model has to be chosen from the available estimation techniques. Pooled OLS can be negated though, since individual-specific or time-specific effects prevail across the countries that might not be captured in the model specification. However, whether to capture these individual-specific and time-specific effects in the intercept or in a random error component can be deduced using specification tests. The decision rules for each of the specification tests follow in the discussion.

High Breusch-Pagan Lagrange Multiplier (LM) test statistics with associated low p -values deduce substantial cross-section variation and rejects the null hypothesis of homoskedastic pooled OLS. Accordingly, high F-test statistic with low p -values in the Fixed Effects models rejects the null hypothesis of no fixed effects. On the other hand, high Hausman test statistic, denoted by m , and low p -values in Random Effects models imply the null hypothesis of no correlation between the regressors, ultimately rejecting the individual effects.

4. Empirical Results

For the World and sub-divisions of countries (list of countries attached in Appendix A-1), the One-Way and Two-Way Fixed Effects models are preferred over Random-Effects Models since the null hypothesis of no fixed effects is rejected (with regard to F -tests) and the null hypothesis of no correlation (with regard to m) is rejected at the same time. Hence, it can be stated that the fixed effects are, therefore, the better models for the currently considered dataset.

4.1 World

Regression results display GDP and Openness to be significant, that too at 1% significance level, with almost all the estimation models and all the political risk indicators. GDP and Openness have a positive relationship with FDI and hence, this was one of the reasoning to consider the formers as the control variables for the respective regressions.

Table 1. Summary of parameter estimates of political risk indicators on *FDI*

Political Risk Components	World			
	One-way Fixed		Two-way Fixed	
	Significant	Insignificant	Significant	Insignificant
Government Stability	-0.31**			0.036
Socioeconomic Conditions	-0.17***		-0.30***	
Investment Profile	-0.33***			-0.07
Internal Conflict		-0.028		0.023
External Conflict		0.004		0.017
Corruption	0.55***		0.13**	
Military in Politics	0.195***		0.195***	-0.001
Religion in Politics		0.002		-0.024
Law and Order		-0.02	-0.156***	
Ethnic Tensions		-0.009		-0.066
Democratic Accountability		-0.007		0.061
Bureaucratic Quality		0.074	-0.21***	

*** indicates significance at 1% significance level, ** indicates significance at 5% significance level * indicates significance at 10% significance level

As can be seen from the table above (Table 1), political risk indicators, in the form of Government Stability, Socioeconomic Conditions and Investment Profile showed strong negative relationship with FDI for the

One-way Fixed Effects Model. This is in line with the hypothesis that political risk has a negative impact on FDI. Corruption and Military in Politics also showed significance, although with a positive coefficient, implying that an increase in the respective indicators would actually lead to increased FDI, controlling for individual effects. The majority of the remaining indicators were insignificant, although having a negative relationship with FDI.

For the Two-Way Fixed Effects model, Socioeconomic Conditions, Law and Order and Bureaucratic Quality displayed significant negative results. Law and Order and Bureaucratic Quality were not significant in One-Way Fixed Effects model, indicating time-specific effects to impact these indicators, and imposing a negative effect on FDI. However, in line with the One-Way Fixed Effects model, Corruption and Military in Politics showed positive relationship, establishing the impact of these two political risk factors on FDI.

4.2 High Income Countries

A summary of the results of the detailed regression results for high-income countries (HICs) is presented in Table 2. Similar to the World, the FDI of HICs also exhibited positive significant relationship (at 1% significance level) with GDP and Openness. In terms of Political Risk indicators, Government Stability, Socioeconomic Conditions and Investment Profile showed significant negative relationship with FDI, for the One-Way Fixed Effects Model. Corruption, Military in Politics, Religion in Politics, Ethnic Tensions and Bureaucratic Quality showed positive significant relationship with FDI. Except the last three Political Risk indicators, the former indicators are in line with the World dataset outcome. Compared to the World, the HICs incorporate less insignificant variables. Now, with the segregation of economies, the results become more concrete. The Two-Way Fixed Effects Model shows significant indicators with a negative coefficient—significant indicators having a positive coefficient in the One-Way Fixed Effects Model take up the negative coefficient.

Table 2. Summary of results of the parameter estimates of political risk indicators on FDI

Political Risk Components	High-Income Countries			
	One-way Fixed		Two-way Fixed	
	Significant	Insignificant	Significant	Insignificant
Government Stability	-0.18***			-0.066
Socioeconomic Conditions	-0.37***		-0.17**	
Investment Profile	-0.24***		0.26***	
Internal Conflict		-0.001		-0.07
External Conflict		0.07	-0.09**	
Corruption	0.26***			-0.11
Military in Politics	0.16**		0.23***	
Religion in Politics	0.32***		0.17**	
Law and Order		0.03	-0.16***	
Ethnic Tensions	0.13**		-0.16***	
Democratic Accountability		0.07		0.09
Bureaucratic Quality	0.29**			0.08

*** indicates significance at 1% significance level, ** indicates significance at 5% significance level, * indicates significance at 10% significance level

4.3 Upper Middle Income Countries

A sum up of the regression results for upper middle-income countries (UMICs) is presented in Table 3.

Interestingly, for the UMICs, the Two-Way Fixed Effects model showed negative relationship between Openness and FDI, while keeping to the positive relationship between GDP and the latter. The economic implication for this may be explained by the substitutability between exports and imports and FDI. It is the case that exports together with imports increased with lesser dependence on FDI. However, the hypothesis is consistent for the other four models under consideration, that is, the relationship being negative and significant.

For the UMICs, Government Stability, Investment Profile and Ethnic Tensions showed negative and significant relationship with FDI. However, other significant Political Risk indicators including Socioeconomic Conditions, External Conflict, Corruption, Law and Order and Bureaucratic Quality showed positive and significant relationship with FDI. This could be because of the upward trend of FDI in these countries over the last few decades. Hence, political risk indicators have not been as significant a factor in these countries as they have been in the HICs.

Table 3. Summary of results of the parameter estimates of political risk indicators on FDI

Political Risk Components	Upper Middle-Income Countries			
	One-way Fixed		Two-way Fixed	
	Significant	Insignificant	Significant	Insignificant
Government Stability	-0.31***			0.14
Socioeconomic Conditions	0.59***			0.068
Investment Profile	-0.20**		0.359***	
Internal Conflict		-0.04		0.07
External Conflict	0.13**		0.27***	
Corruption	0.81***		0.23*	
Military in Politics		0.09	0.34***	
Religion in Politics		-0.01	0.25***	
Law and Order	0.32***			-0.10
Ethnic Tensions	-0.27**			-0.06
Democratic Accountability		0.06		0.11
Bureaucratic Quality	0.23*			0.02

*** indicates significance at 1% significance level, ** indicates significance at 5% significance level, * indicates significance at 10% significance level.

Table 4. Summary of results of the parameter estimates of political risk indicators on FDI

Political Risk Components	Lower Middle Income Countries			
	One-way Fixed		Two-way Fixed	
	Sig.	Insig.	Sig.	Insig.
Government Stability	-0.38***		-0.21**	
Socioeconomic Conditions		0.16	-0.40***	
Investment Profile	-0.27***			-0.06
Internal Conflict	-0.22***		-0.23***	
External Conflict		-0.04		-0.03
Corruption		-0.05		-0.16
Military in Politics		0.12		-0.01
Religion in Politics	-0.28***		-0.26***	
Law and Order	-0.45***		-0.54***	
Ethnic Tensions	-0.25***		-0.17**	
Democratic Accountability	-0.21***		-0.26***	
Bureaucratic Quality		-0.12	-0.29***	

*** indicates significance at 1% significance level, ** indicates significance at 5% significance level, * indicates significance at 10% significance level.

4.4 Lower Middle Income Countries

Similar to the reporting of the previous tables, Table 4 presents the review of the results for the lower middle-income countries (LMICs) and their respective regressions. GDP and Openness are positively correlated at 1% significance level with FDI for all the models in this group of countries. The results for the LMICs support the hypothesis of the paper strongly. Most of the indicators for both One-Way and Two-Way Fixed Effects models are significant and negative at 1% significant level. Only Corruption, Military in Politics, Socioeconomic Conditions, External Conflict and Bureaucratic Quality showed insignificant results. The reasoning could be that the data for these indicators might have been too volatile, which rendered the results to be insignificant. The implication of the analysis is that political risk indicators are more relevant in these countries in comparison to other countries around the world. Also, their negative coefficients are higher for most indicators, indicating the hypothesis of negative relationship between political risk and FDI to be strongly supported for these countries.

4.5 Low Income Countries

For the LICs, Government Stability and External Conflict have shown significant negative results in One-Way Fixed Effects model. This is evident in Table 5, which presents a summary of the regression results of the low-income countries (LICs). On the other hand, External Conflict, Religion in Politics and Bureaucratic Quality has shown negative and significant results in Two-Way Fixed Effects model. For the developing countries, religion and bureaucracy are more pressing issues and explain why such indicators have shown negative results. Other indicators have shown either insignificant results or positive significance (Investment Profile, Internal

Conflict, Corruption and Military in Politics), possibly signifying that for the LICs, other factors play a greater role in determining the inflows of FDI, while at the same time data volatility cannot also be ignored.

Table 5. Summary of results of the parameter estimates of political risk indicators on FDI

Low Income Countries				
Political Risk Components	One-way Fixed		Two-way Fixed	
	Sig.	Insig.	Sig.	Insig.
Government Stability	-0.31***		0.46***	
Socioeconomic Conditions	1.71***			-0.29
Investment Profile		0.09	0.63***	
Internal Conflict		-0.07	0.21*	
External Conflict	-0.34***		-0.18*	
Corruption	1.16***		0.50**	
Military in Politics	0.65***		0.43**	
Religion in Politics		-0.033	-0.74***	
Law and Order		0.01		-0.15
Ethnic Tensions		0.02		0.21
Democratic Accountability		0.23	0.68***	
Bureaucratic Quality		0.35	-0.45**	

*** indicates significance at 1% significance level, ** indicates significance at 5% significance level, * indicates significance at 10% significance level.

6. Conclusion

With FDI's cosmic importance in the economics and business arena, numerous studies have been carried out to find the determinants. The current study was performed to shed light on a topic that has not received much attention. Political risk as a determinant of FDI has received attention only recently, though under the narrower meaning – corruption (Habib and Zurawicki, 2002). Thus, this paper presents the *raison-d'etre* for a detailed analysis of the impact of political risk on FDI, taking different indicators of the former, including corruption.

The regression results of World and HICs show similar results. Government Stability, Socioeconomic Conditions and Investment Profile show negative and significant relationship with FDI in these regions, as was predicted in the hypothesis. However, Corruption and Military in Politics both posited positive relationship with FDI. For the UMICs, a few of the indicators were negative and significant but most of them were positive, indicating that political risk indicators does not pose a significant influence in these countries as the trend in FDI for these countries has been largely upward-sloping. The hypothesis was supported most strongly for the LMIC sub-division. Most of the indicators were negative and significant with their coefficients being higher than in the other regions, implying that political risk is a greater threat in the LMICs in comparison to the rest of the World. Evidence of religion and bureaucracy having a negative impact on FDI was observed very strongly for the LICs.

Political risk factors are difficult to quantify. Most studies thus far have used a particular form of political risk, the mostly commonly used proxy being corruption, to explain its adverse effects on FDI and other economic forces. However, using the ICRG index, this study has empirically deduced that political risk factors play an important role in determining FDI inflows. In this context, the government of respective countries, particularly in the LMICs, should try to contain political risks to the furthest extent since the indicators conclude that the LMICs are more prone to political risks and uncertainties. However, different regression results for different groups of countries indicate that caution must be adopted to deal with risk factors that pertain to a particular country in order to properly utilize a country's potential.

Since the political indicators in the study are categorized, it is advantageous to identify the different types of political risks which are characteristic of the different sub-divisions. It is also important that political parties, other stakeholders and bureaucrats in these countries take into account the fact that aggravation of political situations in the countries would lead to an overall negative impact. The consensus, disregarding any region or country, should be to reduce political risks and uncertainties since political instability play an important role in the determination of FDI and consequently, the long-run economic performance of a country.

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Notes

Note 1. Political risk is defined as the possibility that political events in a country will affect the business climate and investors will not make as much money as expected (Howell, 2001).

Note 2. Data collected from UNCTAD.

Note 3. OECD, 2000.

Note 4. Data collected from the World Bank .

Note 5. Taken from Penn World Table.

Glossary

BoP–Balance of Payment

CPI–Corruption Perception Index

FDI–Foreign Direct Investment

GDP–Gross Domestic Product

GNP–Gross National Product

HICs–High-income countries

ICRG–International Country Risk Guide

LICs–Low income countries

LM–Breusch-Pagan Lagrange Multiplier

LMICs–Lower middle-income countries

MNCs–Multinational Companies

OLS–Ordinary Least Square regression

PR–Political Risk

ROA–Return on Assets

UMICs–Upper middle-income countries

USD–United States Dollar

Appendix

Classification of countries according to GDP/Capita (according to World Bank classification)

High-income economies (\$12,276 or more)	Upper-middle-income economies (\$3,976- \$12,275)	Lower-middle-income economies (\$1,006-\$3,975)	Low-income economies (\$1,005 or less)
Australia	Argentina	Angola	Bangladesh
Austria	Botswana	Bolivia	Burkina Faso
The Bahamas	Brazil	Cameroon	Congo, DR
Bahrain	Chile	Congo	Guinea
Belgium	China	Cote d'Ivoire	Guinea-Bissau
Canada	Colombia	Egypt	Kenya
Denmark	Costa Rica	El Salvador	Liberia
Finland	Cuba	Ghana	Madagascar
France	Ecuador	Guatemala	Malawi
Germany	Jamaica	Honduras	Mali
Greece	Jordan	India	Mozambique
Iceland	Malaysia	Indonesia	Niger
Ireland	Mexico	Morocco	Sierra Leone
Israel	Panama	Nicaragua	Togo
Italy	Peru	Nigeria	Zimbabwe
Japan	South Africa	Pakistan	
Kuwait	Thailand	Papua New Guinea	
Malta	Tunisia	Paraguay	
Netherlands	Turkey	Philippines	
New Zealand	Uruguay	Senegal	
Norway	Venezuela	Sri Lanka	
Oman		Sudan	
Portugal		Syria	
Qatar		Vietnam	
Saudi Arabia		Zambia	
Singapore			
Spain			
Sweden			
Switzerland			
Trinidad and Tobago			
United Arab Emirates			
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United States			

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