

Impact of the Global Financial Crisis on Economic Growth: Implications for South Africa and Other Developing Economies

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ABSTRACT

This paper examines the impact of the recent global financial crisis on economic growth in developing economies and South Africa in particular. It explores whether the events experienced by developing countries conform to what would be anticipated from economic theory. This is done by firstly comparing country growth forecasts for 2012 captured in 2008 at the beginning of the crisis to actual 2012 GDP growth data. Secondly, panel data analysis is used to investigate three important transmission channels, namely those of Trade, Capital Flows and Exchange Rates for 25 developing economies. The results suggest that economic forecasters in 2008 on average overestimated GDP growth for 2012 by -21.6% (excluding Venezuela). The only important transmission channel identified using Trend analysis to explain this negative impact on growth was capital flows. However when using Panel regression analysis all three channels were found to explain the economic impact of the crisis on GDP growth for developing countries, conforming to economic theory. It was discovered that, contrary to what was initially expected, portfolio inflows actually increased for most developing countries during the crisis. This possibly can be explained by the impact of quantitative easing in the USA. South Africa was found to have been negatively impacted by the global financial crisis, but to a lesser extent when compared to most other developing countries. The findings are important for global investors looking for new investment opportunities. The extent to which individual economies are “decoupled” from developed economies’ performance provides possible opportunities for diversifying risk through a geographic spread of investor portfolios.

DECLARATION

This page declares that the work produced is my own and was conducted whilst completing the degree of Masters in Financial Markets whilst at Rhodes University. This thesis has not been submitted to other Universities, Technikons or Colleges for degree purposes.

Neil Edward Savy

Signed: _____

Date: _____

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LIST OF ABBREVIATIONS

CP	Current Prices
EU	European Union
FDI.....	Foreign Direct Investment
GDP.....	Gross Domestic Product
IMF	International Monetary Fund
ITC.....	International Trade Centre
NSA.....	Not seasonally adjusted
N/A.....	Not Applicable
PI.....	Price Index
REER.....	Real Effective Exchange Rate
USA.....	United States of America
WEO.....	World Economic Outlook

CHAPTER 1: INTRODUCTION

1.1 CONTEXT OF THE RESEARCH

A financial crisis according to Claessens and Kose (2013: 3) is defined as “an amalgam of events, including substantial changes in credit volume and asset prices, severe disruptions in financial intermediation, notably the supply of external financing, large scale balance sheet problems, and the need for large scale government support”. According to Reinhart and Rogoff (2009: 3) “financial crises are protracted affairs”. The global financial crisis, since its commencement in 2007, affected many advanced countries around the world, particularly the United States and Europe, however its impact on developing countries was not uniform (Gurtner, 2010). Some developing countries like China were hardly affected at all, but others like South Africa were harder hit initially and economic growth still remains weak more than 5 years after the crisis began (Bivens, Fieldhouse and Shierholz, 2013). Despite Federal Reserve action of sharply cutting interest rates and quantitative easing to create excess bank reserves to stimulate bank lending and consumption and investment growth, bank credit growth remains weak in many countries (Motyovski, 2010). Many developing economies are finding it difficult to increase investor confidence and consumer spending; domestic demand and economic growth remain weak as a consequence (Elwell, 2013).

Blanchard, Das and Faruquee (2010: 266) note that if developing economies’ performance is highly correlated with that of developed economies, a slowdown in the developed economies will mean that growth in developing economies would also automatically decelerate. However, at the dawn of the financial crisis, it was widely expected that developing countries would largely escape the impact of the problems which originated in the United States and had spread to Europe (Claassen, Kabundi and Loots, 2013). This argument that developing countries had “decoupled” from developed economies such as America and Europe emerged because most developing countries were not involved in the complex financial dealings which could have exposed them and their banks’ balance sheets to the toxic assets and bad loans exposed by the crisis in developed economies (Blanchard *et al.*, 2010: 263). Developing countries had usually resorted to more traditional forms of investment instruments and refrained from participating in derivatives and credit default swaps (Suetin, 2009). Thus their banks were expected to be more immune from the fallout of the crisis in developed economies.

However, Boorman (2009: 2) notes that as events unfolded it became clear that the thesis of decoupling was not borne out by events and that “emerging market countries had been hit hard”

by the crisis irrespective of their avoidance of complicated financial systems. According to Te Velde *et al.* (2010: 8) developing countries have similar transmission mechanisms to developed economies in terms of “trade, private capital flows, remittances and aid” links. As a result, while but the total effect of the crisis differed from country to country, as the financial crisis began unfolding in developed countries, major financial institutions began to withdraw funds from subsidiaries in developing countries to recoup their capital holdings. Thus output and employment levels in developing countries were negatively impacted (Singh, 2010). Credit flows to developing countries via international banks and global bond markets dried up, causing developing countries with high current account deficits to be burdened with additional financial stress (Boorman, 2009). Many developing countries such as Pakistan, Ukraine and Serbia had to turn to the IMF for financial support (Muchhala, 2011). Consumer and investor confidence in developing countries was negatively affected as asset values in both equity and housing markets declined and unemployment levels rose sharply (Mckibbin and Stoeckel, 2009). Capital injections and support mechanisms targeted at domestic banks in developing countries created the same ad hoc problem experienced by advanced economies, i.e. “the consistency and coordination across borders of measures to support domestic banking systems” (Boorman, 2009: 6).

In assessing the manner in which the financial crisis impacted on developing countries several authors such as Berkmen, Gelos, Rennhack and Walsh (2009); Boorman (2009); Naude (2009); Te Velde *et al.* (2010) and Sender (2009) suggest there were between three to five transmission mechanism channels responsible for this impact. These mechanisms through which external shocks were transmitted were i) Exports ii) Capital flows iii) Restrictions in credit iv) Remittances and v) Exchange rates.

Looking at the direct effects of the crisis, the assets of developing country banks were fortunately not affected nearly as much as those of developed countries because of “limited interrelationships with international banks” and avoidance of subprime mortgages (Naude, 2009: 4). The banks located in South Africa, for example, were not as severely impacted compared to their international counterparts, mainly because of tighter government controls and lower leverage ratios in the financial sector (Padayachee, 2010). Like South Africa, China was also fortunate in that government controls on the financial sector meant that exposure to American subprime mortgages was minimised (Casarini, 2012). The indirect impact of the crisis due to its negative effect on the prices of housing and stock markets was much more significant (Boorman, 2009).

However Gagnon (2013) suggests that developing countries with flexible exchange rates and those with greater reliance on exports to China should not have been impacted as severely by the crisis despite export demand from Europe and other developed markets being weak.

The negative repercussions of the crisis on developing countries, including South Africa, and the very different magnitude and persistence of this impact on individual economies, suggest that an examination of the reasons for the differences is a useful area of research.

1.2 RESEARCH GOALS

The goal of this research is to examine the manner in which the global financial crisis impacted on developing countries and especially South Africa.

The research will seek to identify why some developing countries were initially much more severely affected by the crisis as well as why some developing economies, for example South Africa, have remained weak whereas others quickly recovered.

The study will also investigate which transmission channels were important in ensuring the crisis that started in developed countries also impacted on developing countries and whether it is the importance of these transmission channels which ensured that some developing countries recovered swiftly from the crisis, while others did not.

1.3 METHODS, PROCEDURES AND TECHNIQUES

The principal method of research utilised is that of quantitative analysis. The paradigm employed is positivist.

Two quantitative methods of measuring the impact of the financial crisis are used. Firstly, a methodology similar to that used by Berkmen *et al.* (2009) is followed, whereby annual growth forecasts for 2012 which was forecasted at the time of the crisis in 2008 is compared to actual GDP for 2012. An analysis of the results is conducted in which differences in forecasted and actual growth for individual developing economies should give an indication as to what were the common variables that caused the crisis to impact differently across developing countries.

The second method uses a longer time frame from Q1 2002 to Q4 2012 in which panel data analysis is conducted using multivariate linear regressions to identify the causes of changes in GDP growth across a sample of developing countries.

In order to examine the possible transmission channels of the global financial crisis on developing countries and South Africa, a number of economic variables are used. Despite literature suggesting five common transmission mechanism channels, namely those of Trade, Capital Flows, Exchange Rates, Remittances and Restrictions in Credit, only the first three are assessed. The trend analysis incorporates Trade and Capital Flows as it is not possible to capture REER in the form of scatter plots. The panel regression analysis makes use of the first three transmission channels. Using the first method of trend analysis, Berkman *et al* (2009) break down these transmission channels into four broad channels referred to as (i) trade linkages; (ii) financial linkages; (iii) underlying vulnerabilities in the financial structure; and lastly (iv) policy frameworks. The empirical work includes constructing exchange rate volatility indices using a GARCH model.

The IMF, OECD and World Bank online databases together with Thomson DataStream were used to obtain the quarterly and annual data necessary to examine the transmission channels for 24 developing economies and South Africa.

CHAPTER 2: LITERATURE REVIEW

2.1 ECONOMIC THEORY BEHIND A FINANCIAL CRISIS

Naude (2009) describes a financial crisis as occurring when financial flows such as credit are restricted to the market, resulting in financial disruptions that then impact on real economic activity. Reinhart and Rogoff (2008) define a financial crisis as imminent in a country when it experiences a sustained decline in economic performance over a long period. The liquidity of banks declines rapidly as deposits are withdrawn from the financial system, thus banks find themselves in a situation in which they have to sell other investments to make up for the shortfall or inevitably collapse (Mamadough and Van Der Wusten, 2011).

A financial crisis can affect both large and small economies and can be kick started by local or foreign events. At times, dubious activities of the public and private sectors of an economy often result in an economic downslide and result in economic turmoil (Claessens and Kose, 2013).

In understanding a financial crisis, one must examine the interaction between the “financial sector and the real economy, referred to as macro-financial linkages” (Claessens and Kose, 2013: 38). Reinhart and Rogoff (2009) have shown that the impact of banking or financial crises is particularly severe and long-lasting. Reinhart and Rogoff (2009: 1) state that “severe financial crises share three characteristics”. Firstly, the asset market collapses to unprecedented levels, taking many years to correct itself despite fiscal and monetary aid. Secondly, output and employment levels decline. Measured over a two year period from the peak to the trough, on average output declines by more than nine percentage points (Reinhart and Rogoff, 2009: 3). Unemployment levels increase on average by seven percentage points over four years, with the duration of the downturn in employment lasting twice as long as the fall in output.

Despite many theories being developed over time to explain the reasons for a crisis, the roots of a financial crisis are still difficult to determine and often unclear (Financial Crisis Inquiry Commission, 2011). Whilst the causes of a crisis are fairly clear from the point of view of “external shocks and macroeconomic imbalances”, the unexplained idea of Keynes ‘animal spirits’ including fire sales, bank runs and contagion effects can also be noted as a driver in causing a financial crisis (Claessens and Kose, 2013: 5). A typical trait followed by financial crises are asset and credit booms which inevitably end in overpricing of assets and thus lead to economic busts and downturn bear markets (Financial Crisis Inquiry Commission, 2011). Asset price booms are when assets become fundamentally overvalued and deviate from expected trends as predicted by economic models. Models trying to explain how asset bubbles and mispricing

come about are predominantly based on individual irrational behaviour or microeconomic imbalances (Financial Crisis Enquiry Commission, 2011). However, the Internet Bubble of the 1990s was broken down by Blanchard and Watson (1982) who used a rational model to show that “asset prices need not equal their fundamental value, leading to rational bubbles” (Claessens and Kose, 2013: 6).

Common to all financial crises are substantial increases in government debt, seen to increase on “average by 86 percent in the major post–World War II episodes” (Reinhart and Rogoff, 2009: 3). Bailing out and recapitalising banks were once thought to be the two biggest contributors to a country’s increase in debt. However, it is known today that as a result of lower output levels, taxation revenue for governments drastically decreases in a financial crisis and thus debt levels rise for this reason also. Another reason would be that often governments take deliberate drastic and “ambitious countercyclical fiscal policies” to correct the economic downturn (Reinhart and Rogoff, 2009: 3).

Asset bubbles that have occurred include the “Dutch Tulip Mania from 1634-1637, the French Mississippi Bubble in 1719-20 and the South Sea Bubble in the United Kingdom in 1720” (Claessens and Kose, 2013: 6).

According to Reinhart and Rogoff (2009: 3) “financial crises are protracted affairs”. Karl Marx had always foreseen that financial crises would regularly occur in capitalist countries (Naude, 2009).

When a financial crisis occurs, empirical evidence suggests that both developed and developing countries are negatively affected (De Zoysa and Newman, 2009) and experience similar “patterns in housing and equity prices, unemployment, government revenues and debt” (Reinhart and Rogoff, 2009: 1). However, depending on the level of integration and reliance of a developing country on developed countries, the adverse effect can be reduced (Reinhart and Rogoff, 2008).

It is important to be aware of the destructive effects that are associated with a financial crisis, not only for the banking sector, but also for other sectors such as manufacturing, farming and textiles (Dullien, Kotte, Marquez, Priewe, 2010). The twenty first century has fallen victim again to another financial crisis which originated in North America as early as mid-2007 and spread like an uncontrollable wild fire to the majority of world markets.

2.2. DIFFERENT TYPES OF FINANCIAL CRISES

It is commonly accepted today in economic literature that there are predominately two different groups of financial crises: i) “Currency and Sudden Stop crises and ii) Debt and Banking crises” (Claessens and Kose, 2013: 11). All financial crises vary in magnitude and have a tendency to transform over time and invade foreign borders (Lin and Treichel, 2012).

2.2.1 *Currency Crisis*

A currency crisis is said to occur when the local currency of an economy begins to depreciate at an alarming rate and government is forced to intervene using various counter-balancing methods such as increasing international reserves to act as a buffer, capital controls and increasing the repo, interest rate (Glick and Hutchison, 2011). During the Bretton Woods system, industrialised countries involved in World War 2 later saw the decomposition of the Bretton Wood system in 1971-1973 (Glick and Hutchison, 2011). Other recent examples of major currency crises include “the crisis of the British pound in 1976, the near-breakdown of the European Exchange Rate Mechanism in 1992-93, the Latin American Tequila Crisis following Mexico’s peso devaluation in 1994-95, the financial crisis that swept through Asia in 1997-98 and, more recently, the global financial crisis in 2008-09” (Glick and Hutchison, 2011: 2). In explaining the causes of a currency crises, investor confidence and capital flight are important to take note of. When investor confidence is low due to various factors such as uncertainty as to government policy or instability of an economy, investors remove and sell their domestic local currency investments and this causes the local currency to depreciate and can thus cause a currency crisis (Esquivel and Larrain, 1998). In trying to predict a currency crisis, certain economic indicators should be considered. The first is whether an economy has a high budget deficit and has to continually borrow to finance its capital spending. Secondly, when the local currency value increases at an abnormal rate, this is a sign that a currency crisis is imminent in the near future (Reisen, 1998).

2.2.2 *Sudden Stop Crisis*

A Sudden Stop crisis, also referred to as a Balance of Payments crisis, is the case whereby foreign capital inflows into emerging or developing markets starts to decrease at an astronomical rate and results in the contraction of economic activity (Ozkan and Unsal, 2010). This phenomenon often occurs in countries whose trading sectors have restrictions and have high levels of foreign exchange liabilities (Dornbusch, Park and Claessens, 2000). Recent sudden stops were experienced in “Latin America and Asia in the 1990’s and in Central and Eastern Europe in the 2000’s” (Claessens and Kose, 2013: 15). Output, credit

flows and consumption spending soon experience negative growth, while the real exchange rate tends to depreciate in value (Ozkan and Unsal, 2010). However, countries can take advantage of the depreciated currency to boost exports, as seen in Asia following the 1997 crisis, in an attempt to eject themselves out of an economic slump (Ozkan and Unsal, 2010). A Sudden Stop crisis is said to commence when for the first time the annual change in capital flows lies within one standard deviation below the sampled mean and is said to end when the yearly change in capital flows go beyond one standard deviation below its sample mean (Reinhart and Reinhart, 2008). Economic literature over the years has indicated that Sudden Stop crises are “associated with global shocks and are more likely with large cross border financial linkages” (Claessens and Kose, 2013: 15). Governments in attempting to turn around the slowdown in capital inflows often depreciate the local currency or raise interest rates. This method prompts foreign investors to invest in foreign markets offering higher rates than their local markets.

2.2.3 Foreign and Domestic Debt Crises

Economic theory over the years has until recent times not recognised the importance of domestic debt crises, as the theories constantly assumed that risk free assets backed by government could never be defaulted upon (Claessens and Kose, 2013). Domestic debt crises often occur in an economy where high inflation is prevalent as a result of government being negligent in quantitative easing, which can result in currency crises occurring later (Das, 2013). In allowing for inflation, government debt can be lowered and relieve some fiscal pressure as the value of debt owed will decrease. However, due to the very nature of inflation in making a consumers purchasing power diminish, it takes not only time for government to restore confidence levels of its citizens in adopting their local currency, but also implies high fiscal costs in trying to curb inflation (Claessens and Kose, 2013). It has been suggested that due to domestic debt crises not involving foreign creditors, this maybe a contributing factor as to why crises of this nature often go unnoticed (Reinhart and Rogoff, 2011). In 2002, Brazil experienced a debt crisis in which it simply could not repay its domestic debt as this debt had been “indexed to the US Dollar and domestic short term interest rates” (Pescaori and Amdou, 2007: 312). This saw Brazil’s local currency depreciate substantially and its bond spreads rise dramatically (Burger, Warnock and Warnock, 2012). Due to the nature of this structured debt, sovereign default was a possibility which could cause Brazil’s debt to GDP ratio to increase considerably (Pescaori and Amdou, 2007). A foreign debt crisis occurs when a government simply cannot repay its foreign financial commitments in the currency in which the loan was made and thus are forced to default on its repayments (Panizza, 2008). The

1980s also saw Latin America and Africa face “foreign debt servicing difficulties” and has since produced several studies concerning sovereign defaults of which credit ratings, spreads and benchmarks are used in assessing the probability of default (Pescaori and Amdou, 2007: 307).

2.2.4 Banking Crisis

A banking crisis occurs when large amounts of liquidity are quickly withdrawn from the banking sector due to the possibility that banks will be insolvent and holders of funds will not have access to their money. A run on banks soon develops as explained by the “herding effect” in which depositors of funds panic because other holders are withdrawing their money for some apparent reason, regardless of their own beliefs. The financial structure of the banking system can be seen as being fragile due to bank funding relying on short term deposits and many banks having “highly leveraged balance sheets” (Claessens and Kose, 2013: 18). Deposit insurance in the event of a run on banks can hamper the effect of the crisis, but several countries like South Africa in the event of a bank run do not have this countermeasure and thus the downside economic effect experienced would be greater. Banking crises tend to occur in countries which face poor macro-economic circumstances (DemKunt and Detragiache, 1998). In preventing a banking crisis, sound micro prudential regulation and risk mitigating strategies should always be a priority of banks (Claessens and Kose, 2013). Several countries across the world in the last decade have experienced banking crisis from Nigeria in 1991-1994 to South Korea in 1997-1998 and it is well documented that countries take longer to recover from banking crises compared to any other crisis.

2.3 THE 2007 CRISIS AND THE USA

2.3.1 The Impact of the Crisis on the United States

The United States economy suffered immense pressure in 2000/1 when the rupture of the ‘dotcom’ bubble and the 9/11 terror attacks occurred. In order to prevent a possible recession, the United States adopted sustained expansionary monetary policies which exposed the economy to massive risk as a result of the consequent expansion in bank lending (Naude, 2009). The Federal Reserve Bank decided to lower its discount rates “no less than 27 times” (Naude, 2009: 2) which directly lowered interest rates for all users to borrow at. Rapid growth was created, but it was credit based. This credit-based growth created huge trade deficits. Those countries with trade surpluses in turn wanted to purchase US Treasury Bonds to prevent their exchange rates from becoming excessively strong (Naude, 2009). Banks allowed massive subprime mortgage lending to occur to individuals who had no means of repaying the debt, further adding to credit

based growth. Mortgage lenders began selling subprime loans as financial assets to many institutions who at the time were not aware of the potential risk attached. It is estimated that up to US\$ 1.3 trillion was initially made available to the market in the form of subprime mortgages (Lin, 2008). Investors looking to disperse the risk of their investments were misled to think that investment schemes such as collateralised debt obligations (C.D.O.s), structured investment vehicles (S.I.V.s) and residential backed security (R.M.B.s) were much safer than they actually were.

By manipulating loopholes in the financial system as a result of inadequate supervision, “bad loans” were sold as assets to the market that later could not be easily assessed as to the level of associated risk. Furthermore, due to the complicated bundling of mortgages, institutions no longer knew where these “bad loans” were in the financial system because of it being so widely dispersed, aggravating counterpart risk (Naude, 2009: 3).

When interest rates began to rise and house prices fell, the weaknesses in the financial system began to be exposed. The consequent financial crisis became severe “when money market interest rates rose dramatically” on the 10th August 2007 (Taylor, 2009: 8). Investor confidence plunged and prices in the housing market continued to plummet to unimagined levels. Following the first rejection bail out of US\$700 billion for financial firms in America by the US House of Representatives in September 2008, the most severe one day loss on Wall Street occurred (Naude, 2009: 3).

As a result, by October 2008 to the surprise of many, US\$25 trillion had vanished from the stock markets (Naude, 2009: 1). After several years of prosperous growth generated in the USA, this largely came to a shock to many institutions (De Zoysa and Newman, 2009: 3). As the amount of defaults on mortgages increased, prices in the housing market fell to levels that were highly undervalued according to their fair value on paper when financed by the banks. Widespread financial panic occurred when the fourth largest investment bank in America, Lehman Brothers, filed for bankruptcy in September 2008 with US\$639 billion in lost assets (Naude, 2009: 3). This resulted in the disappearance of the investment banking sector as investors had lost confidence in the financial sector’s ability to manage their funds appropriately and were hesitant to invest any further money as asset prices were declining in extremely volatile financial markets. This financial shock furthermore caused companies to reduce their spending budgets in an effort to save cash which caused a contraction in the economy (The Economist, 2013). The decision of regulators in not bailing out Lehman

Brothers created financial panic and has been acknowledged as one of the most fatal mistakes in preventing the crisis from getting worse (Hennessey *et al.*, 2011).

With a main investment bank out of business and many more on the threshold, investment in the United States stagnated, growth levels slowed and unemployment rose sharply (Naude, 2009). For middle class Americans consumption and income levels had decreased and with unemployment levels on the rise, fuelling more fear and less investor confidence (De Zoysa and Newman, 2009: 298).

2.3.2 *Non Mainstream opinions on the causes of the Financial Crisis.*

In examining non-mainstream factors that contributed to the financial crisis in 2007, Mitt Romney suggested that banks were forced into providing unsecured mortgages to American citizens by the Democratic Party Administration which, he alleged, was too heavily involved in the US financial markets. By setting quotas for bank lending, US banks were encouraged to make the risky loans needed to meet the imposed financial quotas (Chittum, 2011). Added to this, banks had also been under pressure from their shareholders to increase returns and thus, with no regulations at that time (such as the Basel requirements concerning the liquidity of banks' balance sheets) banks continued making loans (The Economist, 2013). Samuelson (2014) alleges that the financial crisis was caused by the “growing inequality experienced by low and middle income Americans which caused them to over borrow”.

Hennessey, Holtz-Eakin and Thomas (2011: 1) believe there is no single event explaining in detailing how the financial crisis commenced as a standalone single-cause explanation is “too simplistic because they are incomplete”. Arguments since 2008 first started mentioning that “international capital flows or monetary policy” was to blame, while others have targeted “housing policy and insufficient regulation of an ambiguously defined shadow banking sector, or unregulated over-the-counter derivatives, or the greed of those in the financial sector and the political influence they had in Washington” (Hennessey *et al.*, 2011: 1).

However, the majority of current research in explaining the cause of the crisis according to Hennessey *et al.*, (2011:1) is “too broad” in that “not everything that went wrong during the financial crisis caused the crisis”. While some events can be acknowledged as being instrumental, others were simply insignificant such as the “removal of the Glass-Steagall firewall” or the use of non-credit derivatives (Hennessey *et al.*, 2011: 2). Furthermore, Hennessey *et al.*, (2011) also

discard the issue that financial deregulation was to blame, causing banks to loan out large sums of money irresponsibly.

Despite the different opinions in the academic literature as to the specific factors that resulted in the crisis, common to all opinions is that the “theme of growth under the ‘efficient market’ paradigm has failed to deliver what it initially promised” (Sen, 2011: 11). This financial crisis has impeded the American dream and turned it into a nightmare for many Americans. The United States can “no longer be the engine of world growth” (Zoysa and Newman, 2009: 309).

2.3.3 Policy Response by the United States to combat the Crisis

There is currently no fail proof economic theory and advice available for the correct economic policies a country should implement to get itself out of a crisis (Jonung, 2008: 566). However, “financial innovation must be encouraged to increase consumer and society’s welfare” (Tropeano, 2011: 45). Since the financial crisis in July 2007, the United States has used both stimulatory monetary and fiscal policies to help get its economy back on its feet. In December 2007, the Term Auction Facility (TAF) was a policy aimed at making borrowing by banks from the Federal Reserve easier and more direct and also reducing the interest rate spread in the money markets to allow for credit to flow faster at lower interest rates (Taylor, 2009: 10).

This policy did not work with the decrease of household wealth in America, the government needed to improve falling consumption and investment levels to promote employment and demand (Zoysa and Newman, 2009: 299). In February 2008, the Economic Stimulus Act was introduced to stimulate consumption and the economy by handing over “US \$100 billion to American individuals and families” (Taylor, 2009: 11). Despite household disposable income increasing, this policy also did not work as households were saving instead of consuming. This failure was because the policy did not “focus on the underlying causes of the crisis” (Taylor, 2009: 11).

In 2008, monetary policy was relaxed, which saw interest rates at nearly zero percent. The federal funds rate (interbank rate) fell from “5.25 percent when the crisis began in August 2007 to 2 percent in April 2008” (Taylor, 2009: 12). This caused the US Dollar to depreciate.

In 2009 the United States introduced the new Financial Stability Plan which was to see \$US2.5 trillion injected into the American economy directed at disinfecting toxic assets, “unfreezing asset backed markets, expanding the Fed lending program and kick start personal lending” (Wolf, 2009: 1). This policy resulted in the equity market being extremely frustrated

as it was realised that it would not tackle the “heart of the US banking problem” (Wolf, 2009: 1).

In 2009, President Obama promoted an additional fiscal stimulus package to encourage public spending that cost \$US800 billion directed at infrastructure spending, unemployment benefits and tax relief (Wolf, 2009).

Of the many proposals put forward towards financial sector policy reform and regulation, the only one that has been approved by congress is the Dodd-Frank Wall Street Reform and Consumer Protection Act that was signed on the 21st July 2010 (Tropeano, 2011: 46). The Dodd-Frank Act saw the introduction of the modified Volcker Rule set out to improve financial stability and consumer protection (Tropeano, 2011: 47). This has seen “proprietary trading from other activities in the balance sheets of banks and the introduction of more stringent rules on the trading of derivative products” (Tropeano, 2011: 47). By separating banking activities such as issuing deposits and granting loans from trading activities, a principle was established that saw to it that only “part of trading may come from banking activity income” (Tropeano, 2011: 47). This was aimed at preventing banks from using insured deposits belonging to customers guaranteed by the Federal Deposit Insurance Corporation (FDIC) for speculating and possibly guaranteeing further bailouts.

Shriller (2008: 17) argues that the response by the United States government to combat the current subprime crisis has been “disappointingly limited relative to that in the 1930’s and totally inadequate given the scope of the problem”. The scenario the American economy had now found itself in could not simply be rectified by the liquidity tools of the central bank and was “inherently a counterparty risk issue” (Taylor, 2009: 15). By failing to recognize problems in the bank credit markets and focusing on liquidity rather than risk, by examining empirical evidence, one can summarize that policies implemented by the United States did not solve the crisis, but merely prolonged it (Taylor, 2008: 16).

The United States did “not suffer the handicap of a fixed exchange rate system” and thus adopted a very aggressive monetary policy as the Federal Reserve could afford to print more dollars (Reinhart and Reinhart, 2008: 343). However most of the money created found its way to distant shores such as South Africa with higher and more attractive interest rates, thus benefiting emerging markets more than the country it intended to help. The future impact of this policy for the American economy could result in inflation and be a defining cost. By 2011, \$11 trillion in rescue aid had been invested in the financial sector of which \$182 billion

was for the insurance company AIG and \$745 billion for the housing market in order to limit the amount of defaults (Sen, 2011).

Since the commencement of the crisis in 2007, nearly 8 million jobs, mostly blue-collar, were lost in the United States (Zoysa and Newman, 2009: 299). In 2012, the Federal Reserve introduced a third round of quantitative easing nicknamed 'QE3' in which \$85 billion would be made available per month in the purchasing of MBS bonds. Added to this, the FOMC declared that it aims to keep interest rates close to zero till 2015. However with quantitative easing not being a sustainable remedy, the following year in June 2013, the governor of the reserve bank, Ben Bernanke indicated that quantitative easing would be slowly 'tapered off'. This news was not welcomed by financial markets worldwide with stock market values dropping by up to 5%, forcing the Federal Reserve to further delay tapering off announced later that year in September.

2.4 THE IMPACT OF THE CRISIS ON THE EUROPEAN UNION

In August 2007, Europe began to recognise symptoms of a financial crisis when it began experiencing liquidity strains which promptly changed into a crisis of "securitization and leverage" (Pisani-Ferry and Sapir, 2010). This was confirmed when BNP Paribas closed three investment accounts due to their "inability to value structured products" (Pisani-Ferry and Sapir, 2010). As liquidity dissipated and counterparty risk between banks soared within the interbank market, the banking system needed a huge amount of liquidity from central banks (Pisani-Ferry and Sapir, 2010). The European Central Bank (ECB) played the role of the Federal Reserve in helping to rectify the liquidity crisis, neglecting to request "detailed supervisory information on individual institutions" (Pisani-Ferry and Sapir, 2010). The ECB was able to improve the provision of liquidity to financial institutions without having to change their policy and procedure framework compared to that in the United States.

Confidence amongst European banks was also lost when Lehman Brothers filed for bankruptcy in mid-September 2008. This not only added to the further liquidity problem experienced in Europe, but resulted in devastating solvency problems for many major European banks (Ullah and Ahmed, 2014). Belgo-Dutch Bank Fortis and Belgo-French Bank Dexia were the first major financial institutions to be rescued by governments (Pisani-Ferry and Sapir, 2009). This did not go down well with other EU countries as this put their deposit guarantee schemes on the back foot. European banks were immediately affected due to their involvement in American financial markets (Grahl, 2011).

In January 2012, France and Austria were downgraded by Standard and Poor from the AAA rating and countries such as Italy and Spain were downgraded even further (Ahearn et al., 2012).

Initially European banks were experiencing a crisis, but when European governments began to bailout European banks, a second wave of the crisis hit Europe, a bond market crisis. European banks in Greece and Italy sustained high budget deficits as a result of the crisis, which caused the market to lose confidence (Collignon, 2012). European governments thought that by aiding the banks, the economy could be resurrected. Spain and Ireland on the other hand had a fiscal surplus prior to the crisis; however government debt soared when their banks were bailed out (Dellepiane and Hardiman, 2012). For those who had purchased insurance on government bonds in Italy, Spain and France, they were no longer guaranteed as being valid or honoured. This caused the lending rate in Italy, Spain, and France to increase, adding to government debt (Dadush, 2010). Most of the heavily indebted countries such as Greece, Spain and Ireland have had to cut government spending programs and increase taxes to improve their fiscal position because government debts have soared as a result of bank bailouts. As a result of the crisis, Europe has experienced rising government debt levels; investor confidence is at an all-time low and there have been massive trade imbalances (Ullah and Ahmed, 2014).

2.4.1 Similarities and differences to the US experience

Due to the crisis, the United States and the EU have both experienced what East Asia did in 1996; namely that open markets with minimal regulation in financial sectors is a recipe for disaster (Birdsall and Fukuyama, 2011). The crisis for both has resulted in the “instability of ‘inherent capitalist systems’” (Birdsall and Fukuyama, 2011: 48). The liquidity drain has resulted in peripheral countries in Europe being almost entirely dependent on the ECB for funding and the United States dependent on the Federal Reserve and China (Oxford Economics, 2011). The first crisis experienced in the United States was a banking crisis which has resulted in its banks not being able to lend to investors, causing consumption and investment levels to decrease. At the onset of the crisis in 2007, member states of the Euro zone were confident that they would be shielded from the crisis (Karras, 2011: 300). However Karras (2011) suggests that having an independent currency, in this case the Euro, can have both advantages and costs attached that would differ over time.

In contrast to the United States, the European Union also experienced a banking crisis, however due to government involvement in European banks, the crisis has evolved into a

bond and debt market crisis (Lachman, D, 2013). The United States did not find itself in a Bond Crisis as seen in Europe because it could print its own currency (US Dollars.) Due to the fact that the USA could print its own currency, American institutions such as banks and insurance houses avoided immediate downgrades by the rating agencies. A key difference was that long term interest rates in the USA plummeted while sharply rising in the EU because members of the EU could not print Euros. Bond yields increased in Europe as a result of the crisis, as higher risk is always associated with higher returns for investors. This creates a vicious circle as higher yields are associated with higher borrowing costs, thus Europe will experience fiscal strain and prompt investors to demand even higher yields (Schuknech, von Hagen and Wolswijk, 2010).

European banks have continued to lend to consumers and investors, aiming to promote private spending and investment, but are extremely reluctant to lend to European governments in fear that the governments could default on their debt. If governments were to continue defaulting, this would further create a massive future solvency problem and banks and Europe alike would find themselves falling deeper into the economic recession (Jones, 2010). Up until 2011, Europe had experienced “a far less painful recovery, thanks to its more developed system of automatic countercyclical spending” (Birdsall and Fukuyama, 2011: 48). This has caused European economies to slow down, restricted lending and has seen taxes decrease. Europe has realised that maintaining a fiscal discipline is difficult (Ullah and Ahmed, 2014). In contrast, the United States has been able to manage its fiscal policies due to the ability it possesses to fund budget deficits at low interest rates.

2.4.2. Policy response by the European Union to combat the crisis

The EU realised after the crisis that its government economic architecture needed to be improved upon in order to alert officials more accurately and earlier. Both monetary and fiscal policies were used by the European Union to combat the initial crisis, but Europe’s response has been very slow compared to that of the United States, partly due to the fact that 17 nations have to agree on a proposal before it is implemented. (Tropeano, 2011: 50). The primary method for trying to rectify the crisis was the use of bailouts for struggling Eurozone countries such as Greece and Spain. In December 2007, the “EU entered into a swap agreement with the Federal Reserve in order to be able to provide dollar liquidity to European banks experiencing difficulty in accessing it” (Pisani-Ferry and Sapir, 2010: 351). Blanchard, Cottarelli, Spilimbergo and Symansky (2008: 2) state that an optimal fiscal package should be “timely, large, lasting, diversified, contingent, collective and sustainable”. As a result of the

crisis, aggregate demand had declined, thus an optimal economic policy would have to include tools to resurrect aggregate demand and the financial system (Blanchard *et al.*, 2008: 2).

In 2008, it was realised that the community Rescue and Restructuring aid guideline (R&R) was an ineffective framework to manage government aid to the banking sector (Pisani-Ferry and Sapir, 2010). The Finance Ministers of France, Germany and Italy “failed to deliver a meaningful result at the Euro group and ECOFIN meetings” held on the 6-7 October, which called for a co-ordinated response at an EU level (Pisani-Ferry and Sapir, 2010: 353). Heads of State agreed to increase guarantees on deposits to a minimum of €50 000, but failed to adopt broad policies and a “declaration of intent that negative spill over-effects should be avoided” (Pisani-Ferry and Sapir, 2010: 354). In October 2008, “a fixed rate procedure with full allotment” was created by the ECB as an innovative financing procedure whereby banks were now confident that their application for liquidity would be guaranteed by the ECB. (Pisani-Ferry and Sapir, 2010: 316). This helped in reducing uncertainty and the cost of liquidity (Pisani-Ferry and Sapir, 2010).

The Paris Declaration which was endorsed by all EU countries provided a plan for recovery and later paved the way for three more documents. Included in the declaration was a “commitment to further liquidity provision by the central bank, a commitment to the public recapitalization of banking institutions in need of capital and public guarantees for bank borrowing” (Pisani-Ferry and Sapir, 2010: 13). The first Commission document to be passed in attempting to prevent further spillovers was the ‘Banking Communication on the 13th October 2008’ (Pisani-Ferry and Sapir, 2010: 356). This focused on the conditions that banks had to fulfil over national bank liability guarantees with EU state aid rules (Pisani-Ferry and Sapir, 2010). This was established in the hope of avoiding massive interruptions to competition and eliminating the possible danger of huge amounts of funds flowing “between member states in search of the highest level of protection” (Pisani-Ferry and Sapir, 2010: 356).

The next document produced was the “Recapitalisation Communication” on the 5th December 2008 to ensure that sufficient lending to the economy was provided for by national funding (Pisani-Ferry and Sapir, 2010: 357). The 25th February 2009 saw the third document to be passed, named the “Impaired Assets Communication”, which provided a policy framework to remove toxic assets and underperforming loans from banks balance sheets (Pisani-Ferry and Sapir, 2010). The minimum level for deposit guarantees was again increased to €100 000 and considerably shortened the delay payout from nine months to 20 working

days (Pisani-Ferry and Sapir, 2010). In the fourth quarter of 2008, EU authorities were quick to respond to the financial crisis which saw in 2009 the Commission approve over three and a half trillion Euros in aid to financial institutions (Pisani-Ferry and Sapir, 2010).

Isolating five countries in the EU with the highest effective measures relative to GDP, Ireland and Luxembourg focused predominantly on state guarantees and recapitalization while the UK provided mainly banking support with liquidity (Pisani-Ferry and Sapir, 2010). Other member states such as Belgium and the Netherlands used a mixture of measures, including “recapitalization, guarantees, impaired asset relief and bank funding support” (Pisani-Ferry and Sapir, 2010). It can be said that a few member states, namely Ireland, Netherlands, Belgium and the UK experienced banking crises, but as a whole the EU did not experience a banking crisis, but more a bond crisis (Gasparini and Van Rixtel, 2013). The European Union now focused more on modifying its banking regulation according to the Basel Committee reports. Three main new regulatory bodies were created, the European Banking Authority, European Securities and Markets Authority and the European Insurance and Occupational Pensions Authority (Tropeano, 2011: 50). A similar document to that of the Dodd- Frank Act called the European Market Infrastructure Regulation (EMIR), pertaining to derivative regulation, made for “over the counter derivatives to be cleared through central counterparties” (Tropeano, 2011: 50). The Basel Committee revised capital regulation in Europe according to Basel 3 as a policy response to the crisis, as Basel 2 ignored the increase in counter-party risk as a result of the crisis. (Tropeano, 2011: 51). The ECB attempted to improve Europe’s liquidity and decrease volatility by engaging in open market operations in purchasing government and private debt securities. By February 2012, the ECB had invested over €219.5 billion. The ECB further modified its credit rating on loan deposits policy in which it accepted as “collateral all outstanding and new debt instruments issued or guaranteed by the Greek government” (Ahearn *et al.*, 2012).

Due to the bond market crisis, Europe has had to use a contractionary fiscal policy to reduce their deficits as quickly as possible, predominantly because they cannot persuade investors to buy their government bonds anymore (Birdsall and Fukuyama, 2011). This has caused European economies to slow down, restricted lending, and has seen taxes decrease. In May 2010, a legal instrument was created called the European Financial Stability Facility (EFSF) aimed to provide financial aid to instable Eurozone states, through issuing bonds and debt instruments to the value of €440 billion euros (European Financial Stability Facility, 2012). However, Standard and Poor have downgraded EFSF from AAA to AA+, raising concern as

to how effective it will be. January 2011 saw the European Union create the European Financial Stabilisation Mechanism (EFSM) to help Eurozone countries in financial difficulty by providing funds that were to be generated in “financial markets and guaranteed by the European Commission using the budget of the EU as collateral” (Ahearn *et al.*, 2012). In conjunction with the loans of €60 and €250 billion Euros from the European Financial Stabilization Mechanism and the IMF respectively, Europe now has an estimated €750 billion euros in financial aid. This policy response briefly improved investor confidence concerning a possible Greek default and had stock prices and the Euro appreciate (Cace, Cace, Nicolaescu and Dimtrescu, 2011). In trying to aid Greece, the Brussels Agreement saw 53.5% of Greek sovereign debt held by banks written off. In a statement made in 2012 by the European Central Bank President Mario Draghi, it was indicated that the ECB would do everything possible to keep the Eurozone intact. Confidence in the bond market was briefly restored realising lower yields and giving government slightly more room to breathe. Furthermore, in 2012 a new financing instrument named the European Stability Mechanism (ESM) was inaugurated, establishing a fixed rescue mechanism for Eurozone members (Ullah and Ahmed, 2014). In 2013, members of the Eurozone agreed to sign the Treaty for Stability, Coordination and Government which aims to solidify economic and government discipline.

2.5 THE EFFECTS OF THE CRISIS ON DEVELOPING COUNTRIES

According to Blanchard, Das and Faruquee (2010: 266) developing countries are dependent on developed countries for several reasons and there will therefore be direct and indirect effects as a result of a financial crisis. At the commencement of the financial crisis, it was widely expected that developing countries would largely escape the plague which originated in the United States and had spread to Europe because many developing countries were not involved in the complex financial dealings which could have exposed them and their banks' balance sheets to toxic assets and bad loans (Blanchard *et al.*, 2010: 263). Developing countries had usually resorted to more traditional forms of investment instruments and refrained from participating in derivatives and credit default swaps.

However, Boorman (2009: 2) believes that “emerging market countries have been hit hard” by the crisis irrespective of their avoidance of complicated financial systems. According to Te Velde *et al.* (2010: 8) developing countries have experienced similar transmission mechanisms in “trade, private capital flows, remittances and aid” but the total effect differs from country to country. As the financial crisis began unfolding in developed countries, major financial institutions began to

withdraw funds from subsidiaries in developing countries to recoup their capital holdings thus negatively impacting on output and employment levels in developing countries (Boorman, 2009).

Credit flows to developing countries via international banks and global bond markets dried up, causing developing countries with substantially high current account deficits to be burdened with additional financial stress (Boorman, 2009). Many developing countries had to turn to the IMF for financial support (IMF, 2014). Fear became indoctrinated in the consumer and investor in developing countries as asset values in both equity and housing markets declined and unemployment levels rose sharply (Boorman, 2009). Capital injections and support mechanisms targeted at banks in developing countries created the same ad hoc problem experienced by advanced economies.

Developing market countries were primarily affected through external shocks via two channels, exports and net capital flows (Griffith-Jones and Ocampo, 2009). Boorman (2009: 2) suggests that due to the endless effects a financial crisis can have on a developing country, it is useful to focus on the three areas of trade and exports, exchange rates and capital flows. Looking at the direct effects, the assets of developing country banks were fortunately not affected to a large extent compared to that of developed countries because of “limited interrelationships with international banks” and avoidance of subprime mortgages (Naude, 2009: 4). Developing countries such as China were fortunate in that government controls of their financial sectors meant that exposure to American subprime mortgages was negligible.

The indirect impacts of the crisis are also of concern due to the negative effect on the prices of the housing and stock markets in developing countries (Boorman, 2009). Developing countries had already experienced a difficult period prior to the financial crisis when global fuel and food prices reached unprecedented levels.

2.5.1 Capital flows

One of the most important transmission mechanisms for developing countries as a result of the crisis in developed countries was the effect on private capital flows (Griffith-Jones and Ocampo, 2009). Capital flows predominantly consist of three components: portfolio investment, foreign direct investment (FDI) and international bank lending (Te Velde *et al.*, 2010: 3).

Capital inflows are reduced when investors are pessimistic about future market conditions. This causes banks to have less capital to lend and can result in a solvency problem in which their governments would have to recapitalize them (Naude, 2009: 4). As institutions would have less capital available to borrow at higher interest rates, investment levels would decrease,

unemployment and crime levels would increase and economic growth would decline (Ross, 2008). Government revenue would decrease as there would be less income to tax and resultant cutbacks in government spending mean that infrastructure investment will also be negatively affected. At the onset of the financial crisis in 2008, developing countries experienced massive capital outflows as foreign countries needed their cash back in their home country as a safe haven and to help aid their liquidity issues which meant that the exchange rates of developing countries weakened (United Nations, 2011). Portfolio investment was the hardest hit in 2008 and 2009 with many developing countries reporting significant declines in capital inflows. An example of this was the collapse of the Nairobi Stock Exchange in 2009, which declined by over 46% in value (Te Velde *et al.*, 2010: 3).

FDI, which was thought to be more resilient than private capital flows, also decreased (Te Velde *et al.*, 2010: 5). The adverse effect the crisis had on international bank lending to developing countries varied according to their level of exposure to foreign-owned banks (Te Velde *et al.*, 2010: 6). For developing countries, the adverse effects of financial contagion of the Euro debt crisis was felt again in 2011, particularly from June onwards due to investors being more risk conscious (Massa, Keane, Kennan, 2012: 36).

2.5.2 Exchange Rates

Associated often with financial crisis are significant fluctuations in exchange rates which can be directly linked to the perception of risk by investors (Kohler, 2010). As volatility increases in markets, investors become more risk averse and the result is often elevated currency options prices. It has been noted by Kohler (2010) that many currencies around the world despite not being at the epicentre of the crisis did in fact depreciate against major currencies such as the US Dollar and the Japanese Yen. However, by contrast with past events such as the Asian Crisis of 1997, currencies began appreciating within a year predominantly for two reasons. Firstly, the safe haven effect trend in which capital flows find their way to 'safer' currencies such as the US Dollar and the Yen was quickly reversed (Kohler, 2010). Secondly, interest rate differentials have played more of an important role in exchange rate fluctuations relative to past crises. The reason for this suggested by (Kohler, 2010: 40) is that "carry trade activity" have increased over the years, dramatically influencing economies now more than ever. Ironically when the United States decided to inject capital into its economy to stimulate growth, large capital flows found their way back to emerging markets because of more attractive interest rates causing their exchange rates to strengthen and reducing the competitiveness of their exports in already weak global export markets (Griffith-Jones and Ocampo, 2009).

Irrespective of the fact that some countries had significant current account surpluses the exchange rates in many developing countries were negatively affected (Griffith-Jones and Ocampo, 2009). This is a direct result of developed countries withdrawing their “currency positions out of high yielding assets in emerging economies” (Griffith-Jones and Ocampo, 2009: 2).

The real exchange rate is an important determinant in providing an “incentive to shift resources into manufacturing” allowing profits to be maximized. Developing countries also experienced a decrease in the value of their foreign exchange reserves as a result of the US dollar depreciating against major currencies (Te Velde *et al.*, 2010: 17).

For developing nations, the depreciation of the Euro can have two effects concerning trade flows. Firstly, if a developing nation has its currency pegged to the euro, it can possibly benefit from enhanced competitive exports (Massa *et al.*, 2012). Secondly, if the US dollar was to appreciate against the euro, countries which base their currency on the US dollar would lose out on exports.

2.5.3 Exports

Economic theory suggests that exports are influenced by the strength of a country’s currency in relation to its trading partners. When a country’s currency depreciates in real terms this causes its export levels to increase while decreasing the volume of imports (Ma and Cheng, 2005). The trade balance of a country can be improved if the Marshall-Lerner condition¹ is satisfied (Ma and Cheng, 2005). The economic recession caused demand in world markets, particularly advanced economies, to fall. Most export-reliant developing countries therefore experienced a sharp decrease in their trading volumes or, in the case of commodity producers, a sharp drop in their terms of trade (Blanchard *et al.*, 2010: 266). A large number of developing countries base their economic growth on export earnings (Naude, 2009). With a decrease in exports should follow a decrease in economic growth. According to Naude (2009: 5) the IMF expected “growth in world trade to decline from +9.4% in 2006 to +2.1 % in 2009” as a result of a decrease in commodity prices and global demand as a result of the crisis. Most African states are heavily reliant on commodity prices, exporting raw materials such as copper, oil, diamonds, platinum and gold. It

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“The condition that the sum of the elasticities of demand for exports and imports exceed one (in absolute value); that is, $\eta_X + \eta_M > 1$, where η_X , η_M are the demand elasticities for a country's exports and imports respectively, both defined to be positive for downward sloping demand” (Deardorff, 2006: 1)

is clearly evident that “exporters of primary goods have been more affected by declining prices” (Griffith-Jones and Ocampo, 2009). Due to volatility in the price of energy, emerging markets like Africa and Latin America have experienced lower investment levels and economic activity as investors are hesitant to invest long term (Griffith-Jones and Ocampo, 2009).

The period prior to the 2008 recession saw commodity prices attain a record high which stimulated growth in developing countries. However in some cases commodity prices are experiencing price fluctuations due to unstable direct and indirect input costs (Nelson, Nanto, Sanford and Weiss, 2010). Several stronger developing countries such as South Africa have suffered as a result of having a large balance-of-payments deficit; however countries such as China had accumulated surpluses prior to the crisis.

2.6 CHAPTER SUMMARY

A general conclusion from the literature overview is that the current global financial crisis that originally commenced in America with its roots in the housing bubble and was followed by the European crisis was a result of poor economic policy and lack of financial market regulation. Despite conscientious efforts by governments worldwide to prevent contagion effects, the impact still found its way to developing economies who it was initially thought they would be shielded from such a crisis.

Though the literature regarding growth in developing countries is vast, the following factors were identified in the literature as likely channels through which the impact of the crisis would impact on economic growth, namely Trade, Capital Flows, Remittances, Restrictions in Credit and lastly Exchange Rates.

CHAPTER 3: DATA, METHODS AND TECHNIQUES

3.1 DESCRIPTION OF THE DATA

The IMF, Thomson DataStream and World Bank online databases amongst others were used to obtain the data needed to examine the transmission channel effects of the financial crisis for developing economies and South Africa. The developing countries identified in this project are Algeria, Angola, Argentina, Bangladesh, Botswana, Brazil, China, Chile, Egypt, India, Indonesia, Kenya, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Russia, South Africa, Sri Lanka, Thailand, Turkey, Uganda and Venezuela. The decision to use the selected countries above includes both the goal of examining the Fragile 5 (Brazil, India, Indonesia, South Africa and Turkey) and the BRICS countries because of their importance in the current literature and discourse on the crisis, as well as the aim of assessing the worldwide impact of the crisis on developing countries across different continents. All countries specified in appendix A table 8 are included in both methods, however data for certain countries was adjusted due to a lack of available data. An appendix A will be provided to indicate the various modified variables for each country and sources from which the data was obtained.

3.2 STRUCTURING THE PANEL DATASET AND VARIABLES USED

Actual quarterly data ranging from 2002Q1 to 2012Q4 was used most of which are captured at current prices and not seasonally adjusted. Some of the variables used for the purposes of this project have been commonly used in past literature on how to analyse the impact of past financial crisis, however certain variables were excluded to avoid correlation and multicollinearity errors.

In order to examine the possible transmission mechanisms of the global financial crisis on developing countries and South Africa, a broad range of economic variables were used. The four main channels examined consisted of (i) trade linkages; (ii) financial linkages; (iii) underlying vulnerabilities in the financial structure; and (iv) policy frameworks.

Empirical evidence suggests that developing countries that are dependent on advanced countries for trade will be negatively affected if anything was to happen to the ‘mother’ country. As Europe is distinguished as South Africa’s largest trading partner (as a bloc), for example, it is expected that South Africa’s trade channel would be severely impacted by the recession in Europe. Explanatory variables used to investigate this section in various models included (i) exports by individual country to the World as a percentage of nominal GDP (ii) exports by individual country to the EU as a percentage of nominal GDP, (iii) exports by individual country

to China as a percentage of nominal GDP. These variables were used to examine whether being a commodity exporter shielded or worsened countries from the expected impact of the global slowdown and whether the slowdown in Europe caused developing countries to export more China.

The next section reviewed is that of financial linkages. The financial sector in Europe since the unveiling of Greece's debt problem spurred further problems for the European economy and created new concerns about European banks. Added to this was the introduction of quantitative easing and later the tapering off of this monetary policy by the Federal Reserve in the USA. It is expected that developing countries with financial linkages to the USA and Europe would be negatively affected. The variables (i) Inward FDI as a percentage of nominal GDP and (ii) Net Portfolio Investment Flows (Net of FC Bonds) as a percentage of nominal GDP are used in analysing the extent to which countries are dependent on foreign capital flows. It was not possible to distinguish the geographic source of these flows.

Explanatory variables used to measure underlying vulnerabilities in the financial structure of countries are the (i) Balance of Payments Current Account Balance as a percentage of nominal GDP, (ii) Inflation measured as a percentage of consumer prices for all items (2010=100), and (iii) Government Gross Debt as a percentage of nominal GDP.

Prior to the crisis, credit was easily attainable which stimulated growth in emerging markets. However, once the crisis gained momentum, it caused major problems for economic variables such as reversing capital flows, currency depreciation and a constant supply of cheap credit was ended. According to the IMF (2009: 12) if a country found itself with "high indebtedness, high current account deficits, low international reserves and high growth by credit", it would be expected that the economic impact would be greater for that country.

To assess the strength and effectiveness of policy and institutional frameworks, two sets of variables are used. Firstly, Exchange rate volatility is measured using a GARCH model in which the Real Effective Exchange rate (2007 = 100) monthly data is used. Countries with more flexible exchange rates are expected to handle external shocks more easily than those with inflexible exchange rate regimes.

Secondly, the Structural Government Budget Balance measured as a percentage of nominal GDP is also used as a substitute for the primary fiscal gap. It is expected that countries with higher government budget deficits will have had higher growth revisions based on the premise that during an economic crisis most countries tighten fiscal policy, thus implying reduced growth.

3.3 EMPIRICAL WORK FOR PANEL DATA

Due to limitations in attaining information pertaining to smaller developing countries, quarterly and monthly data was often not available and hence was generated using techniques accepted in the economic literature.

When monthly and quarterly data were not available, Thomson Reuters DataStream and Eviews 8 were used in order to convert low frequency annual data into high frequency quarterly and monthly data (vice versa). Variables downloaded using Thomson Reuters were linearly interpolated using the continuous series function CSR# (Series, Q). Missing variables not available on Thomson were converted using Eviews 8 using the Quadratic Match Average (QMA). Aziakpono (2005) highlights the importance of selecting the appropriate method of interpolation to ensure the series produced “reflects the partner of the original series”. Refer to Appendix A Table 5 which indicates all variables used in the study, which were modified and what conversion method adopted. Variables for each country that were modified were then recalculated individually as a percent of GDP and inserted in the panel.

3.3.1 Exchange rate volatility using GARCH modelling

In order to create a volatility index, the GARCH model was adopted. Due to the panel data being formulated using quarterly data, quarterly data was first tested for an ARCH effect for several countries in which there was found to be none. Monthly data was therefore used to find ARCH effects.

A correlogram at level and first difference terms was first used to identify the possible components of the estimated mean equation. Using Ordinary Least Squares as the method, the mean equation ARMA (Autoregressive Moving-Average) was then estimated in which individual components specified in the ARMA model were required to be significant for the period 2002M01 to 2012M12. If significant, a heteroskedasticity test was conducted in which the Chi Square statistic had to be significant in order to indicate whether an ARCH effect was present and provide evidence that the data used was suitable for volatility modelling. Using the previously estimated mean equation and using the ARCH estimation option in Eviews, a GARCH model was then estimated. A GARCH model “allows the conditional variance to be dependent upon previous own lags” and “describes movements in the conditional variance of an error term, which may not appear to be particularly useful” (Brooks, 2008: 392-411). GARCH models “can be used to model the volatility of a series over time” (Brooks, 2008: 411). Commonly used is a GARCH [1.1] for estimation purposes but may not be necessarily

constrained to this restriction (Brooks, 2008). GARCH models are accepted to be better than ARCH models due to the former being more “parsimonious and avoids over fitting” and less likely to ‘breach non-negativity restrictions’ (Brooks, 2008: 393). Following the GARCH estimation, a residual diagnostic ARCH LM test was then conducted to indicate whether the ARCH effect had disappeared. Once completed, a GARCH variance series was then created for the period concerned.

To convert the volatility series from high frequency to low frequency for the panel data, Eviews 8 was used to convert the monthly series for each country using the ‘average’ option after generating the GARCH variance series. This procedure was repeated for each individual country and then inserted into the quarterly panel data.²

3.3.2 Inflation

Inflation was calculated using Consumer Prices, All Items (Price Index, Not Seasonally Adjusted, 2010=100). In order to calculate inflation as a percentage, the percentage change between quarters was first calculated. Once the percentage change had been calculated, it was then compounded to the power of four and then subtracted by one and multiplied by 100 in order to attain a percentage value. To compare how much inflation changed on a yearly basis between quarters, the previous quarter of each year was divided by the same quarter of the current year. This process was repeated for all 25 countries and inserted in the panel.

3.3.3 Dummy Variable

A dummy variable was used to indicate the presence of the financial crisis. Inserted in the panel was 1 for crisis and 0 for no crisis. The selected period for the inclusion of dummies started from 2008Q3 to 2012Q4. The start of the crisis was identified by a sudden decrease in the yield of long term government bonds in the US and EU whilst the ‘end’ of the crisis was noted by the gradual reversal of long term government yields. Interactive terms were used to investigate which transmission channels were seen to be more or less important concerning the financial crisis impact on developing economies.

² Refer to Appendix A, Table 4 where the relevant GARCH model used and the relevant mean equations for each country are recorded.

3.4 GDP GROWTH FORECASTED VS ACTUAL GDP GROWTH

In order to explore the economic impact of the global financial crisis, firstly a simple comparison of annual GDP growth forecasts made before the full extent of the crisis was appreciated and before its spread to the EU and actual annual GDP growth that was realised is conducted.

At the start of the financial crisis in 2008, economists had forecasted GDP growth for countries for several years ahead. In looking at what economists were forecasting in 2008 as GDP growth for 2012 and then comparing actual GDP results with the forecasted figures, one can gauge what economists were predicting and saying about the future state of countries' economic growth and then compare those to what actually happened. To measure this difference, GDP forecasts for 2012 published in the World Economic Outlook October 2008 database was used for 25 developing countries. The percentage changes between forecasted GDP growth in 2008 for 2012 and actual 2012 GDP growth rates were then calculated. The advantage of using the WEO database is that it consists of a broader range of countries and measurements for developing countries.

3.5 CHAPTER SUMMARY

This chapter has set out to describe the data, methods and techniques undertaken in order to complete this research. Annual GDP growth forecasts for 2012 made at the start of the crisis were compared with actual annual GDP growth figures. A panel data-set was compiled using quarterly data for all variables documented as being possible transmission mechanism channels in economic literature. Due to limitations in accessing data the empirical work consisted of firstly converting gathered data into comparable formats using accepted techniques recorded in the literature. Secondly, a volatility index was created based on countries' monthly Real Effective Exchange Rate (2007=100) using a GARCH model. Inflation was calculated for all 25 countries using CPI, All Items whereby the percentage change between each quarter was calculated. Lastly, dummy variables were used to indicate the presence of the financial crisis, the dates of the crisis being determined by correlations with deteriorating government bond yields as indicators of perceived financial risk.

CHAPTER 4: RESULTS AND ANALYSIS

The analysis will be broken down into two parts in which the results of the two different methods described in previous chapters will be assessed. Both analytical and descriptive evidence of the impact of the global financial crises on economic growth for the selected developing economies will be presented. An *a priori* analysis is conducted followed by an explanation as to whether the results attained differ or conform to what is expected from economic theory.

4.1 APPLYING TREND ANALYSIS

As in Berkmen *et al.* (2009) GDP growth revision forecasts were used in analysing cross country economic impacts of the financial crisis on developing economies. GDP forecasts reflect what is expected to happen to an economy in the future based upon all available information at the time. Growth revisions represent the changes to previous estimates upon new insights gained during the relevant period concerned with respect to previous forecasts.

4.1.1 *A priori expectation regarding Forecasted growth and Actual GDP growth*

Due to what is now known about the prolonged nature of the global financial crisis and the severity of its impact on world markets, it is expected that in 2008 forecasters would have overestimated GDP growth in 2012 for most developing economies simply because the information pertaining to the extent of financial troubles was not yet known, for example the extent to which Greece, Spain and other developed economies were in debt.

In comparing the forecasts for 2012 made in 2008 with actual GDP growth figures for 2012 we would therefore expect the actual growth outcome for most countries in 2012 to be less than what was forecasted in 2008. The results in Table 1 show that actual growth in 2012 was indeed lower than what had been forecast for 2012 in 2008, with an average percentage difference for the 25 countries of -21.6% (excluding Venezuela). The extent of the differences between actual and forecast growth vary considerably **from -77.6% to 180%**. Growth in 19 of the 25 countries was lower in 2012 than had been forecast in 2008. In only 6 countries was it higher than had been forecast. This shows that, unsurprisingly, forecasters in 2008 underestimated the consequences of the financial crisis and its impact on long term growth. However if forecasts made closer to 2012 were used, the results would be very different.

Table 1: Actual GDP Growth vs Forecasted GDP Growth

Country	GDP forecast for 2012 made in 2008 %	Actual GDP for 2012 %	% difference between Forecasted GDP and Actual GDP
Algeria	5.10	3.3	-35.26
Angola	3.20	5.2	62.50
Argentina	3.00	1.9	-36.67
Bangladesh	6.15	6.1	-0.73
Botswana	6.39	4.2	-34.25
Brazil	4.02	0.9	-77.58
Chile	5.00	5.6	12.00
China	10.00	7.7	-23.00
Egypt	6.81	2.2	-67.70
India	7.96	3.2	-59.80
Indonesia	6.50	6.2	-4.62
Kenya	6.52	4.6	-29.47
Malaysia	6.00	5.6	-6.67
Mexico	4.76	3.6	-24.40
Nigeria	7.39	6.6	-10.68
Pakistan	5.70	4.4	-22.81
Peru	6.50	6.3	-3.08
Philippines	5.40	6.8	25.93
Russia	5.70	3.4	-40.35
South Africa	4.98	2.5	-49.75
Sri lanka	5.20	6.4	23.08
Thailand	6.00	6.5	8.33
Turkey	5.25	2.2	-58.10
Uganda	8.00	2.8	-65.00
Venezuela	2.00	5.6	180.00

Source: IMF World Economic Outlook

4.2 TRADE LINKAGES

Because the crisis was global in nature, it is expected that countries with strong linkages to the rest of the world should be negatively impacted by the slowdown in global economic growth. One channel identified by Berkmen *et al.* (2009) through which this impact would spread is through trade linkages, with countries depending heavily upon exports likely to be more severely impacted than those which are more self-sufficient and more dependent upon growth in domestic markets.

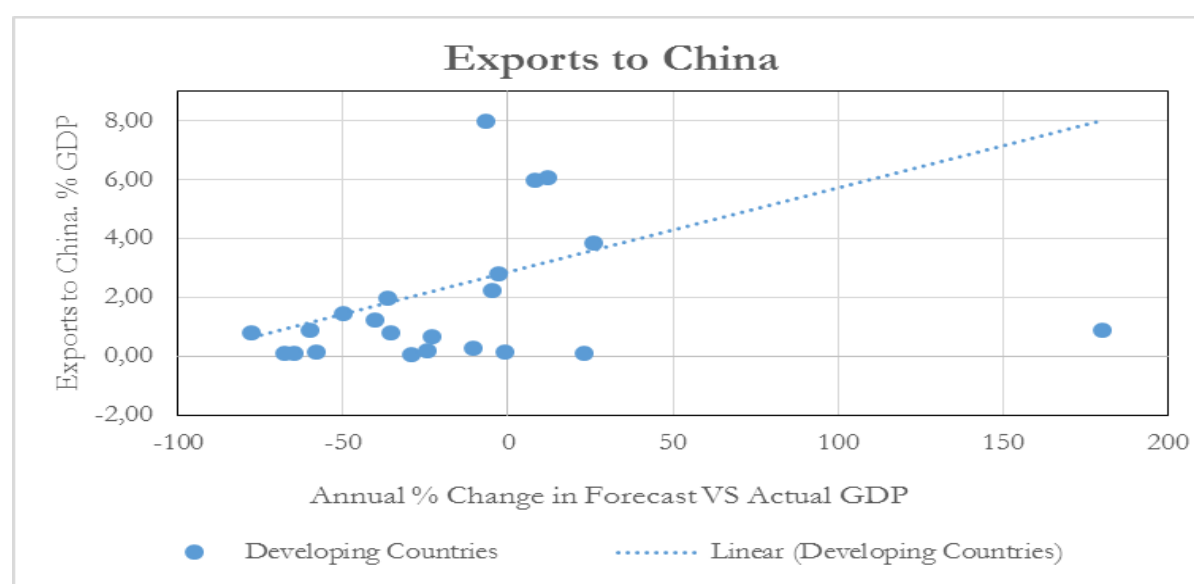
4.2.1 EXPORTS TO CHINA

Exports to China consist of all goods ranging from manufactured products to food and non-fuel commodities for 2007.

A priori expectation would be a negative relationship between Exports to China and GDP growth outcome relative to forecast. However, because growth in China was not expected to have been as severely affected by the crisis as growth in the US and Europe, we would expect countries who were dependent on exports to China would not be as negatively impacted as those dependent upon exports to the US and Europe where the crisis impacted most severely.

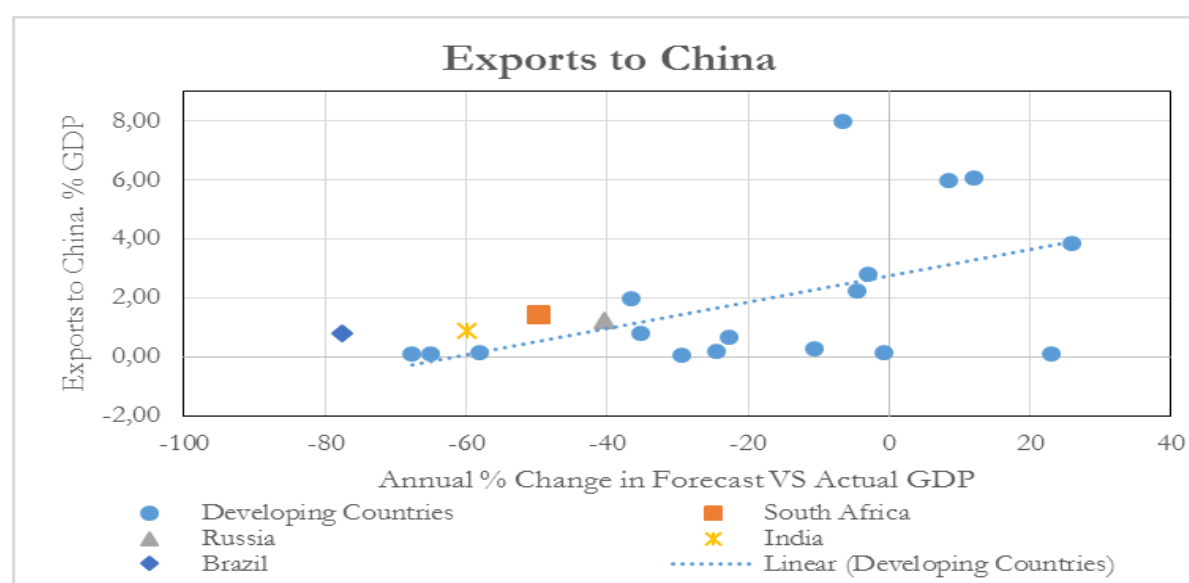
Figure 1a and 1b confirm our expectations. It can thus be concluded that exports to China were an important determinant of the growth performances of the developing countries examined. South Africa was found to be above the trend line in Figure 1b suggesting that given the level of South Africa's exports to China, growth relative to what was forecast was worse than what would generally be expected.

Figure 1a: Exports to China Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figure 1b: Exports to China Scatter Plot Diagram



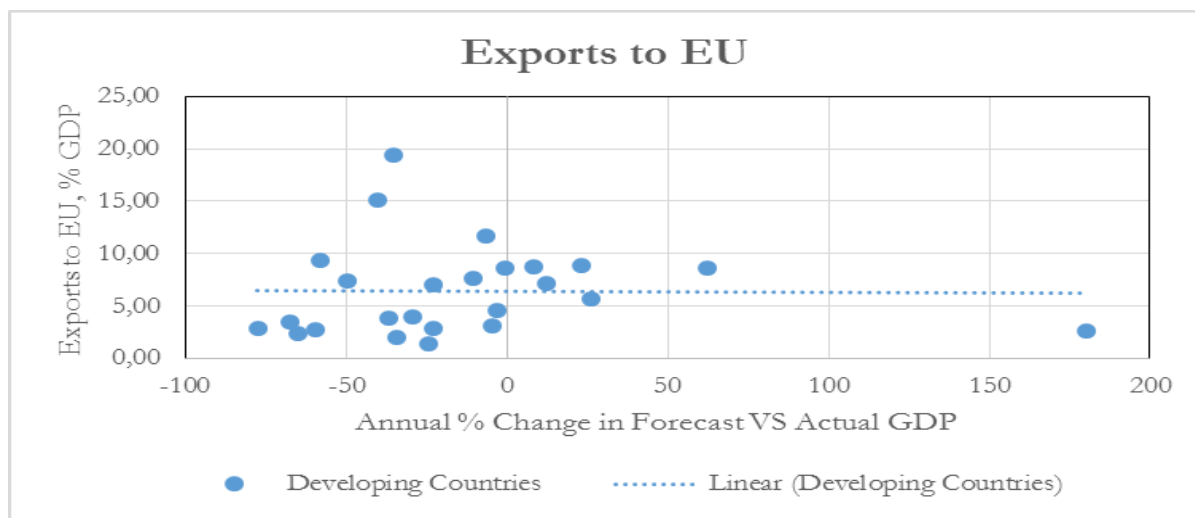
Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics (Angola and Venezuela excluded)

4.2.2 EXPORTS TO THE EU

This variable indicates the total level of goods ranging from manufactured products to food and non-fuel commodities exported to the European Union in 2007.

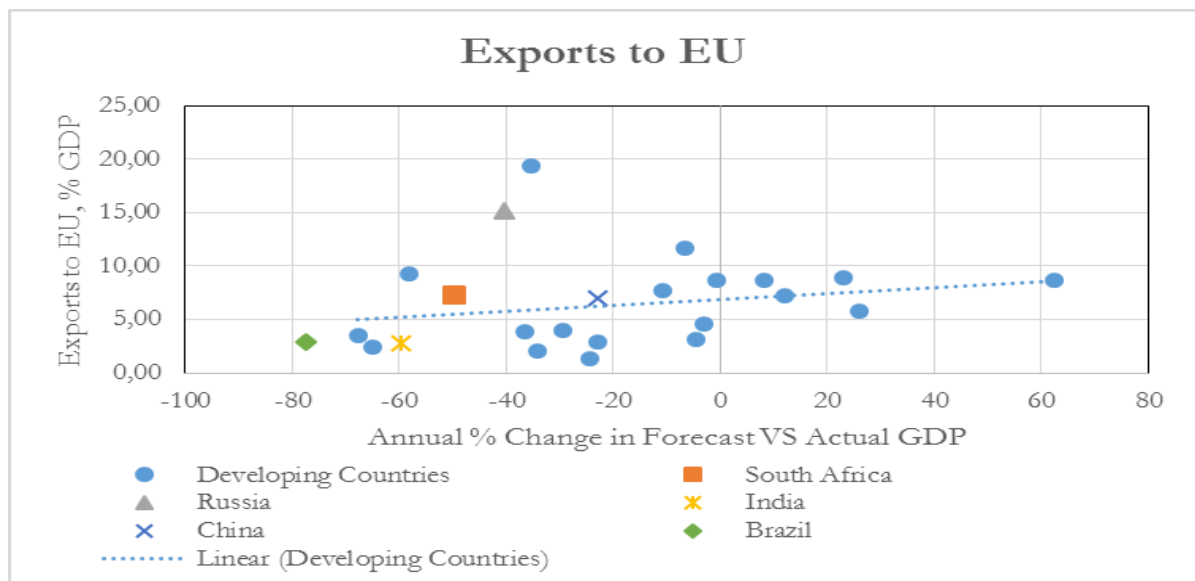
A priori expectation would be a negative relationship between exports to the European Union and GDP growth outcome relative to forecast as growth in the EU was worse than would have been expected back in 2008 when the growth forecasts were made. Countries with high levels of exports to the EU would therefore be expected to have been negatively affected. The first scatter plot, Figure 1c illustrates a horizontal trend line suggesting no clear relationship between exports to the EU and growth outcomes relative to forecast. Due to Venezuela having an exceptionally high growth revision forecast and being a major outlier to the sample used, Venezuela was excluded in Figure 1b. The results indicate a positive linear trend which does not conform to our expectations. The two scatter plots therefore suggest that exports to the EU were not a good determinant of what happened to countries' growth performance relative to what was forecast in 2008. South Africa who has relied on the EU as its largest trading partner for many years was found to be marginally above the trend line suggesting that growth was worse than would be expected from the importance of exports to the EU.

Figure 1c: Exports to EU Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figure 1d: Exports to EU Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics (Venezuela excluded)

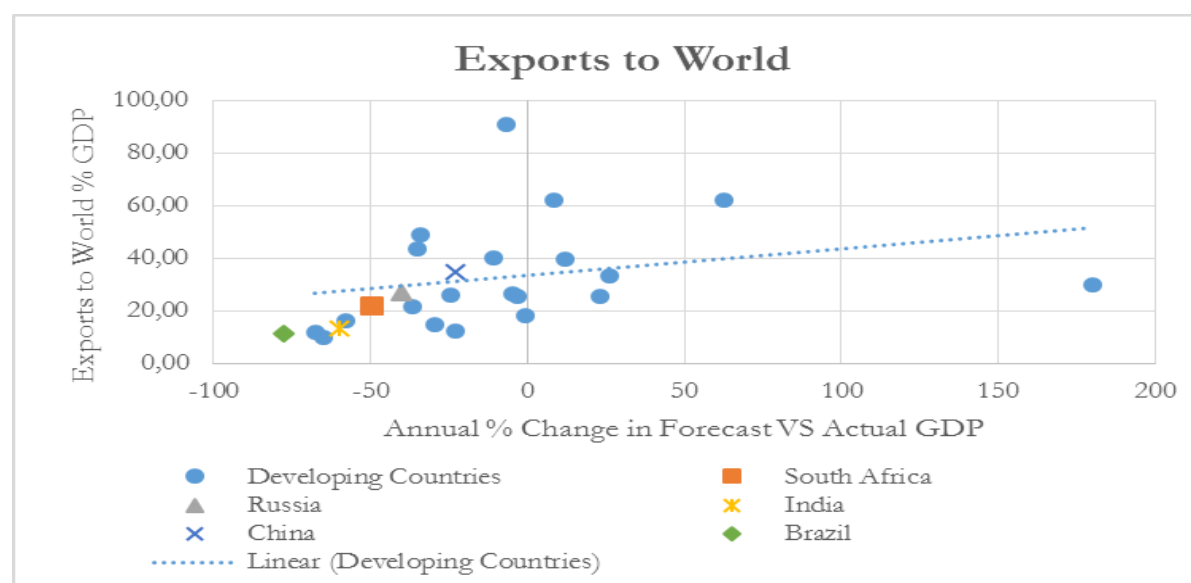
4.2.3 EXPORTS TO THE WORLD

This variable indicates the total level of goods exported by an individual country ranging from manufactured products to food and non-fuel commodities including those exported to China and the EU.

A priori expectation would be that countries which are more reliant on exports as a share of GDP would be negatively affected by the unexpectedly severe slowdown in their global markets,

hence there will be a negative relationship. The results in the Figure 1e are contrary to what was expected. The relationship between exports to the EU and growth relative to forecast is positive. It was expected to be negative as a high reliance on exports to the EU should result in a larger fall in growth relative to forecast when EU growth is weak. Given the level of South Africa's exports to the World, growth relative to what was forecasted was better than what would be expected.

Figure 1e: Exports to World Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figures 1a to 1e suggest that the trade channel was not an important determinant of the unexpected slowdown in growth in developing countries as a result of the global financial crisis. This result is surprising. The importance of the trade channel is tested again using panel regression analysis below.

4.3 FINANCIAL LINKAGES

Financial linkages was identified as another channel suggested by Berkmen *et al.* (2009) through which the impact of the crisis could spread.

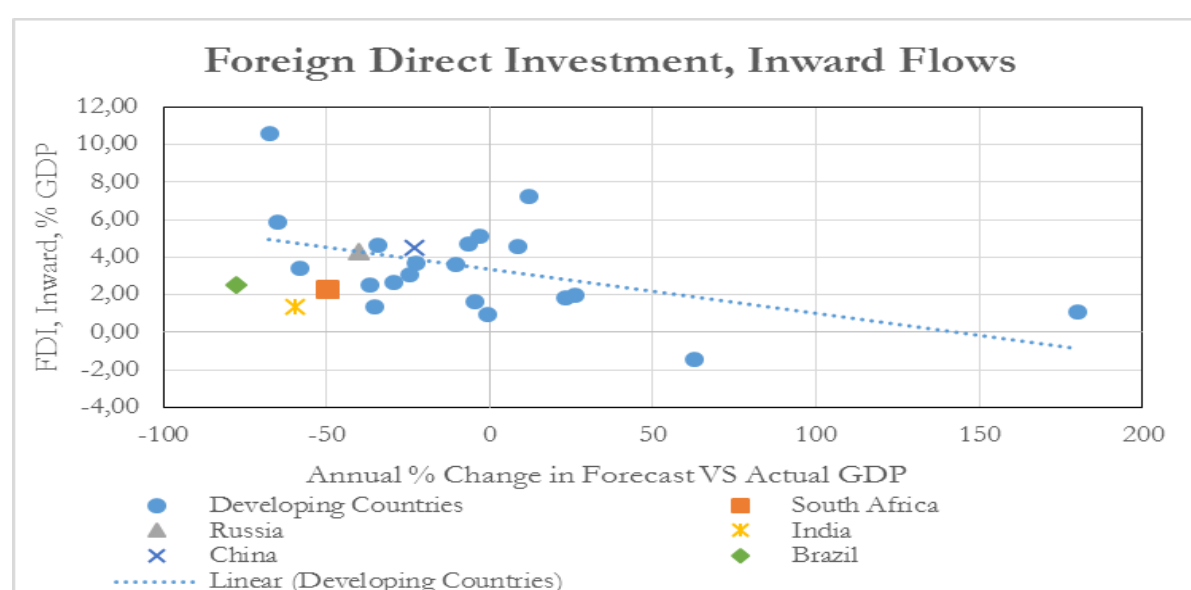
4.3.1 FOREIGN DIRECT INVESTMENT, INWARD FLOWS

Foreign Direct Investment is an important variable for economic development as it promotes cross border relationships which promote the transfer of technology and expertise which are essential to economic integration (OECD, 2002).

A priori expectation for the FDI and GDP growth outcome relative to forecast is expected to be a negative relationship. FDI is likely to have fallen as a result of the crisis and so countries dependent upon FDI are expected to have larger falls in their growth relative to forecast. Countries with a high dependence upon FDI are therefore likely to have been more severely affected by the crisis.

Figure 2a does support the *a priori* claim and a fairly strong relationship is exhibited indicating that FDI inward flows are an important determinant of GDP growth outcome relative to forecast in developing countries.

Figure 2a: Foreign Direct Investment, Inward Flows Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

South Africa falls below the trend line which suggests that growth was worse than what would be expected from South Africa's (fairly low) reliance on FDI inflows.

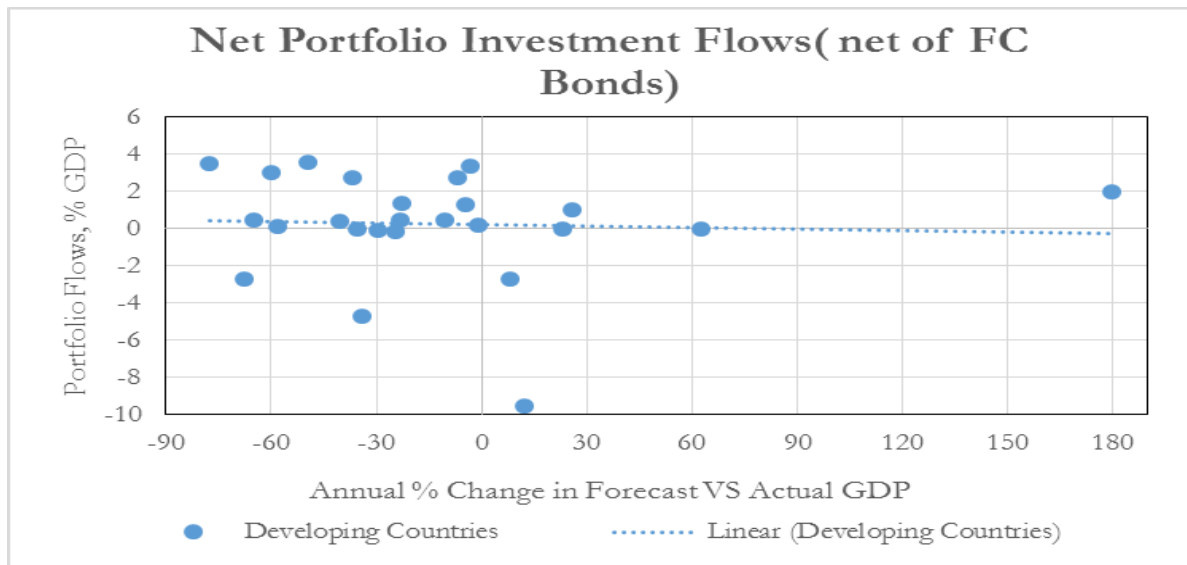
4.3.2 PORTFOLIO INFLOWS

Portfolio inflows are an important economic variable to both developed and developing economies (Duasa and Kassim, 2009).

A priori expectation would be that there will be a negative relationship between Portfolio Inflows and GDP growth outcome relative to forecast. This is explained by the fact countries that are more dependent on capital flows are expected to have experienced larger decline in growth relative to forecast as a result of the disruptive impact of the crisis on global portfolio flows.

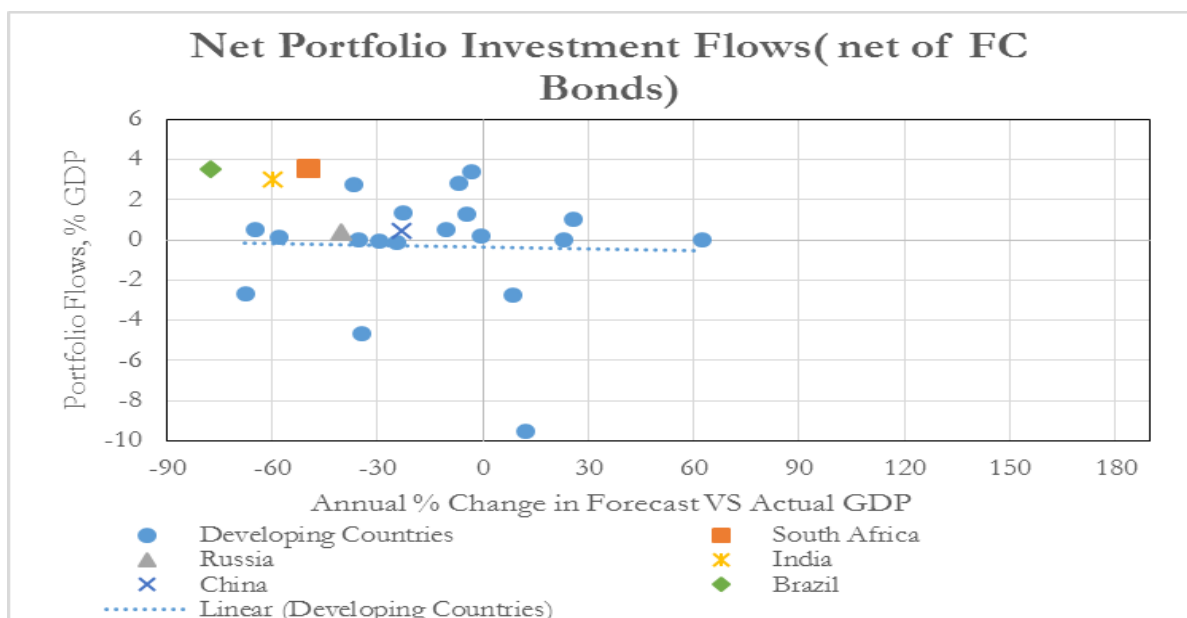
Figure 2b does illustrate a downward (negative) relationship. With Venezuela removed the relationship is slightly more pronounced as seen in Figure 2c. This suggests that changes in portfolio inflows were not an important explanation of growth differences during the crisis.

Figure 2b: Portfolio Inflows Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figure 2c: Portfolio Inflows Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics (Venezuela excluded)

South Africa is substantially above the trend line, indicating its unusually high dependence upon portfolio inflows. This is illustrated also by the fact that for South Africa portfolio inflows are much more important than FDI.

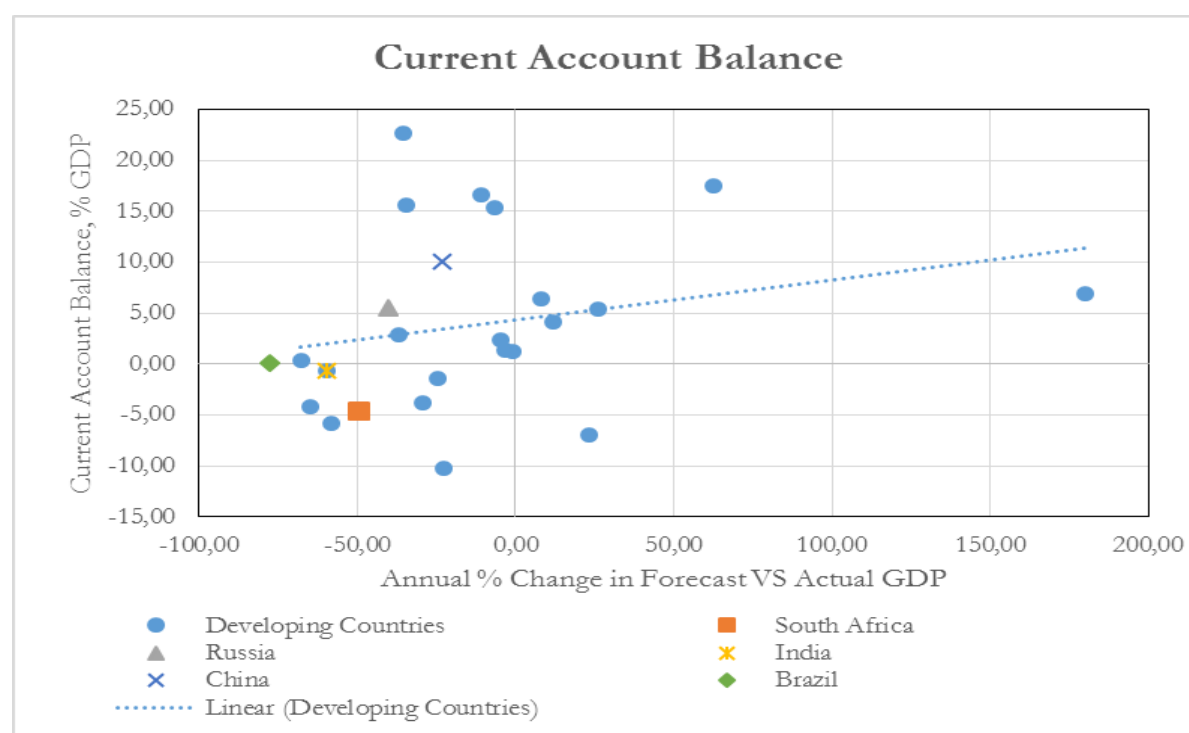
4.4 UNDERLYING VULNERABILITIES IN THE FINANCIAL STRUCTURE

A third channel identified by Berkmen *et al.* (2009) through which the impact of the crisis would be spread is through the underlying vulnerabilities in the financial structure.

4.4.1 CURRENT ACCOUNT BALANCE

Current Account balance as a percent of GDP provides an indication of the level of international competitiveness of a country as well as its vulnerability to a disruption of the capital inflows needed to fund a current account deficit (Clarida, 2007). Countries that have a high current account deficit are often most vulnerable to financial crises (Gosh and Ramakrishnan, 2012), thus one would expect an upward sloping trend line.

Figure 3a: Current Account Balance Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figure 3a supports the expectation of an upward sloping trend line demonstrating the positive relationship between current account balances and the extent of the difference between actual GDP growth in 2012 and what had been expected in 2008. Despite current account balance being commonly used in illustrating economic health, current account deficits as an indicator can

at times be misinterpreted for underperformance and should be assessed on the core factors giving rise to the deficit starting with investment and savings (Keeton, 2012). It is interesting to note that many developing countries in 2007 had current account surpluses and so were not particularly vulnerable to a cessation of capital inflows. South Africa had a current account deficit in 2007 that was substantially worse than the average of all other developing countries used in the sample. This contributed to the fact that South Africa's growth in 2012 was worse than had been expected in 2008.

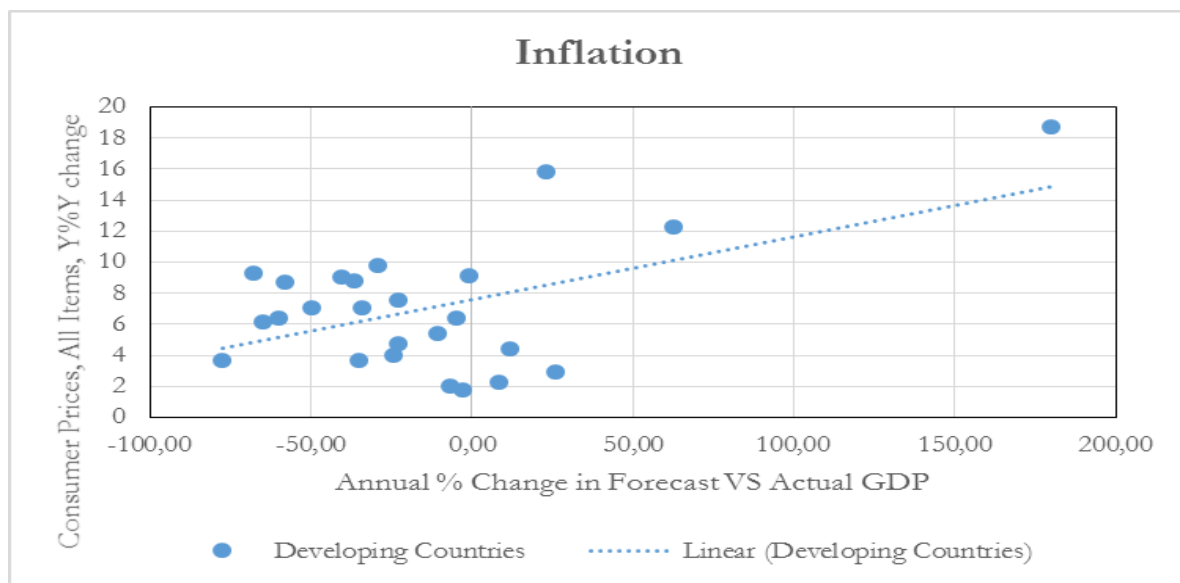
4.4.2 INFLATION

Inflation (CPI) is used to indicate the rate at which prices of all items increase for consumers which eventually results in diminishing an individual's buying power, often causing a devaluation in a local currency (Harriott, 2000). Inflation and GDP are considered to be 'important macroeconomic variables influencing monetary and fiscal policy' (Banerjee, Marcellino and Masten, 2005: 786).

A priori one would expect that inflation and GDP growth should have a negative relationship during the crisis. It is expected that countries with higher inflation would have less scope for countercyclical cuts in interest rates. Inflation was found to have a positive relationship with GDP growth relative to forecast according to the first scatter plot of all 25 developing countries. However, the positive relationship in Figure 3b is realised due to 3 outliers. Algeria, Sri Lanka and Venezuela had substantially higher inflation relative to their 2012 growth outcome compared to the all other developing countries.

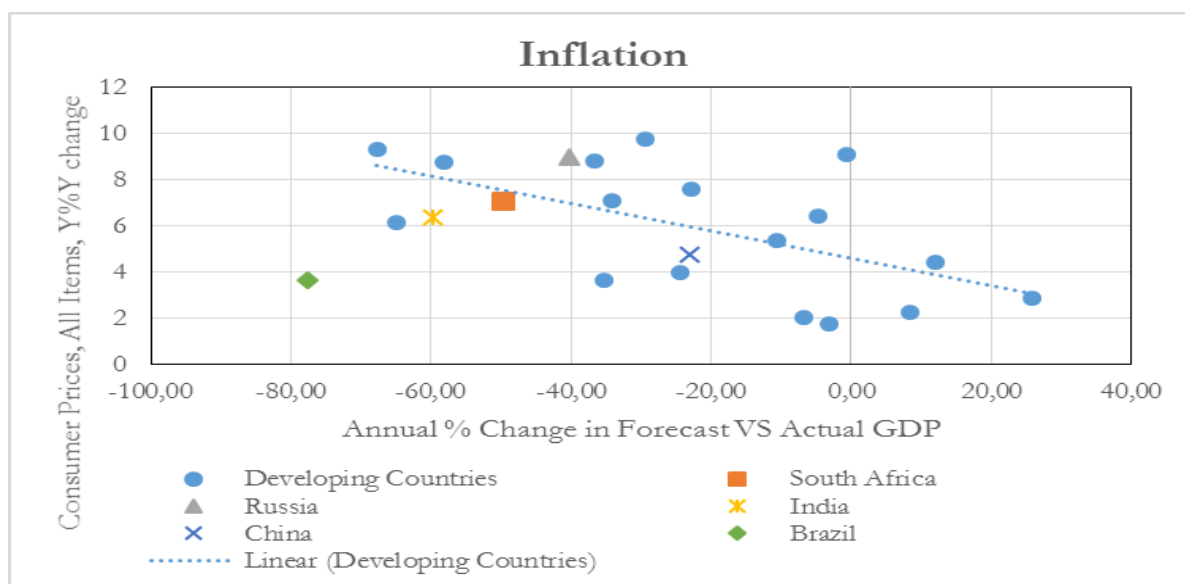
The second scatter plot illustrated by Figure 3c excludes these outliers and supports our expectation of a negative relationship between inflation and growth relative to forecast for the remaining countries in our sample. Except for Brazil, countries with lower inflation results generally experienced smaller declines in economic growth in 2012 relative to what had been forecast in 2008. South Africa's inflation rate for 2007 was slightly above the inflation target band of 3-6% but 2012 growth relative to forecast was about what would be expected given South Africa's rate of inflation.

Figure 3b: Inflation Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

Figure 3c: Inflation Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics (Angola, Sri Lanka and Venezuela excluded)

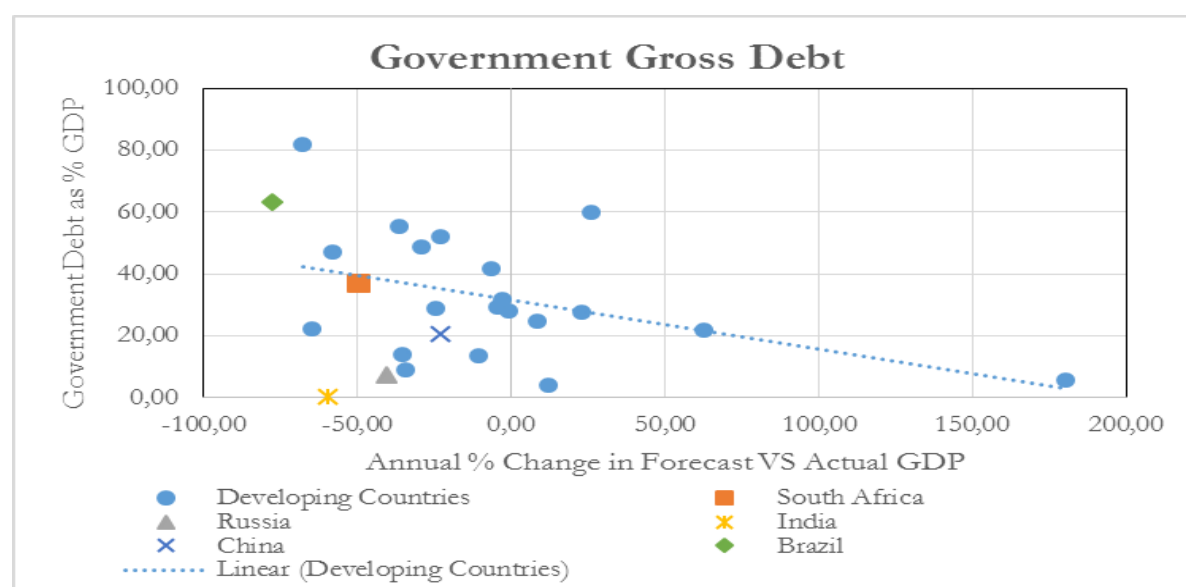
4.4.3 GOVERNMENT GROSS DEBT

Government gross debt is used to indicate the total level of fiscal indebtedness of individual countries. High levels of debt are often associated with negative implications for GDP growth as the country concerned cannot efficiently generate or manage its own funds accordingly and at

times can find itself in a debt trap (Wohlgemuth, 2009). However, if used correctly debt can also be used to fund investments in infrastructure thus promoting economic growth for the future.

It is expected that at a time of financial crisis funding high levels of fiscal debt will become more difficult. *A priori* this would suggest a negative relationship between the level of debt and the 2012 GDP growth relative to forecast. Figure 3d supports our expectation of a negative relationship, with countries with higher debt levels experiencing lower growth relative to forecast. South Africa was found to be only marginally lower than the expected growth outcome.

Figure 3d: Government Gross Debt Scatter Plot Diagram



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

4.5 POLICY FRAMEWORK

The last channel identified by Berkmen *et al.* (2009) through which the impact of the crisis would be spread is via policy frameworks.

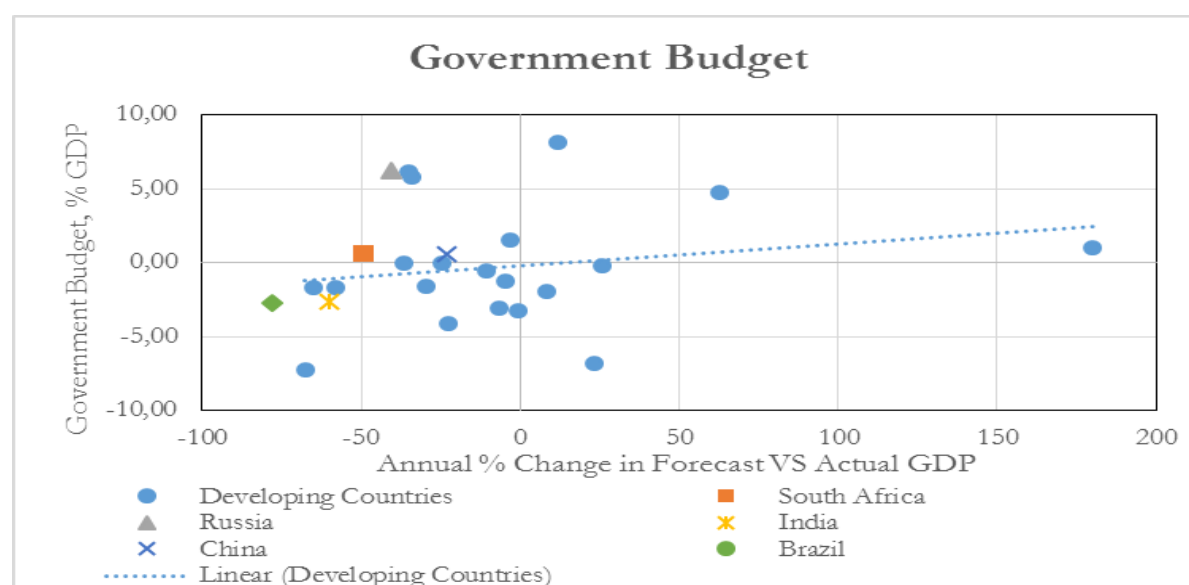
4.5.1 GOVERNMENT BUDGET

Government budget accounts are a combination of income received and payments made by a nation's government in order to sustain the level of public services in an economy (Trading Economics, 2012).

It is expected that the government budget balance (surplus or deficit) will have a positive relationship with GDP outcomes. At a time of crisis, countries with high government budget deficits will find it harder to fund their deficits. They will also have less room to pursue countercyclical measures to dampen the negative impact of the crisis on GDP growth.

Figure 4a clearly illustrates a positive trend line thus supporting our expectations that higher budget deficits were associated with more negative outcomes for 2012 GDP growth compared with what had been forecast in 2008. Russia despite having a high budget surplus in 2008 experienced a far more negative growth outcome than would have been expected. South Africa had a budget surplus at the start of the crisis and its growth is also worse than would be expected from this variable alone. This serves as a reminder that, on its own, having a budget surplus did not protect countries from all the other negative influences on growth as a result of the crisis. Other economic variables must also be considered.

Figure 4a: Government Budget Scatter Plot Diagram for Policy Framework



Source: Research Analysis, based on Data from Thomson Reuters: Oxford Economics

4.6 CONCLUSIONS FROM TREND ANALYSIS

A general conclusion from the evidence produced from trend analysis indicates that the financial linkages channel, particularly FDI, was found to be an important channel in explaining the economic slowdown in growth relative to what had been previously forecasted. Furthermore, all underlying vulnerabilities in the financial structure variables and policy framework variables, specifically the Current Account Balance, Inflation, Government Gross Debt and Government Budget appear also to support the slowdown in economic activity relative to the previous forecasts in GDP. It not surprising that overall most country GDP forecasts captured in 2008 for 2012 were higher than actual 2012 results as it is clear that the depth of the impending financial crisis was initially underestimated. Despite literature placing emphasis on Trade being an important channel for developing countries during a financial crisis, the results obtained

suggest the trade channel was not a contributing factor to the unexpected slowdown in economic growth relative to what was forecast in 2008. In the next section, a second method will be adopted whereby the findings of trend analysis will be further tested econometrically.

4.7 APPLYING PANEL REGRESSION ANALYSIS³

Panel data analysis was deemed to be the most appropriate econometric method due to the nature of the cross sectional and time series data collected. This section begins by looking at four fixed effects models based on economic literature in order to establish which model is better suited to the purpose of this research. A pooled OLS model is then compared to that of the selected fixed effects model using a restricted F-test in order to demonstrate which model is of better use. The *a priori* expectation would be that the fixed effects model will generate better results than the pooled OLS model because the fixed effects model recognises the panel nature of the data-set while the pooled OLS model simply stacks the data without taking account of the heterogeneity between the cross-sectional units in the data-set or the time dimension of the data (Gujarati and Porter, 2009: 593-597). A random effects model is then generated and used with the fixed effects equation in order to perform a Hausman test that compares the fixed and random effects approaches. The findings are then used to analyse which transmission mechanisms were found to be more important and whether this supports the theoretical expectations concerning the impacts of a financial crisis on developing economies.

An intercept dummy is used to indicate whether on average growth was higher or lower during the years of the crisis. Furthermore, interactive dummy variables are also used for the purpose of illustrating the relationship between the selected variables and GDP growth during the crisis period.

An analysis of the impact of the crisis on the BRICS and FRAGILE 5 countries is also conducted. However, due to the limited scope of this paper, only a brief graphical illustration as to how GDP has been affected in these country groupings will be presented. Regressions for the BRICS and FRAGILE 5 countries were conducted using the same variables and dummies. The results can be seen in Appendix C.

³ Gross Debt and Government Budget were excluded in the panel regressions because this method looks at a longer time frame of ten years and not only the crisis period like model one does. Gross Debt and Government Budget were excluded due to multicollinearity problems and insignificant results. Despite Gross Debt and Government Budget in trend analysis indicating they were important variables during the crisis, over a longer period their impact was captured by some of the other variables in the regressions.

Despite Remittances being discussed as a transmission mechanism, this was not included due to the chosen narrower scope of this study as well as the work already done in this area by Ezeoha (2013).

The variables used in the present study are as follows:

GDPGR represents growth in Gross Domestic Product

FDI represents Inward Foreign Direct Investment as a percentage of GDP

Infl represents Inflation

Curr_Acc represents Current Account Balance as a percentage of GDP

Vol represents a Volatility index based on the Real Effective Exchange Rate (2007=100)

Portfolio represents Portfolio Inflows, net of FC Bonds as a percentage of GDP

Crisis is a Dummy Variable to indicate the presence of a Financial Crisis

XEU represents Total Exports to European Union as a percentage of GDP

XChina represents Total Export to China as a percentage of GDP

A number of fixed effects regressions were initially conducted in order to distinguish which model was best suited for the purpose of this research.

The four different versions of the estimated model are shown below and the estimated results are depicted in columns 1-4 of Table 2:

$$(1) \quad GDPGR = f(Crisis, Curr_Acc, Curr_Acc * Crisis, Portfolio, Portfolio * Crisis, FDI, FDI * Crisis, Infl, Infl * Crisis, Vol, Vol * Crisis, XChina, XChina * Crisis)$$

$$(2) \quad GDPGR = f(Crisis, Curr_Acc, Curr_Acc * Crisis, Portfolio, Portfolio * Crisis, FDI, FDI * Crisis, Infl, Infl * Crisis, Vol, Vol * Crisis, XEU, XEU * Crisis)$$

$$(3) \quad GDPGR = f(Crisis, Curr_Acc, Portfolio, Portfolio * Crisis, FDI, FDI * Crisis, Infl, Infl * Crisis, Vol, Vol * Crisis, XEU, XEU * Crisis)$$

$$(4) \quad GDPGR = f(Crisis, Curr_Acc, Portfolio, Portfolio * Crisis, FDI, FDI * Crisis, Vol, Vol * Crisis, XEU, XEU * Crisis)$$

Table 2: Fixed Effects Models

Dependent Variable: GDPGR	Panel Least Squares			
Independent Variables:	[1]	[2]	[3]	[4]
C	1.42 *	1.46 *	1.56 *	1.42 *
CRISIS	-0.41 *	-0.28 ***	-0.32 **	-0.25 ***
CURRENT_ACCOUNT	0.03 *	0.03 *	-	0.03 *
CURRENT_ACCOUNT*CRISIS	-0.01	-0.02 ***	-	-0.02 **
FDI	-0.01	-0.008	-0.02	-0.02 ***
FDI*CRISIS	0.06 **	0.06 **	0.07 **	0.07 **
INFL	-0.009 **	-0.01 *	-0.01 *	-
INFL*CRISIS	0.007	0.008	0.007	-
PORTFOLIO	0.02 ***	0.02	0.014	0.02 ***
PORTFOLIO*CRISIS	0.05 **	0.05 **	0.06 *	0.05 **
VOL	0.001 *	0.001 *	0.001 *	0.001 *
VOL*CRISIS	-0.002 *	-0.003 *	-0.003 *	-0.002 *
XCHINA	0.05 **	-	-	-
XCHINA*CRISIS	-0.07 *	-	-	-
XEU	-	0.009	0.01	0.007
XEU*CRISIS	-	-0.04 *	-0.05 *	-0.03 *
Observations	1100.00	1100	1100	1100
Adjusted R-squared	0.225840	0.221106	0.212964	0.216888
F Statistic	9.664945	9.431766	9.496543	9.696435
Prob(F-statistic)	0.00000	0.00000	0.00000	0.00000
D.W	1.588972	1.58551	1.570785	1.566048

(Author's own estimation using Eviews 7)

Note:

- * indicates statistical significance at a 1% level,
- ** indicates significance at a 5% level.
- *** indicates significance at a 10% level.

Columns [1]-[4] represent the various equations that were constructed in panel data analysis

4.7.1 Fixed Effects Specification using Model 2

Note that Model 1 includes exports to China rather than the EU in the specification. This model performs fairly well with the coefficient of the crisis dummy, exports to China and portfolio flows among the significant variables. However, because of the major impact of the financial crisis on the EU and the importance of the EU as a major trading partner for most of the countries in the sample, it was decided to focus on model specifications that included exports to the EU rather than exports to China (see Models 2 to 4 above). From the table above, and considering Models 2 to 4 (which include the EU), Model 2 appears to be the best fixed effects

model that includes EU exports based on the level of ‘goodness of fit’ (i.e. the adjusted R squared). The Fixed Effects model allows for heterogeneity between the countries used in the sample panel. The estimated equation makes use of both intercept and interactive dummy variables to indicate the impact of the financial crisis on average growth across the different countries, as well as on the various determinants of growth.

$$(2) \text{ GDPGR} = f(\text{Crisis}, \text{Curr_Acc}, \text{Curr_Acc}*\text{Crisis}, \text{Portfolio}, \text{Portfolio}*\text{Crisis}, \text{FDI}, \text{FDI}*\text{Crisis}, \text{Infl}, \text{Infl}*\text{Crisis}, \text{Vol}, \text{Vol}*\text{Crisis}, \text{XEU}, \text{XEU}*\text{Crisis})$$

Table 3: Fixed Effects Model 2: Empirical Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.466228	0.164122	8.933781	0.000000
CRISIS	-0.287313	0.147868	-1.943043	0.0523
CURRENT_ACC	0.033806	0.009338	3.620328	0.0003
CURRENT_ACC*CRISIS	-0.021163	0.012278	-1.723621	0.0851
FDI	-0.00858	0.018311	-0.468546	0.6395
FDI*CRISIS	0.066602	0.029035	2.293874	0.022
INFL	-0.011043	0.003965	-2.784966	0.0054
INFL*CRISIS	0.008882	0.008957	0.99157	0.3216
PORTFOLIO	0.02591	0.015848	1.634862	0.1024
PORTFOLIO*CRISIS	0.055308	0.021824	2.534225	0.0114
VOL	0.001495	0.000448	3.336897	0.0009
VOL*CRISIS	-0.002826	0.000572	-4.939184	0.000000
XEU	0.009497	0.019855	0.47829	0.6325
XEU*CRISIS	-0.044615	0.013443	-3.318927	0.0009
R-squared	0.247329	Durbin-Watson	1.58551	
Adjusted R-squared	0.221106	Prob(F-statistic)		0.00000
F-statistic	9.431766			

(Author’s own estimation using Eviews 7)

4.7.1.1 Main Findings

In assessing the relationship between the core variables and GDP growth (excluding the crisis dummy and the interactive dummies) the results in the table above support *a priori* expectations except for the FDI and Vol coefficients whose signs are the opposite of what was expected. This is surprising as higher levels of FDI and lower levels of exchange rate volatility should promote growth. However the FDI coefficient is statistically insignificant, suggesting that FDI did not impact significantly on growth in this period. The current account, inflation and volatility

coefficients were all found to be significant at the 1 % level. The Portfolio Inflows coefficient is almost significant at the 10% which is a weak result. The coefficient of the EU exports variable was insignificant.

With regards to the intercept dummy, the results highlight that the crisis did in fact have a negative impact on GDP growth on average. The effect was statistically significant at the 10% level, and almost significant at the 5% level. In examining the interactive dummies, the impact of an improvement in the current account on growth in developing countries during the crisis was reduced as expected, and the negative impact of the crisis was significant at the 10% level. This implies that during the crisis, an improvement in the current account has less of a positive effect on growth.

The impact of FDI on GDP growth during the crisis was found to be positive and significant at the 5% level. This may be because some of the other determinants of growth were weaker during this period.

It is interesting that during the crisis the impact of Portfolio Inflows on growth in the developing country sample was also positive and statistically significant at the 5% level. In other words, the positive impact of foreign flows to developing countries on growth became significant during the crisis. This is contrary to what would have initially been expected at a time of financial crisis but could possibly be the result of quantitative easing in the USA and lower interest rates in developed markets. This meant that portfolio inflows increased during the crisis rather than falling as had been anticipated. The impact of Inflation on growth was not significantly affected during the crisis.

The crisis had a significant negative impact on the contribution of exports to the EU to growth in developing countries. This result conforms to economic theory and supports the view that the developing economies used in this study are dependent on exports to the EU.

Finally, the impact of exchange rate volatility on growth was surprisingly found to be positive during the non-crisis period. However exchange rate volatility had a significant negative effect on growth during the crisis period, as expected. Overall, the model is statistically significant at the 1% level.

4.7.2 Pooled OLS Estimation of Model 2

In this model, all the observations in the OLS regression have been pooled, meaning that the coefficients including intercepts are assumed to be the same for all countries.

$$(2) \text{ GDPGR} = f(\text{Crisis}, \text{Curr_Acc}, \text{Curr_Acc} * \text{Crisis}, \text{Portfolio}, \text{Portfolio} * \text{Crisis}, \text{FDI}, \text{FDI} * \text{Crisis}, \text{Infl}, \text{Infl} * \text{Crisis}, \text{Vol}, \text{Vol} * \text{Crisis}, \text{XEU}, \text{XEU} * \text{Crisis})$$

Table 4: Pooled OLS Estimation of Model 2: Empirical Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.360083	0.081541	16.679790	0.000000
CRISIS	-0.249314	0.154269	-1.616105	0.106400
CURRENT_ACC	0.022574	0.007518	3.002685	0.002700
CURRENT_ACC*CRISIS	-0.031429	0.012279	-2.559525	0.010600
FDI	-0.013337	0.016639	-0.801541	0.423000
FDI*CRISIS	0.031617	0.029437	1.074055	0.283000
INFL	-0.001205	0.003788	-0.318019	0.750500
INFL*CRISIS	-0.003252	0.009143	-0.355678	0.722200
PORTFOLIO	0.028232	0.016046	1.759450	0.078800
PORTFOLIO*CRISIS	0.044398	0.023063	1.925120	0.054500
VOL	0.000887	0.000395	2.246084	0.024900
VOL*CRISIS	-0.001901	0.000582	-3.265323	0.001100
XEU	0.020534	0.007897	2.600205	0.009400
XEU*CRISIS	-0.032042	0.013618	-2.352872	0.018800
R-squared	0.101420	Durbin-Watson	1.311291	
Adjusted R-squared	0.090664	Prob(F-statistic) 0.000000		
F-statistic	9.428772			

(Author's own estimation using Eviews 7)

4.7.2.1 Main Findings

The results in table 4 are similar to those of the Fixed Effects Model 2 as far as the individual coefficients are concerned. One difference is that the impact of Exports to the EU on growth in the non-crisis period in this model is very significant at the 1% level conforming to *a priori* expectations. In addition, the coefficient of the Crisis dummy was insignificant which does not conform to theoretical expectations. However the adjusted R-squared is much lower and the Durbin-Watson statistic is a lot weaker in the pooled OLS estimation than in the fixed effects estimation. This illustrates the main shortcoming of the pooled OLS model, namely that it does not distinguish the panel nature of the data-set, both in terms of the various countries in the sample and in terms of the time dimensions involved.

4. 8 Restricted F-Test

The Fixed Effects model and the Pooled OLS model can be formally compared using the restricted F-Test (Gujarati and Porter, 2009).

Restricted F-Test Empirical Results:

$$\begin{aligned} F^* &= \frac{(R^2_{UR} - R^2_R) / m}{(1 - R^2_{UR}) / (n-k)} \\ &= \frac{(0.247329 - 0.101420) / 24}{(1 - 0.247329) / (1100 - 14)} = 8.77 \quad (\text{compare } F_{6,1086}^{\text{crit}}) \text{ with a } F.\text{crit} = 1.79 \end{aligned}$$

4.8.1 Main Findings

It can be concluded at the 1% level of significance that the null hypothesis should be rejected and that the unrestricted regression (i.e. the Fixed Effects Model 2) is therefore more valid and better to use than the Pooled OLS model.

4.9 Random Effects Specification: Model 2

For completeness sake, a Random Effects model was estimated to test for the stability of the Fixed Effects model.

The Random Effects panel estimation for the 25 countries was conducted using Model 2 which was the most comprehensive model specification that included exports to the EU (see section 4.7.1):

$$(2) \text{ GDPGR} = f(\text{Crisis}, \text{Curr_Acc}, \text{Curr_Acc} * \text{Crisis}, \text{Portfolio}, \text{Portfolio} * \text{Crisis}, \text{FDI}, \text{FDI} * \text{Crisis}, \text{Infl}, \text{Infl} * \text{Crisis}, \text{Vol}, \text{Vol} * \text{Crisis}, \text{XEU}, \text{XEU} * \text{Crisis})$$

Table 5: Random Effects Estimation of Model 2: Empirical Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.409265	0.155222	9.079017	0.000000
CRISIS	-0.280871	0.147075	-1.909705	0.056400
CURRENT_ACC	0.031291	0.008843	3.538380	0.000400
CURRENT_ACC*CRISIS	-0.022398	0.012141	-1.844868	0.065300
FDI	-0.010830	0.017803	-0.608299	0.543100
FDI*CRISIS	0.061543	0.028792	2.137510	0.032800
INFL	-0.009625	0.003882	-2.479410	0.013300
INFL*CRISIS	0.006967	0.008860	0.786333	0.431800
PORTFOLIO	0.026192	0.015714	1.666797	0.095800
PORTFOLIO*CRISIS	0.054483	0.021767	2.503038	0.012500
VOL	0.001408	0.000432	3.259886	0.001100
VOL*CRISIS	-0.002717	0.000567	-4.790033	0.000000
XEU	0.017550	0.013645	1.286259	0.198600
XEU*CRISIS	-0.041839	0.013076	-3.199622	0.001400
<i>Weighted Statistics</i>				
R-squared	0.134052	Durbin-Watson	1.546540	
Adjusted R-squared	0.123686	Prob(F-statistic) 0.000000		
F-statistic	12.932010			

(Author's own estimation using Eviews 7)

4.9.1 Main Findings

There are very few differences compared to the findings for the Fixed Effects model except that the coefficient of Portfolio inflows is now significant at the 10 % level.

4.10 Hausman Test

A Hausman test was conducted in order to identify which of the Fixed and Random Effects models is the more appropriate.⁴

⁴ The decision to exclude the intercept and the intercept dummy for the Hausman test was recommended both by Greene (2012: 420) and by the University of Indiana (2014: 1).

Table 6: Hausman Test Results

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		11.010227	12	0.528
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CURRENT_ACC	0.034998	0.032296	0.000009	0.3659
CURRENT_ACC*CRISIS	-0.02049	-0.021903	0.000003	0.4389
FDI	-0.002721	-0.005064	0.000018	0.5856
FDI*CRISIS	0.037592	0.033343	0.000009	0.1584
INFL	-0.01062	-0.009241	0.000001	0.0872
INFL*CRISIS	0.001385	-0.000318	0.000001	0.1482
PORTFOLIO	0.02791	0.027949	0.000004	0.9845
PORTFOLIO*CRISIS	0.051824	0.051107	0.000002	0.6459
VOL	0.001508	0.001424	0.000000	0.4833
VOL*CRISIS	-0.002901	-0.002791	0.000000	0.1526
XEU	0.015327	0.021926	0.000205	0.645
XEU*CRISIS	-0.058218	-0.055507	0.000012	0.4342

(Author's own estimation using Eviews 7)

4.10.1 Main Findings

The null hypothesis for the Hausman test is that there is no significant difference between the Fixed and Random Effects coefficients (Gujarati and Porter, 2009: 604). Following the evidence in Table 6, it can be seen that the Chi Square statistic is not significant. This implies that the Fixed Effects model is not significantly better than the Random Effects model which does support the similar results produced in previous regressions. The final choice between the random and fixed effects models depends upon factors such as degrees of freedom and whether the cross sectional units can be seen as random drawings from a large population (Gujarati and Porter, 2009: 606-7).

Table 7: Country Specific Coefficient Difference from Model Average

Country	Cross-section fixed effects (Var.)	Cross-section random effects (Var.)
Algeria	-0.701993	-0.71572
Angola	1.414638	1.14785
Argentina	0.045595	0.066897
Bangladesh	0.240221	0.204426
Botswana	-0.252115	-0.188793
Brazil	-0.485121	-0.406133
Chile	1.015747	0.941355
China	-0.24685	-0.200286
Egypt	-0.084305	-0.042183
India	0.510676	0.484204
Indonesia	-0.006709	0.022084
Kenya	-0.024057	-0.028995
Malaysia	-0.41384	-0.361781
Mexico	-0.77925	-0.657647
Nigeria	0.728176	0.639138
Pakistan	-0.085766	-0.056796
Peru	0.129332	0.145453
Philippines	-0.227124	-0.186334
Russia	-0.306659	-0.325865
South Africa	-0.411272	-0.381033
Sri lanka	0.385219	0.320096
Thailand	-0.264304	-0.236486
Turkey	0.205192	0.054575
Uganda	0.333282	0.344247
Venezuela	-0.718713	-0.582275

(Author's own estimation using Eviews 7)

Table 7 shows the amount by which the coefficients for each of the countries differ from the model average. South African growth was found to be below the average in both Fixed and Random Effects model (-0.411272 and -0.381033 respectively). Angola and Chile were found to have higher than average growth for both Fixed and Random Effects model whilst Algeria, Brazil, Mexico and Venezuela displayed the lowest growth in the sample.

4.11 THE FRAGILE FIVE

The Fragile Five named by Morgan Stanley consists of five developing economies selected because of the magnitude by which their currencies were affected due to the announced slowing down of quantitative easing programs in the USA (Morgan Stanley, 2013). With growth very low in many parts of the developed world, much attention has been placed by investors on developing countries for growth opportunities. Brazil, India, Indonesia, South Africa and Turkey

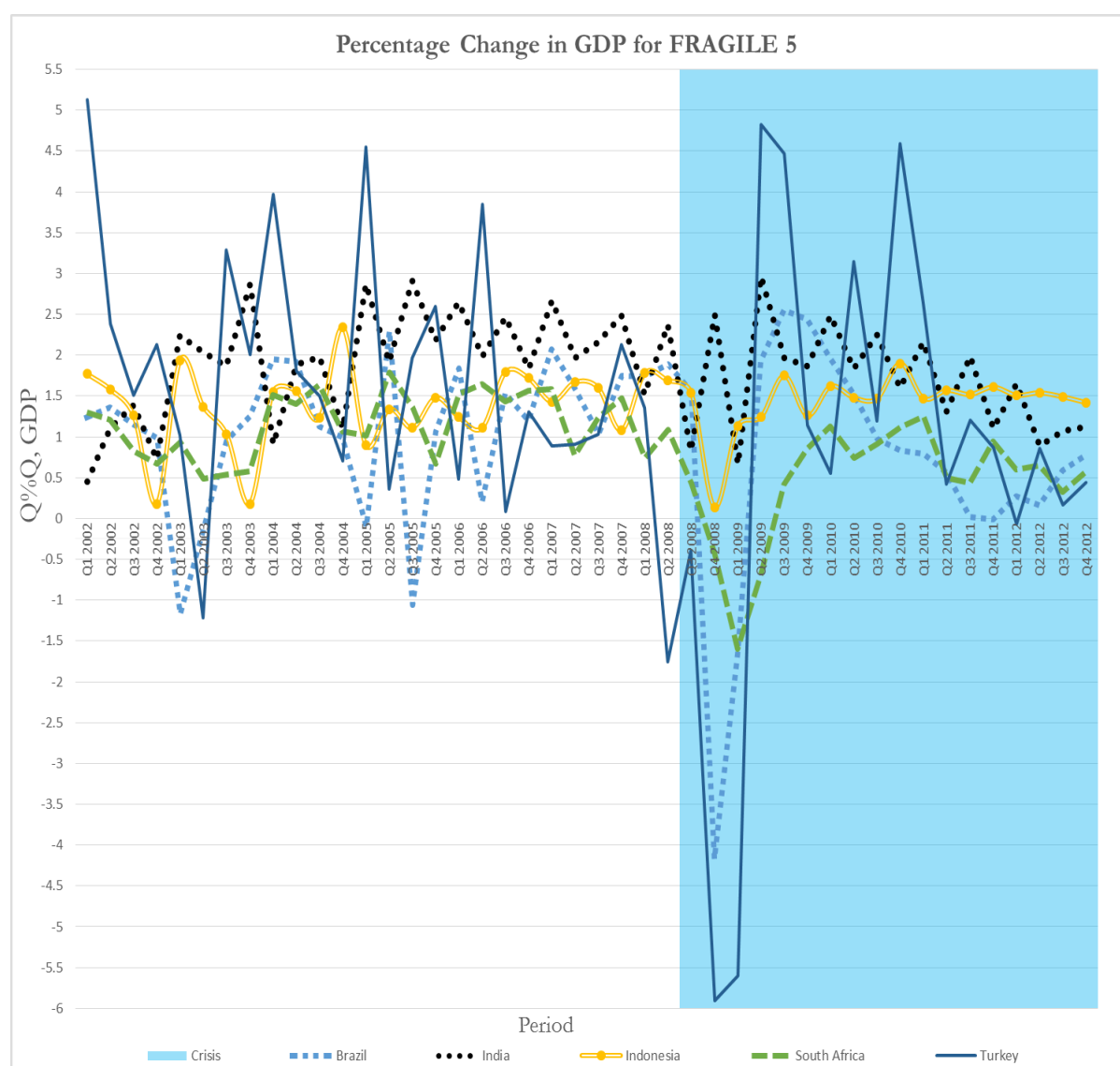
are grouped together as the Fragile 5 in that common to member countries is political instability, high inflation, current account deficits and low economic growth (Morgan Stanley, 2013).

In order to counteract the negative implications of quantitative easing, most of the Fragile 5 countries have raised interest rates in order to attract capital flows from foreign investors as yields in developed markets remain very low. The following graph depicts the quarter by quarter percentage change of GDP growth for the Fragile Five.

4.11.1 Main Findings

Following the evidence in Figure 5 all countries during the commencement of the financial crisis in 2008Q1 saw a decrease in GDP growth. From the regression results produced in Table 11 Appendix C, it is noticeable that FDI during the crisis was highly significant at the 1% level on average and confirmed to the *a priori* negative relationship with GDP growth. This evidence suggests that Fragile Five countries were hard hit via the FDI channel which could explain the sharp reduction in their GDP growth in 2012 relative to what had been forecast in 2008. GDP growth for Brazil and Turkey were found to have decreased sharply whilst India and Indonesia were affected to a lesser extent over the sampled period, experiencing no negative GDP growth results. Despite GDP growth for South Africa dropping in late 2008, South Africa's recovery compared to the other Fragile Five countries has not fared well. This could be a result of the continuous strikes and energy problems that have plagued South African output (World Bank, 2014).

Figure 5: Graph of Fragile 5 Q%Q, GDP Growth



Source: Research Analysis, based on Data from Thomson Data Stream, IMF World Economic Outlook Database

4.12 BRICS

Brazil, Russia, India, China were grouped together in order to “represent a class of middle-income emerging economies of relative size that could potentially provide steam to enhance economic growth in the world economy” (Bianconi, Yoshino and Machado de Sousa, 2012). South Africa was later officially added to this grouping, though its ability to “enhance growth in the world economy” is disputed. The BRICS economies over recent years have attracted many foreign investors due to accelerated growth prospects as well as for reasons such as cheaper labour and less stringent policy compliance. The following graph depicts the quarter by quarter percentage change of GDP for BRICS.

4.12.1 Main Findings

In Figure 6 it can be seen how the recent financial crisis has also impacted these emerging markets. Due to the fact that these developing economies are structurally differently from each other the impact on growth would be expected to differ (Banerjee and Vashisth, 2010).

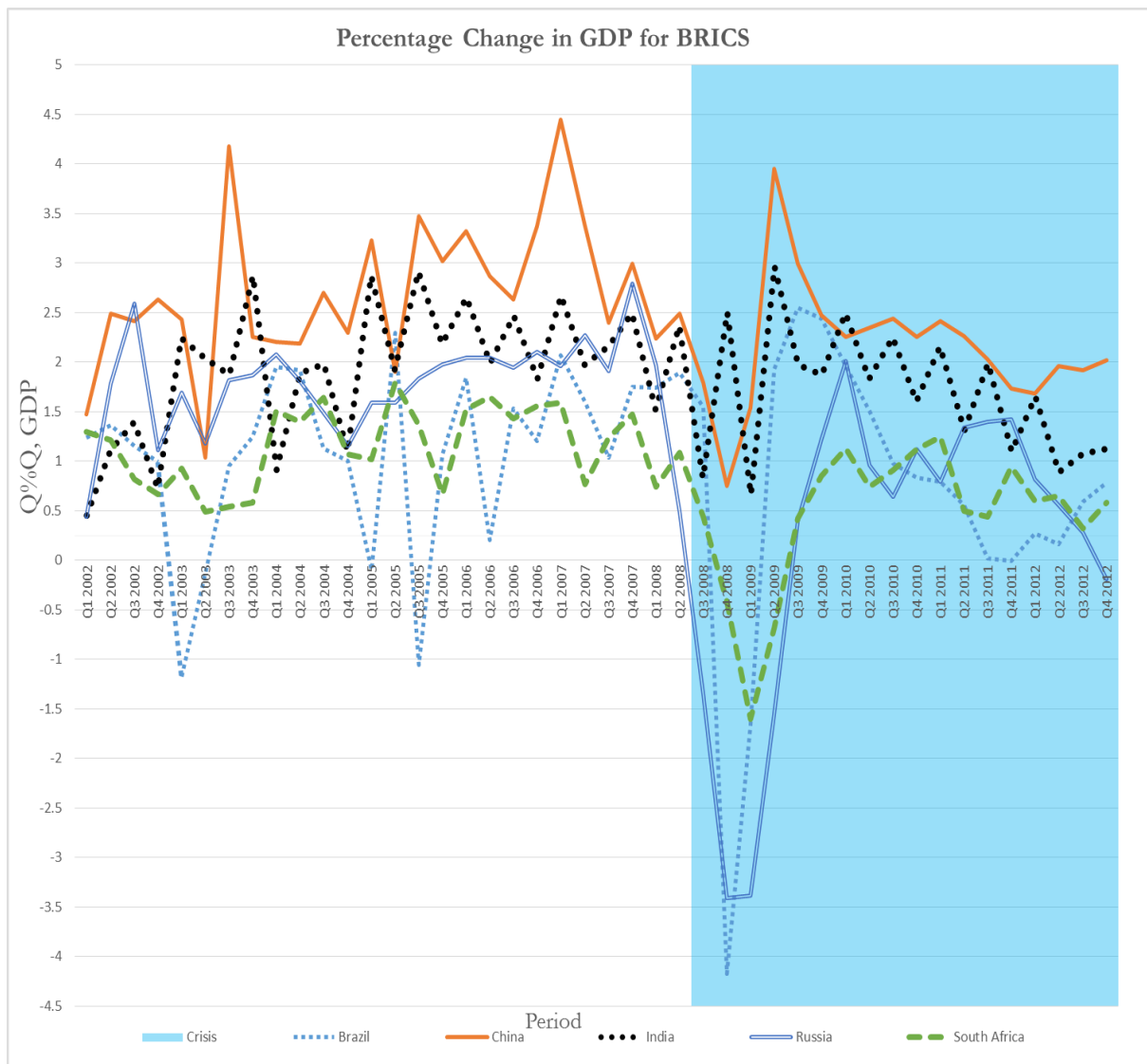
From the regression results produced in Table 12 Appendix C, it can be seen that FDI and Portfolio Inflows during the crisis were highly significant at the 1% level on average. This evidence of the causes of the sudden drop in GDP growth in 2012 compared with what had been forecast in 2008 conforms to what was predicted by economic theory. The Fragile Five appear to be even more dependent on capital flows than the BRICS, which is not surprising given the characteristics that define the Fragile Five countries.

Despite GDP growth for China slowing in 2008, the modest magnitude of the drop in comparison to other BRICS countries, excluding India, is significant. China, which is expected to be the world's largest economy by 2030 (Banerjee and Vashisth, 2010) recovered quite quickly after the crisis initially commenced. However recent years have seen growth stabilise at a slower pace than pre-crisis.

Russia, like Brazil and South Africa, saw GDP growth drop significantly at the commencement of the financial crisis. Russia experienced a quick recovery to pre-crisis rates of growth. However in recent times GDP growth has slowed, dropping once again towards negative growth. This could be a result of recent economic and geopolitical instability and lack of investor confidence (Brutsch and Papa, 2013).

In summary, the majority of developing countries were not shielded from the financial crisis and have all experienced downward growth to some degree which paints a clear picture that developing countries are still very much dependent on developed markets for growth.

Figure 6: Graph of BRICS Q%Q, GDP Growth



Source: Research Analysis, based on Data from Thomson Data Stream, IMF World Economic Outlook Database

CHAPTER 5: CONCLUSION

5.1 SUMMARY OF FINDINGS

The financial crisis which began in the United States in 2008 as a result of the collapse in the value of subprime mortgages has clearly resulted in an economic slowdown in developing countries (Naude, 2009). Similarities and differences concerning the impact of the crisis can be noticed amongst developed and developing countries. The United States experienced a banking crisis and aggressively used both monetary and fiscal policy to support its economy. Initially the nature of and response to the crisis was the same in Europe. However, the crisis in Europe became a bond market crisis as the solvency of European governments began to be questioned by investors. In response to the bond crisis some European countries were forced to implement contractionary fiscal policy to reduce government budget deficits. This pushed several countries and the European Union as a whole back into recession.

Initially, a common trait amongst all developing countries was low and uncertain investor confidence which was evident in changes in the capital flows to and from particular economies. Developing countries were initially hit hard, evidently “suffering from capital flight due to their direct exposure to the international financial system” (Commission of the European Communities, 2009). According to the Commission of the European Communities (2009) less developed developing countries agonized with contagion effects in which credit flows were exhausted, causing investment and private flows to wither. Quantitative easing in the USA brought an end to this lack of capital inflows and higher interest rates in developing countries caused capital flows from developed to developing economies to resume.

5.2 CONCLUSIONS

Financial Linkages, particularly FDI, appeared to be an important variable in causing the unexpectedly severe slowdown in GDP growth in developing economies. The results from using panel data analysis suggested that all three transmission channels, namely those of Trade, Capital flows and Exchange Rates, were important in spreading the impact of the slowdown in developed economies to developing economies.

FDI was an important variable for the Fragile Five countries during the crisis period. The results for BRICS suggested that both FDI and Portfolio Inflows were significant channels.

The financial crisis caused world economies to enter turbulent times that can be compared to that in the 1930's. This has resulted in the major emerging markets like China, Russia and

India becoming ever more important in stimulating world economic growth. It has perhaps consolidated a paradigm shift away from the US and the European Union dictating the pace of global economic activity.

5.3 RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

The initial belief that developing countries had “decoupled” from developed countries and would therefore be unaffected by the financial crisis in developed economies was incorrect.

The main implication for the modern investor from the evidence produced above suggests that if developing countries are not decoupled the opportunity for risk diversification is reduced.

With regards to policy implications, developing countries need to reduce their reliance on FDI and capital inflows if this is a key source of contagion. Developing countries need to raise their savings in order to fund more investment from domestic sources.

Areas for future research could look at the restrictions in credit also identified as a transmission mechanism channel in literature. This was excluded due to limitations in accessing reliable data, however using current and reliable data this could provide valuable information as to whether GDP was indeed effected by Banks in not lending to corporates and to the general public.

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APPENDICES

APPENDIX A

TABLES

Table 8: List of Countries

Algeria	Brazil	Indonesia	Pakistan	South Africa
Angola	Chile	Kenya	Peru	Thailand
Argentina	China	Malaysia	Philippines	Turkey
Bangladesh	Egypt	Mexico	Russia	Uganda
Botswana	India	Nigeria	Sri Lanka	Venezuela

Table 9: List of Explanatory Variables with predicted relationship and Sources of Data

Variable	Expected Sign (method 1) ⁵	Expected Sign (method 2) ⁶	Source
1. FINANCIAL LINKAGES			
FOREIGN DIRECT INVESTMENT, INWARD CURN AS % GDP	-	+	Thomson data Base : Oxford Economics
NET PORTFOLIO INVESTMENT FLOWS (NET OF FC BDS) AS % GDP	-	+	Thomson data Base : Oxford Economics
2. TRADE LINKAGES			
EXPORTS TO THE WORLD AS % GDP	-	+	Thomson data Base : IMF Direction of Trade Statistics & ITC
EXPORTS TO CHINA AS % GDP	-	+	Thomson data Base : IMF Direction of Trade Statistics & ITC
EXPORTS TO EU AS % GDP	-	+	Thomson data Base : IMF Direction of Trade Statistics
3. UNDERLYING VULNERBILTIES AND FINANCIAL STRUCTURE			
CURRENT ACCOUNT AS % GDP	+	+	Thomson data Base : Oxford Economics
GOVERNMENT GROSS DEBT AS % GDP	-	-	Thomson data Base : Oxford Economics and IMF WEO
INFLATION %	-	-	Thomson data Base : IMF International Financial Statistics
4. POLICY FRAMEWORK			
GOVERNMENT BUDGET AS % GDP	+	+	Thomson data Base : Oxford Economics & TradingEconomics.com
REAL EFFECTIVE EXCHANGE RATE VOLATILITY INDEX (2007= 100)	+	+/-	World Bank Statistics & Bruegel.org

⁵ Specifically focusing on the Crisis effect only

⁶ Over the 10 year period, 2002Q1 to 2012Q4

Table 10: Conversion Method and Type of Data

Variable	Countries' Modified	Data Type	Method of Conversion
1. <u>FINANCIAL LINKAGES</u>			
FOREIGN DIRECT INVESTMENT, INWARD CURN AS % GDP	Algeria, Angola, Bangladesh, Kenya, Nigeria, Peru, Sri Lanka, Uganda	CP, NSA	Annual Data converted to Quarterly: CSR#
NET PORTFOLIO INVESTMENT FLOWS (NET OF FC BDS) AS % GDP	Bangladesh, Botswana, Egypt, Kenya, Nigeria, Pakistan, Peru, Sri Lanka, Uganda	CP, NSA	Annual Data converted to Quarterly: CSR#
2. <u>TRADE LINKAGES</u>			
EXPORTS TO THE WORLD AS % GDP	Botswana	CP, NSA	Yearly data interpolated using Eviews8: QMA
EXPORTS TO CHINA AS % GDP	Botswana	CP, NSA	Yearly data interpolated using Eviews8: QMA
EXPORTS TO EU AS % GDP	N/A	CP, NSA	N/A
3. <u>UNDERLYING VULNERBILTIES AND FINANCIAL STRUCTURE</u>			
CURRENT ACCOUNT AS % GDP	Algeria, Angola, Bangladesh, Botswana, Sri Lanka	CP, NSA	Annual Data converted to Quarterly: CSR#
GOVERNMENT GROSS DEBT AS % GDP	Algeria, Angola, Bangladesh, Botswana, Kenya, Nigeria, Pakistan, Peru, Sri Lanka, Uganda	CP, NSA	Annual Data converted to Quarterly: CSR# : then Annualised
CONSUMER PRICES, ALL ITEMS (2010= 100)	N/A	PI, NSA	Refer to chapter 3, section 3.3.2
4. <u>POLICY FRAMEWORK</u>			
GOVERNMENT BUDGET AS % GDP	Algeria, Angola, Bangladesh, Botswana, Egypt, Kenya, Mexico, Nigeria, Pakistan, Peru, Sri Lanka, Uganda	CP, NSA	Annual Data converted to Quarterly: CSR#
REAL EFFECTIVE EXCHANGE RATE(2007= 100)	N/A	PI, NSA	Refer to chapter 3, section 3.3.1

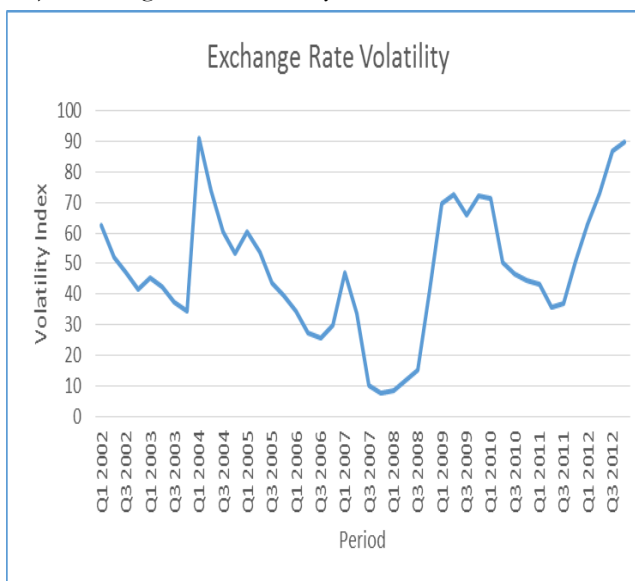
Table 11: Estimated Mean Equation and GARCH Model Specified.

No.	Country	Estimated Mean Equation	Estimated GARCH]
1	Algeria	reer1 c ar(1) ma(1)	[1,1]
2	Angola	reer2 c ma(1)	[1,1]
3	Argentina	reer3 c ar(1) ma(1)	[1,1]
4	Bangladesh	reer4 c ar(1)	[1,0]
5	Botswana	reer5 c ma(1)	[1,1]
6	Brazil	reer6 c ar(1) ma(1)	[1,0]
7	Chile	reer7 c ma(1)	[1,1]
8	China	reer8 c ma(1)	[1,1]
9	Egypt	reer9 c ma(1)	[1,1]
10	India	reer10 c ma(1)	[1,0]
11	Indonesia	reer11 c ma(1)	[1,1]
12	Kenya	reer12 c ar(1)	[1,0]
13	Malaysia	reer13 c ma(1)	[1,1]
14	Mexico	reer14 c ma(1)	[1,1]
15	Nigeria	reer15 c ar(1)	[1,1]
16	Pakistan	reer16 c ar(1)	[1,1]
17	Peru	reer17 c ma(1)	[1,1]
18	Philippines	reer18 c ma(1)	[1,1]
19	Russia	reer19 c ar(1)	[1,1]
20	South Africa	reer20 c ma(1)	[1,1]
21	Sri Lanka	reer21 c ma(1) ma(2) ma(3)	[0,1]
22	Thailand	reer22 c ma(1)	[1,1]
23	Turkey	reer23 c ar(1)	[1,1]
24	Uganda	reer24 c ar(1)	[1,1]
25	Venezuela	reer25 c ma(1)	[1,1]

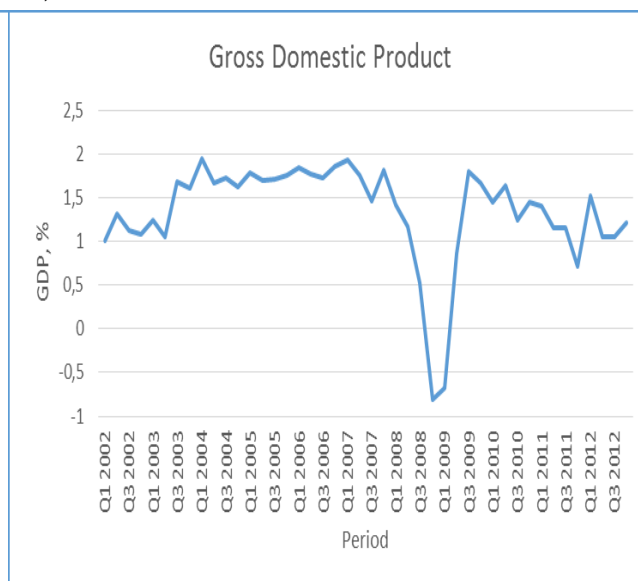
APPENDIX B

Figure 7: Line Charts for regression co-efficient validation

i) Exchange Rate Volatility



ii) Gross Domestic Product

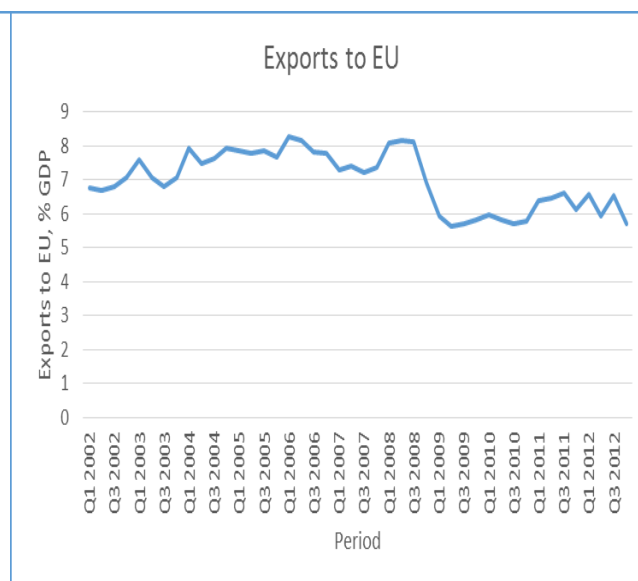


Source: Refer to Appendix A, Table 9

iii) Exports to China

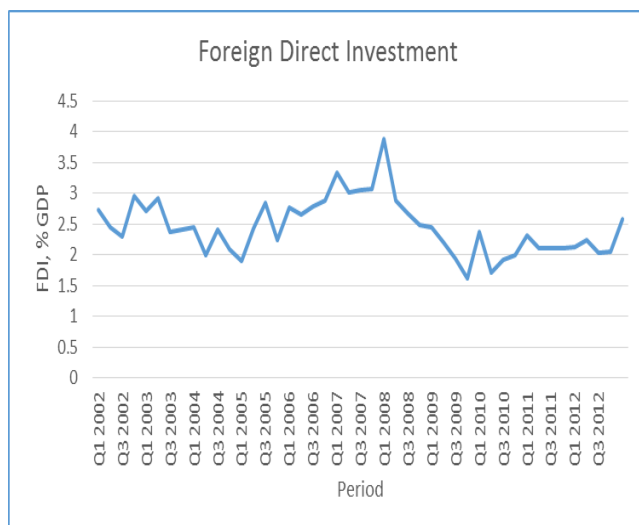


iv) Exports to EU

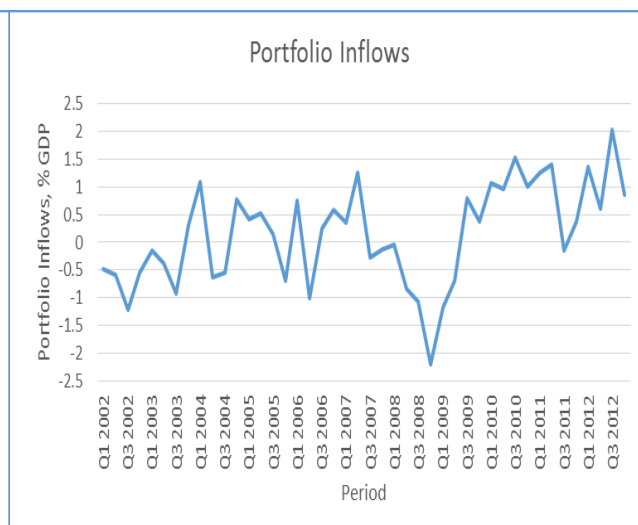


Source: Refer to Appendix A, Table 9

v) Inward Foreign Direct Investment

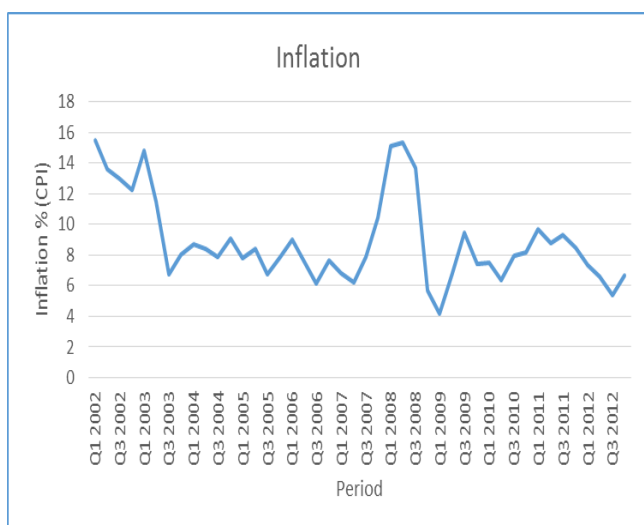


vi) Portfolio Inflows

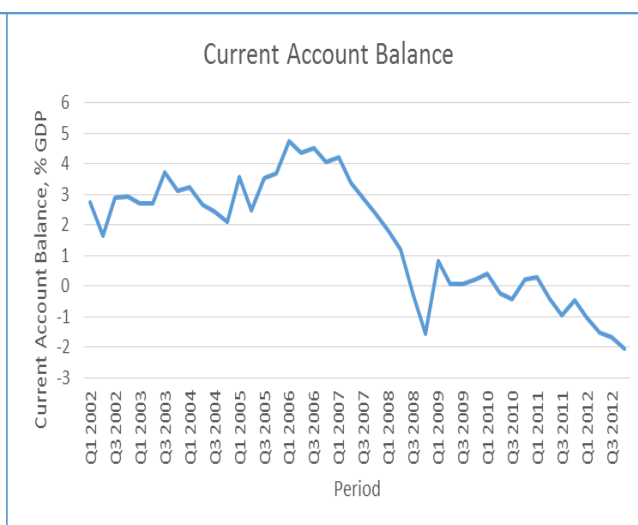


Source: Refer to Appendix A, Table 9

vii) Inflation



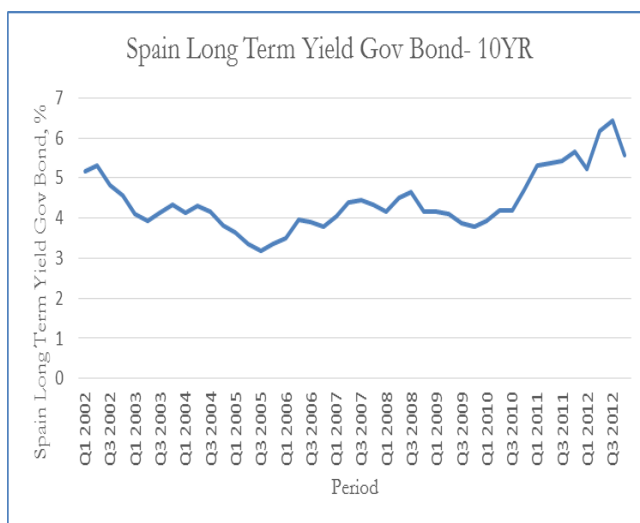
viii) Current Account Balance



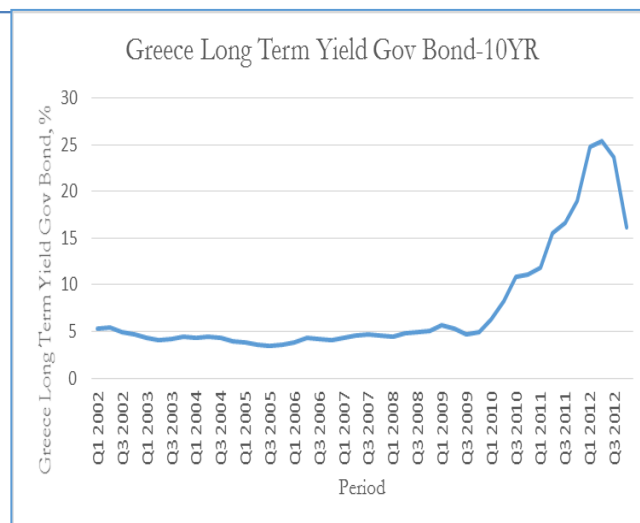
Source: Refer to Appendix A, Table 9

Figure 8: Line Graph for EU Government Bond Yields- 10 Years

i) Spanish Long Term Bond

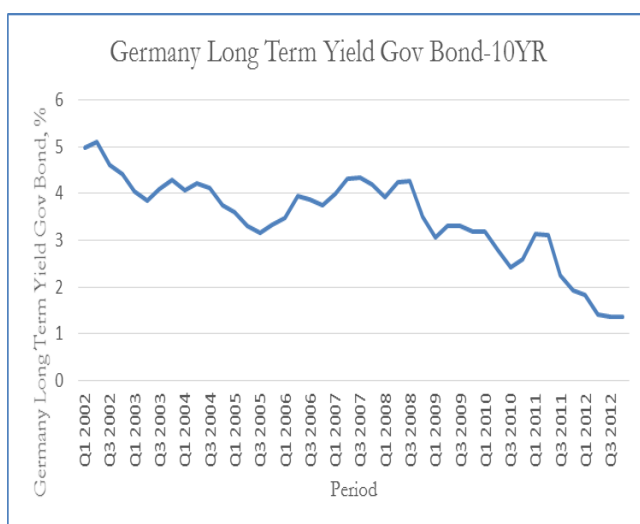


ii) Greece Long Term Bond

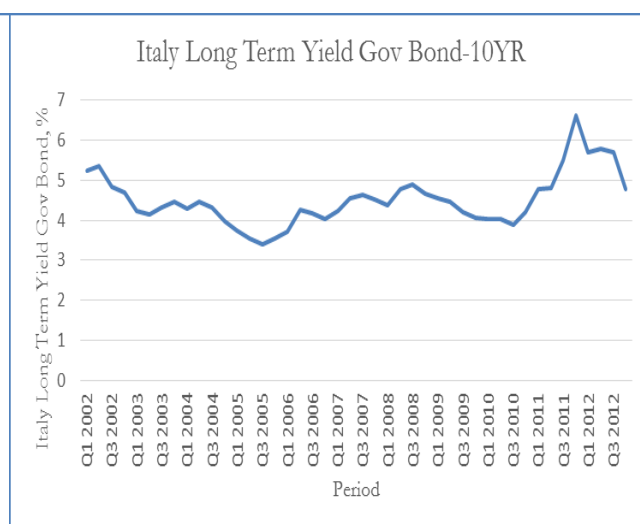


Source: Thomson Data Stream, Main Economic Indicators, OECD.

iii) Germany Long Term Bond



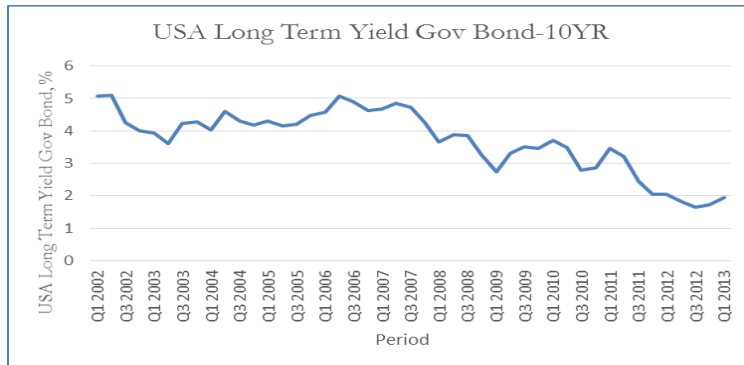
iv) Italy Long Term Bond



Source: Thomson Data Stream, Main Economic Indicators, OECD.

Line Graph for USA Government Bond Yields- 10 Years

vi) USA Long Term Bond



Source: Thomson Data Stream, Main Economic Indicators, OECD.

APPENDIX C

Table 12: Fragile Five Fixed Effects Regression Model⁷

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.034511	0.503213	4.043042	0.0001
CRISIS	0.593927	0.446924	1.328921	0.1854
CURRENT_ACC	-0.045106	0.047315	-0.953312	0.3416
CURRENT_ACC*CRISIS	0.008807	0.07066	0.124643	0.9009
FDI	0.01202	0.071169	0.168895	0.866
FDI*CRISIS	-0.480383	0.148415	-3.236757	0.0014
PORTFOLIO	0.021115	0.044754	0.471807	0.6376
PORTFOLIO*CRISIS	0.118968	0.060902	1.953443	0.0521
INFL	0.003267	0.014326	0.22803	0.8199
INFL*CRISIS	-0.007159	0.028845	-0.248206	0.8042
VOL	0.001851	0.003743	0.494353	0.6216
VOL*CRISIS	-0.002975	0.005592	-0.53189	0.5954
XEU	-0.095891	0.06193	-1.548369	0.1231
XEU*CRISIS	-0.06519	0.034146	-1.909175	0.0577
R-squared	0.244854	Durbin-Watson	1.842875	
Adjusted R-squared	0.181302	Prob(F-statistic)	0.000002	
F-statistic	3.852814			

Table 13: BRICS Fixed Effects Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.902619	0.360039	2.507005	0.013
CRISIS	0.907994	0.365263	2.485862	0.0137
CURRENT_ACC	-0.02409	0.027129	-0.887956	0.3756
CURRENT_ACC*CRISIS	0.077809	0.037654	2.066444	0.0401
FDI	0.014768	0.045457	0.324882	0.7456
FDI*CRISIS	-0.384716	0.093952	-4.094801	0.0001
INFL	-0.017602	0.014566	-1.208438	0.2283
INFL*CRISIS	0.001402	0.023032	0.060891	0.9515
PORTFOLIO	0.031022	0.030211	1.026848	0.3057
PORTFOLIO*CRISIS	0.112728	0.043015	2.620694	0.0094
VOL	-0.000296	0.002625	-0.112842	0.9103
VOL*CRISIS	-0.002043	0.003486	-0.586243	0.5584
XEU	0.133475	0.054577	2.445621	0.0153
XEU*CRISIS	-0.098552	0.039284	-2.50868	0.0129
R-squared	0.549088	Durbin-Watson	1.549559	
Adjusted R-squared	0.51114	Prob(F-statistic) 0.000000		
F-statistic	14.46948			

⁷ A Random Effects model could not be generated and thus compared because the Random Effects estimation requires number of cross sections > number of coefficients between estimator for estimate of RE innovation variance. The same applies for Table 12 concerning BRICS.

