Executive Summary

The purpose of this thesis is to provide an empirical analysis on capital flight for Portugal, Italy, Greece and Spain (P.I.G.S) during the current euro zone debt crisis. This is a very popular topic in today’s media and provides a rare opportunity to study capital flight episodes in highly developed economies. Although the euro zone debt crisis is still ongoing, evidence of capital flight from these countries does exist and warrants examination. More importantly, this paper contributes to the current literature on the Target2 imbalances and their connection to capital flight. In order to provide a thorough discussion and analysis of capital flight, the following are discussed:

- A comprehensive literature review focusing on capital flight episodes from all parts of the globe over the past twenty plus years. Capital flight estimates and the determinants for these capital flight flows are discussed and the major determinants are incorporated into the empirical analysis undertaken in this paper.
- The three most popular capital flight estimation techniques including the World Bank Method, Hot Money (1-3) Method, and the Dooley Method. The potential downfall of the Dooley Method along with conflicting results from the World Bank method and Hot Money Method are discussed.
- An empirical analysis using the most popular capital flight determinants from the literature. In addition, the Target2 balances of the central banks in the respective countries are examined as the development of these Target2 imbalances have become a hot debate among economists and European governments. The results of panel data regression analysis are presented and show that the current capital flight flows and determinants of the troubled P.I.G.S countries are fairly similar to previous capital flight episodes covered in the academic literature. Moreover, the empirical results differ depending on the capital flight estimation technique. Finally, capital flight estimates are shown to be correlated with Target2 liabilities and a significant contributing factor to these net Target2 imbalances.
# Table of Contents

*Executive Summary*  
1

*Table of Contents*  
2

*Table of Figures*  
4

## Introduction  
5

### Part 1: Literature Review

- 1.1 Capital Flight Definitions ................................................................................................................. 9
- 1.2 Consequences of Capital Flight ....................................................................................................... 10
- 1.3 Latin America .......................................................................................................................... 13
- 1.4 Sub-Saharan Africa .................................................................................................................. 18
- 1.5 Central Asia .............................................................................................................................. 20
- 1.6 East Asia ................................................................................................................................... 22
- 1.7 Europe ...................................................................................................................................... 27
- 1.8 Concluding Remarks ................................................................................................................. 28

### Part 2: Empirical Section

**Methodologies**

- 2.1 Methodologies Overview ............................................................................................................. 29
- 2.2 Direct Measure ........................................................................................................................ 32
- 2.3 Indirect Measure ..................................................................................................................... 34
- 2.4 Trade Mis invoicing .................................................................................................................. 37
• 2.5 Capital Flight Estimates Data .................................................................................................. 38

Empirical Analysis

• 2.6 Introduction to Euro Zone Crisis .......................................................................................... 40
• 2.7 Capital Flight Estimates Overview ...................................................................................... 42
• 2.8 Hot Money Estimates ......................................................................................................... 47
• 2.9 World Bank Estimates ........................................................................................................ 49
• 2.10 Determinants .................................................................................................................... 52
• 2.11 The Model ......................................................................................................................... 55
• 2.12 Model Results and Discussion ......................................................................................... 57
• 2.13 Implications and Short Comings ...................................................................................... 63

Part 3: Target2 Net Balances

• 3.1 Background Information .................................................................................................... 64
• 3.2 Target2 Determinants ........................................................................................................ 67
• 3.3 Determinants Results and Discussion ............................................................................... 69
• 3.4 Implications ....................................................................................................................... 72

Conclusion

References

Appendix
Table of Figures

Figure 1: Goods for Processing Imports vs. Foreign Exchange Reserves.................................................................12
Figure 2: Methods of Calculating Capital Flight.........................................................................................................30
Figure 3: Table from Claessens and Naude (1993).......................................................................................................31
Figure 4: Hot Money Method Descriptions................................................................................................................32
Figure 5: Central Government Debt as a % of GDP.................................................................................................42
Figure 6: P.I.G.S. Capital Flight Estimates Graph.......................................................................................................43
Figure 7: P.I.G.S. Capital Flight Estimates Table.......................................................................................................44
Figure 8: Capital Flight Methods Correlation Matrix...............................................................................................46
Figure 9: Hot Money 3 Estimates Graph....................................................................................................................47
Figure 10: Hot Money Averages 2009-2011 Table.......................................................................................................47
Figure 11: World Bank Estimates Graph....................................................................................................................49
Figure 12: World Bank Averages 2009-2011 Table....................................................................................................50
Figure 13: Determinants of Capital Flight................................................................................................................57
Figure 14: Target2 Net Liabilities Graph....................................................................................................................66
Figure 15: Target2 Net Liabilities vs. Capital Flight Graph..........................................................................................68
Figure 16: Determinants of the Target2 Net Liabilities..............................................................................................69
Introduction

A popular quote exists in the capital flight literature from an article in the Wall Street Journal by Stephen Kanitz. He states “Why is it that when an American puts money abroad it is called “foreign investment” and when an Argentinean does the same it is called “capital flight”? Why is it that when an American company puts 30 percent of its equity abroad it is called “strategic diversification” and when a Bolivian businessman puts only 4 percent abroad it is called “lack of confidence?”¹ This quote embodies the essence of this paper and the previous capital flight literature. I will attempt to show that “timing” is missing from the quote above. Every individual is free to diversify his/her assets in order to achieve the risk profile that he/she desires. However, the timing and magnitude of the diversifications can not be ignored.

The Greek unemployment rate for August 2012 hit a record high of 25.4% (Thompson 2012). Nearly 6 out of every 10 workers under the age of 24 are looking for work (Ibid.). The Greek economy has been in recession for four years following the onset of the financial crisis in the United States that began in 2008. The unemployment rate for other troubled Euro zone countries, dubbed P.I.G.S², is comparable if not more severe. Spain in the fourth quarter of 2012 reported an unemployment rate of 26.02% ("Spain's unemployment rate reaches record high" 2013). As unemployment and GDP (gross domestic product) figures receive the most attention in the news media, it is understandable that citizens of the troubled euro zone economies are frightened. The Boston Consulting Group (BCG) May 2012 report entitled

¹ Stephen Charles Kanitz in Wall Street Journal, September 21st, 1984 p.45
² Portugal, Italy, Greece, and Spain
“Tracking Consumers through Europe’s Debt Crisis”, states “more than 60 percent of the respondents in Greece believe that the economy won’t improve in the next several years, and about 80 percent believe it will get even worse in the next 6 to 12 months (Bascle et al. 2012).”

Ms. Katri, a Greek citizen, stated: They’ve [The Greek government] made us afraid to imagine the future (Walker et al. 2012).” Portugal, Greece, and Spain have all received emergency funding from an emergency fund created by the 17 nations of the Euro Zone (“Cyprus becomes fifth eurozone country to apply for Brussels bailout as banking sector is hit by exposure to Greece” 2012). As a condition for this funding from either the EU or IMF, the governments of these nations must agree to specific austerity measures. These austerity measures include tax increases coupled with decreases in government spending. After all, this financial crisis in Europe has been named the euro zone debt crisis. Greece for example has a projected budget deficit of 190% of GDP next year (Thompson 2012). The resulting financial decisions made by the citizens of P.I.G.S. to protect their financial assets are the main focus of this paper.

Capital flight in this paper is defined as “short-term speculative capital exports by the private non-bank sector”\(^3\) (Cuddington 1987). While definitions of capital flight may differ, there is a consensus that capital flight revolves around external claims acquired by residents of a particular country. The motivations of these acquisitions are up for debate as well. However, like the definition, I will start with the general consensus that acquisition of external claims, or capital exports, arises from some perceived risk, economic or political, that may reduce the real value of a resident’s asset.

\(^3\) Commercial banks may also engage in capital exports (Cuddington 1987). Commercial banks are included in the capital flight estimates presented in this paper.
The international debt crisis of the late 1970’s and 1980’s increased the attention of capital flight and the effects on the domestic economy. For example, Mexico averaged capital flight estimates of 3.1% of GDP per year from 1976-1991 (Le et al. 2006). The highest estimate was 8.7% of GDP in 1983 (Ibid.) Economic models and reasoning thus far tell us that capital should move from developed to developing countries due to a higher marginal product of capital, i.e. interest rate. Therefore, when capital moves against our economic reasoning, the issue must be examined.

The following sections of this paper will be structured in the following way. The review of the literature will describe the consequences of capital flight and previous capital flight episodes around the globe. The empirical analysis will be split into a methodological and empirical section. The methodological section will describe the different calculation methods of capital flight and the advantages and disadvantages of each method. A brief introduction to the euro zone crisis along with capital flight estimates and possible determinants for capital flight will be discussed and examined in the empirical section. Additionally, the net Target2 balances will be introduced and examined in order to determine the causes of the imbalances within the euro zone. The net Target2 imbalances are thought to be the result of capital flight.

Part 1: Literature Review

Much of the previous studies on capital flight have focused on developing countries, and for good reason. Capital flight is a problem for any country, however, financing
may be difficult for developing countries and capital that is used abroad and not domestically can present problems. A low endowment of capital and underdeveloped financial markets allows capital inflows to be extremely effective (Dasgupta et al. 2001). However, these inflows leave the developing economy susceptible to a high level of risk. Volatile capital inflows are often cited as contributing factor in balance of payment crises (Ibid). I contribute to the capital flight literature by providing an analysis on developed, OECD, countries that are part of a common currency union. Flight capital might flow to stronger countries within the currency union due to lower transactions costs and closer proximity. In fact, this is occurring in the Euro Zone via the Target2 system. Target2 imbalances are new in the academic literature and as a consequence, capital flight estimation techniques have not been used in the analysis of these imbalances. There exists a gap in the literature.

The following literature review will focus on the definitions of capital flight, the effects of capital flight, capital flight episodes in various geographic locations, and the determinants that affected capital flight. The causes leading up the individual capital flight episodes will be briefly discussed as a full discussion of the individual debt and currency crises would be papers in themselves. More importantly, the determinants will be discussed extensively as they may provide guidelines for mitigations of flight capital. It should be noted that capital flight theoretical models are not within the scope of this paper and are therefore not included in the literature review.4

4 For capital flight theoretical models see Khan and Haque (1985) and Collier et al. (2001)
1.1 Definitions

There are many definitions of capital flight provided in the literature. There has yet to be a consensus on the precise definition of capital flight. Pastor (1990) associates capital flight with wealthy citizens investing abroad by acquiring enormous stocks of foreign assets. This is one of the broader definitions of capital flight. However, Pastor defends this broad definition over more narrow definitions by the notion that capital should be flowing to capital scarce countries and not to more developed countries. This is consistent with economic theory. According to the Solow Model of economic growth, countries with lower stocks of capital grow at faster rates than countries with large stocks of capital as marginal returns of capital are higher in low capital stock countries. Nevertheless, by Pastor’s definition this includes normal portfolio outflows as individuals are consistently evaluating risks and returns.

Schneider (2003) uses a more narrow definition; he states capital flight as “outflows of resident capital which is motivated by economic and political uncertainty” (Schneider 2003). This definition is generally accepted. It would be more appropriate if the term “abnormal” was included as political and economic risks are always present. Ketkar and Ketkar define capital flight as hot money outflows and as a result use the hot money method which will be discussed later (Ketkar et al. 1989). Consequently, capital flight is viewed as short term volatile portfolio investments and unrecorded transactions. Dooley (1986) attempts to address this issue and defines capital flight as “the stock of claims on non-residents that do not generate investment income in the creditor country’s balance of payments data” (Dooley 1986). The benefit of this

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5 Hot Money method includes Net errors and omissions which is associated with unrecorded financial flows.
definition is the specificity. However, using this definition, all capital flight is considered illegal as the income is not reported to tax authorities.

I make the case the best definition of capital flight is given by Cuddington (1987) and defined as “short-term speculative capital exports by the private non-bank sector.” That is, domestic residents acquire assets outside the realm of the domestic economy and thus attempt to mitigate certain economic risks that may arise. After all, in today’s capital markets, investors are able to react quickly to economic and political risks. Moreover, since the timing of acquisitions of external claims is imperative, the definition must capture the short term/volatile nature that flight capital often exhibits.

1.2 Consequences

There is ample literature focused on capital flight due to the negative effects on the domestic economy. Capital flight arises from economic or political uncertainty. If that uncertainty is due to a debt crisis, as present in this paper, then servicing the foreign debt is imperative. Capital flight decreases the effectiveness of a government to raise revenue from taxes. External claims are more difficult to tax than domestic claims. Wealthy individuals, usually associated with capital flight, have the means to protect external claims from taxation through lobbying legislation or financial expertise (Pastor 1990). If capital is unreported to the tax authorities then taxation on that capital is forgone, save the tax authorities become aware of the foreign capital. The government may decide to increase enforcement of tax evasion,
however this decreases the net revenue raised from the taxes. Moreover, loss revenue from taxation makes public financial budgeting extremely difficult as actual tax revenue is less than expected tax revenue.

Short term outflows of capital that are abrupt hurt the domestic economy in many ways. The capital that was once invested in the domestic economy is now invested abroad. Investment income may be reinvested abroad or repatriated. Decreased domestic investment creates a domino effect as it decreases domestic output, wages, and employment. These consequences further decrease the domestic tax base and thus the government deficit. A larger government deficit coupled with decreased economic growth would further exacerbate capital flight. Following Mexico’s capital flight episode in 1983, per capita GDP fell by 5.8% (Le et al. 2006). A lesser known growth consequence of capital flight is decreased imports. As Pastor (1990) points out that if foreign exchange is used to finance capital flight, then that foreign exchange cannot be used to finance imports that may lead to growth.
Figure 1, above, depicts goods for processing imports versus the foreign exchange position of the Greek central bank. It is evident that on the onset of the financial crisis in 2008, the foreign exchange account has decreased quite drastically. Foreign exchange can be used to repay foreign debt. Typically, when goods are purchased from another country, the purchaser must pay the holder of the goods in the holder’s domestic currency. The purpose of this is to limit the holder of the goods to exchange rate risk. If foreign exchange is more difficult to get, then this may limit the ability to import goods. Goods for processing are goods that are not completed and thus require further work. These are typical of manufactured goods. The level of
goods for processing imports decreases over the same time period as that of the foreign exchange account.

Capital flight and income inequality have been linked extensively together. In order for individuals to move their capital abroad there must be savings. Savings in this case will be defined as all income after expenses and taxes. Therefore, many individuals, due to a lack of savings, will be unable to move assets abroad. It is well documented for Latin America that capital flight negatively hurts the distribution of income (Pastor 1990). While the short run effects of large income inequality have been shown to positively influence economic growth, the long run effects are to the contrary (Forbes).

1.3 Latin America

Latin America has received the most attention in regards to capital flight. According to Manuel Pastor, Jr., “From 1973 to 1987, capital flight from Latin America added up to $151 billion, or about 43 percent of the total external debt acquired during those same years” (Pastor 1990). Total external debt is debt owed to non-residents of that country (“External Debt Stocks, Total”). Capital flight figures are often shown as a ratio of external debt to show how repatriated capital could aid in decreasing the external debt.

Several economies in Latin America have experienced debt crises since the 1980s. Dooley (1987) calculates capital flight figures for six countries\(^6\) in South America and the Philippines from 1977-1984. Dooley aggregated the data and found the ratio of capital flight to

\(^6\) Argentina, Brazil, Chile, Mexico, Peru, Venezuela
external debt was roughly 33% over the eight year period (Dooley 1986). He estimated an equation using OLS (ordinary least squares) with capital flight as the dependent variable and domestic inflation, financial repression, and risk premium on external debt as the independent variables. Endogeneity was corrected by the use of instrumental variables. 7 Dooley defines financial repression as the interest charged on a US$ denominated short term assets versus a domestic short term time deposits denominated in the host country’s currency corrected for exchange rate fluctuations(Ibid.) This may also be interpreted as covered interest. A positive value indicates a lower interest rate in the domestic economy versus the United States. Low interest rate environments make domestic residents susceptible to the inflation tax.

Domestic inflation can be considered a tax by the host government. Unanticipated inflation provides financial relief for the government on financial assets such as host currency denominated government debt. Domestic inflation and financial repression had positive coefficients and were statistically significant at the 1% level. 8 The risk premium on external debt was not statistically significant. A positive coefficient is consistent with economic logic and goes back to the previous discussion as a “tax”. The positive coefficient on financial repression may be interpreted in two ways. The lower interest rates present in the pooled studied countries relative to the United States could signify portfolio choice decisions or inflation tax. An investor would prefer to invest in higher yielding assets.

Mexico, for example, in 1982 suspended interest payments on debt and thus relinquished faith in international capital markets (Wijnbergen et al. 1991). A combination of

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7 For Instrumental Variables see Dooley (1987)
8 For detailed results, see Dooley 1987 Capital Flight: A Response to Differences in Financial Risks
rising interest rates in developed economies and deteriorating balance of payments led to the default. The central bank was thus forced to print money and inflation reached 159% in 1987 (Ibid.). The inflation tax coupled with the high external debt led to large capital flight. Pastor (1990) calculates capital flight of Mexico to be near 61 billion US$ from 1973-1987. Mexico was just one of the eight countries included in Pastor’s paper. Using pooled data for the eight Latin American economies, he finds that the change in inflation rate, financial incentive, and currency overvaluation are all significant at the <5% level when these are the only three regressors included (Ibid). Pastor calculates financial incentive in the same manner as Dooley (1986) calculates financial repression. Take note of the two worlds used to describe the same covered interest between the host country and the United States. Dooley sees a low interest rate environment as a form of repression that may be used as an inflation tax on domestic assets. Pastor describes inflation as a portfolio decision to maximize returns.

The financial incentive and change in domestic inflation had positive coefficients and were statistically significant. The coefficients however are much smaller than that of Dooley. Financial incentive was calculated using the method employed by Dooley. Degree of overvaluation was calculated by comparing the real exchange rate to an “equilibrium value”. The equilibrium value was chosen rather arbitrarily but was rational justified as the currency and world markets were rather stable in the year chosen (Pastor 1990). The use of an “equilibrium” exchange rate has also been used by other authors including Ketkar and Ketkar (1989). The coefficient is positive as consistent with economic logic; however, the coefficient is rather small. The degree of overvaluation is statistically significant at the 5% level. Capital
availability was developed as an indicator for loan pushing and loan guarantees that may have existed in Latin America but is not applicable for this paper. For more information see Pastor (1990).

The variable country growth rate relative to the US was included to represent quality of investments. If the economy is growing then investments should be higher yielding than investments in a slowing economy. The coefficient is negative, as expected, and statistically significant at the 5% level. An increase in the host country’s GDP relative to the US should decrease flight capital. Increase for taxes as a percent of GDP was not statistically significant at that 5% level. This is surprising as, an increase in taxes would encourage capital flight. The coefficient reported was positive. The last variable reported in this table is a dummy variable for the presence of capital controls. The coefficient had a negative sign. An argument could be made for the sign of the coefficient. The presence of capital controls increases the difficulty of capital flight and thus would reduce the degree of capital flight. However, the presence of capital controls may signal to domestic residents that economic problems are at hand and would provide incentive to keep capital outside the area of domestic authorities. Capital controls was statistically significant at the 5% level.

Ketkar and Ketkar (1989) looked at capital flight in Argentina, Mexico, and Brazil from 1977-1986. They modeled capital flight using “push” and “pull” factors. Push factors are those from the debtor countries that tend to push capital out from the domestic economy (Ketkar et al. 1989). These may include domestic inflation rates, interest rates, currency overvaluation, and others that have been discussed in the aforementioned papers. The pull factors are factors
that are present in the United States and thus pull capital to the United States and away from
the debtor country (Ibid). United States domestic inflation and interest rates are a couple
examples of the pull factors. Using domestic and international (U.S.) interest rates is similar to
both Pastor (1990) and Dooley (1986).

Ketkar and Ketkar estimated the maximum capital flight from Mexico from 1977 to 1986
to be 29.3 billion U.S. dollars.\(^9\) As expected, capital flight flows peaked after the 1982 debt
crisis. On the other hand, Brazil’s capital flight was found to occur more prominently in the later
years of the sample. This is logical, as a series of monetary reforms were enacted to quell the
high inflation rates in economy. From 1981 to 1994, Brazil experienced inflation rates above
that of 100% except for 1986 (Dasgupta et al. 2001). Push factors were statistically significant in
explaining capital flight in Brazil and Argentina. However, push and pull factors were found to
be statistically significant in explaining flight capital from Mexico during this time period (Ibid).
The proximity to the United States and a more interconnected economy through trading
partners aid in explaining these results.

Cuddington (1987) calculated capital flight estimates for Argentina, Brazil, Chile, Korea,
Mexico, Peru, Uruguay, and Venezuela from 1974 – 1982. Using a standard portfolio model,
Cuddington proposed capital flight is influenced by currency overvaluation, interest rates, and
inflation. Argentina during the sample period suffered capital flight due to currency
overvaluation (Cuddington 1987). Thus, domestic residents acquired foreign assets
denominated in a non-domestic currency to hedge a currency downside correction. In addition

\(^9\) Compare capital flight estimates from Pastor (1990) for a similar time span in Mexico.
Mexico was also a victim to currency overvaluation. Venezuela, on the other hand, was affected by both currency overvaluation and high domestic inflation. Overall, Cuddington finds currency overvaluation as the greatest factor in prompting acquisitions of external claims (Ibid.)

1.4 Sub-Saharan Africa

Sub-Saharan Africa is less often recognized than Latin America and East Asia in the academic literature for its capital flight episodes. Nevertheless, capital flight is as significant, if not more, as other geographical regions around the world. Sub-Saharan Africa (SSA for short) is home to some of the poorest countries in the world. Corruption along with domestic conflicts has long plagued this region.

Ndikumana and Boyce (2002) use the term “revolving door” to explain the increases in external debt coupled with the increasing external claims in SSA (Ndikumana et al. 2002). Corrupt government figures or corporations (through government-backed debt) use a host country’s external borrowing to finance personal and corporate external claims (ibid). From 1970-1996 Boyce and Ndikumana (2002) estimate the stock of capital flight to be 247 billion U.S dollars. That is equivalent to 145% of total debt of the included countries. Therefore, the 30 sample countries were a net creditor to the rest of the world! However, “the difference is that while the assets are in private hands, the liabilities are the public debts of African governments” (Ndikumana et al. 2002). The magnitudes of the capital flight estimates are astounding. The citizens of those nations must use scarce capital to finance the debt instead of more productive
areas of the economy such as education and infrastructure. For example, debt service was 3.8% of GDP while health care amounted to just 2.4% (Ibid.)

Jimoh (1991) focuses solely on Nigeria in particular and finds that in 1990, 31.7% of the foreign exchange earnings were budgeted for servicing the external debt (Jimoh 1991). This foreign exchange could be used for more productive uses such as goods for processing imports that expand the export sector. Jimoh (1991) includes exchange rate overvaluation, interest rate differential, domestic and external inflation. A variation to the exchange rate overvaluation is made that differs from Ketkar and Ketkar (1989) and Pastor (1990). Jimoh uses the trend value of exchange rate over the same period. In addition, the level of primitive capital accumulation is included. This variable is used to proxy criminal convictions of fraud, smuggling, and currency offenses (Ibid). The rationale behind this variable is similar to the Boyce and Ndikumana (2002) article that describes corrupt government and business officials amassing external claims through a country’s external debt. If an individual or corporation amasses wealth illegally, it is logical that a foreign bank or financial entity would provide a more confidential residence for the capital. The expected sign for this variable is positive. That is as the number of criminal convictions relating to monetary crimes increases, so should capital flight.

The results of the study are quite intriguing. From 1960 to 1988 capital flight in Nigeria is estimated at 744 billion U.S. dollars (Jimoh 1991). Moreover, capital flight through trade misinvoicing, reached a high of 4.768 billion U.S. dollars (current dollars) in 1982. Trade misinvoicing is defined as under invoicing exports and over invoicing imports (Claessens and Naude 1993). For example, if a resident wishes to hide a capital transfer abroad, it would be
logical to underinvoice the value of the export. Other findings include that exchange rate overvaluation, interest rate differential, inflation rate differential, primitive capital accumulation, and a dummy variable for a structural reform are statistically significant at least at the 5% level (Ibid). The signs are the coefficients are as expected. Jimoh (1991) concludes that “monetary authorities should put their watchful eyes on exchange rate over-valuation, domestic inflation and primitive capital accumulation since these are the only factors that are within their control.”

1.5 Central Asia

Many new countries and colonies were formed after the dissolution of the Soviet Union in the early 1990’s. These economies became known as transitional economies. Russia, the largest economy of the group, had a crawling peg currency policy. A significant drop in oil prices (main export) in the 1997-1998 and an overvalued currency led to a current account deficit and a drop in the foreign exchange reserves (Dasgupta et al. 2001). Confidence in Russia to maintain the crawling peg was at question. In less than a week the Ruble, the Russian currency, lost over 60% of its value (Ibid.).

Brada et al (2011) estimate capital flight for Russia and 6 other countries from the Commonwealth of Independent States from 1995-2005. These six states include Armenia, Azerbaijan, Belarus, Kazakhstan, Moldova, and Ukraine. Russia has estimated capital flight flows of 8.6 to 67.8 billion U.S. dollars (Brada et al. 2011). In 1998, capital flight was estimated as 25.04% of GDP. In addition, Kazakhstan had capital flight estimates as high 25.9% of GDP (Ibid.).
Azerbaijan, on the other hand, had capital flight estimates much lower and even capital inflows during the same period.  

A model of capital flight to capture economic, political, and the cost of moving money offshore variables were estimated. The usual economic variables such as the real interest rate and exchange rate differentials were included. Moreover, GDP growth, inward foreign direct investments, and current account balance as a percent of GDP were added. The only political variable included was an integer ranging from +10 for most democratic to -10 for most autocratic institutions (Ibid.) Five cost of moving money offshore variables were included. These included a first order autoregressive on the capital flight estimate, exports plus imports as a percent of GDP, an index for trade liberalization and economic liberalization.

Using pooled OLS, Brada et al (2011) concluded that the real interest rate differential is only statistically significant when included with foreign direct investment as a percent of GDP, political dummy variable, and the first order autoregressive term for the capital flight estimate. This result is different from most of the other literature on capital flight as interest rate differential is usually statistically significant at a high confidence level. Brada et al. defend this result as wealthy business men (most often the perpetrators of capital flight) returns on domestic investments are not well captured by the domestic interest rate as returns are higher for the owners of the business (Ibid.) Another interesting result is that the current account balance as a percent of GDP was positive and significant. That is, an increase in the current account balance increases capital flight. The justification given is the foreign exchange earnings

\[10\] Capital inflow denoted by a negative capital flight value
from the exports were recycled as capital flight (Ibid). However, an argument could be made to the contrary.

The ration of FDI/GDP was constantly significant throughout the estimates. This is in line with previous academic literature using the argument that a non-resident has a lower level of risk associated with a domestic investment than a resident. Thus, the resident sells the investments to the non-residents and moves the capital abroad. This argument is mostly seen in capital flight literature concerning Latin America and publicly guaranteed debt.

The variables that were used to proxy trade and economic liberalization were positive and significant. Therefore, as these economies became more interconnected to world, avenues for capital flight were opened. To say that these liberalization variables caused capital flight may be incorrect. The resident may have already decided to place capital outside the reach of domestic authorities and the liberalizations only provided the capacity to do so.

1.6 East Asia

The East Asian crisis developed in Thailand in July of 1997 and then spread to neighboring Malaysia and Indonesia (Dasgupta et al. 2001). In the 1990’s Thailand began economic liberalizations and reduced capital controls. The bank of Thailand maintained a fixed exchange rate with the U.S. dollar (Ibid.) Therefore, confidence in Thailand was ample and capital inflows were substantial. As the money poured in, the Baht, domestic currency, appreciated. However, in order to maintain the fixed exchange rate with the dollar, Thailand had to use its’ foreign exchange reserves to defend the currency from speculative attacks. The
foreign reserves of Thailand fell from U.S. 40 billion in July of 1997 to well under U.S. 30 billion six months later (Ibid.) A floating exchange rate was initiated and confidence in Thailand began to fall. The East Asian crisis was not one built on large external debt and balance of payment issues, however, one due to economic liberalizations and accumulation of private debt.

Beja Jr. (2006) estimates the magnitude of capital flight from Indonesia, Malaysia, the Philippines, and Thailand from 1970 to the early 2000’s. Using a “revolving door approach”, capital flight is estimated using two stage least squares regression.\footnote{Similar to Ndikumana and Boyce (2002)} That is, the simultaneity problem between capital flight and external borrowing is addressed (Beja Jr. 2006). In a newly liberated financial market and/or a domestic high interest rate environment, residents may borrow abroad. Other independent variables in the model include lagged GDP growth, current account balance, and dummy variables for deregulation or financial liberalization. External borrowing represents the fuel, or motive, for capital flight and vice versa. In turn, the stock of external debt increases and with the loss of capital due to capital flight, more external borrowing is needed to fill the hole. The increase in the stock of external debt is an economic risk that residents may wish to avoid.

The results of the model are broken down by country. In Indonesia, every dollar of external borrowing resulted in 94 cents of capital flight (Ibid.) Moreover, the increase in the stock of external debt led to a 3 cent increase in capital flight. Those combine to an almost one to one relationship. Results show debt-fueled and debt-drive capital flight. Variables representing GDP growth, increases in international reserves, and interest rate differentials

\footnote{Similar to Ndikumana and Boyce (2002)}
were statistically significant and took the expected signs. In the second stage of the regression, it is shown that for every dollar of capital flight 56 cents was borrowed externally. Capital flight fueled borrowing. Beja Jr. defends these conflicting results “as evidence of capital flows dynamics in the context of the open capital accounts...” (Ibid).

Malaysia was found to have had “debt-fuelled” capital flight but not “debt-driven” (Ibid). Out of every dollar of external borrowing, 55 cents turned into capital flight. Beja Jr. notes this low coefficient in comparison to the others due to Malaysia’s low level of external debt to GDP. Interestingly, GDP growth was insignificant and the lagged current account balance was statistically significant and positively correlated with capital flight. A possible explanation given for this result was trade misinvoicing. As exports grow in relation to imports, the opportunities and scale of trade misinvoicing increase. The Interest rate differential variable was not significant.

Unlike Malaysia, Thailand had “debt-fuelled” and “debt-driven” capital flight. However, the “debt-driven” variable is statistically weak (Ibid). Of every one dollar of external borrowing, 12 cents became flight capital. The GDP growth and international reserves variable were significant and negative. Interest rate differential alone was not significant; however, paired with and financial liberalization interaction term, the variable was significant and positive (Ibid.). Thus, indicating, the financial liberalization lead to higher domestic interest rates and therefore increased external borrowing.

Varmin and Schneider (1990) examine capital flight in the India and the Philippines from 1976 to 1985. Rent-seeking and corruption are hypothesized as the motives for capital flight
(Varmin-Schneider et al. 1990). Their model consists of a single dummy variable for political risks that is utilized for the years in which abnormal political risks were present and external trade. For example, in 1976-1977 a state of emergency was declared. External trade, exports plus imports, is often used as a proxy for trade mis invoicing. The model was estimated using only 10 annual observations. The results were as expected. In the presents of abnormal political risks, capital flight was positively correlated (Ibid). In addition, external trade and capital flight were positively correlated. Varmin and Schneider conclude that capital flight in India ranged from a maximum of $2.4 billion to a minimum of $1.2 billion per year (Ibid.)

The situation in the Philippines was different than that of India. They hypothesize that capital flight from Philippines was a result of crony capitalism and interventionist policies into financial markets (Varmin et al. 1990). Once again, dummy variables are utilized in order to capture the determinants of capital flight in addition to the external trade variable. The dummy variables include martial law (political), balance of payment crisis (economic), and turmoil (economic and political). For instance, in 1983 a senator was assassinated. Thus, a value of 1 is given for this year. This is a major assumption. That is, a single event or many events may record a 1 year period of turmoil. Varmin and Schneider determine capital flight as a result of the martial law period resulted in $525.79 million dollars per year. The dummy variable representing the balance of payment crisis was negative and significant. As foreign lending to the Philippines dried up, the level of capital flight decreased. This result confirms Vermin et al. hypothesis that capital flight was fueled by external debt (Varmin et al. 1990). During the early
1980’s, economic and political turmoil induced capital flight. External trade was positive and significant, indicating as trade increases so does capital flight.

Cheung and Qian (2010) look explicitly at China’s experience with capital flight. In 1978, China instituted reforms to open its’ economy to the world. Residential capital that may have previously desired to flee now gained avenues abroad. Calculated capital flight estimates reveal that capital flight was relatively mild until the 1990’s. After the financial crisis in late 2007 and early 2008, capital flight estimates began to increase and reached as high as $100 billion in 2008 (Cheung and Qian 2010). Cheung and Qian note from their estimates that capital flight could easily out value foreign direct investment flows into China (Ibid.). To estimate the determinants of capital flight, the authors use a basic OLS regression including covered interest returns, GDP growth rate, inflation rate relative to the U.S., and trade openness. This variable is used to proxy trade mis invoicing. Interestingly enough, trade openness was the only statistically significant variable present. The coefficient was positive as expected.

Cheung and Qian (2010) shed light on the possible problem of using quarterly versus annual data, as annual is most often reported in the balance of payments. The authors note that as capital flight or capital inflows may adjust quickly to an economic or political stimulus, the higher frequency data may more accurately capture the response of capital flight. Monthly data was transformed from quarterly data using the method by Chow and Lin (1971). The covered interest rate differential variable is found to be significant at the first lag in comparison with the three quarters lag (Ibid). However, other differences in coefficients and lag structures were negligible.
1.7 Europe

In a déjà vu moment, Gibson and Tsakalotos (1993) look at capital flight episodes from five European countries from the mid 1970’s to late 1980’s. Four out of the five countries included in this study are now the present P.I.G.S. countries (the other being France). Portugal, Greece, and Spain were included as worries existed that these countries would have difficulty integrating into the European integration. These fears were realized some 15 year later.

The capital flight estimates from the five countries studied revealed that the capital flight episodes in this geographic area have been brief in nature. Gibson and Tsakalotos note that all countries in this study had capital controls. Capital controls liberalization did not begin until 1986 and 1987 (Gibson et al. 1993). Thus, these capital flight estimates may be suppressed, in that capital flight avenues were tightly restricted.

Capital flight is modeled after portfolio theory. The determinants of capital flight include covered interest rates, political dummy (risk), domestic interest rates, exchange rate proxy (similar to overvaluation used in previous literature\(^\text{12}\)), and government budget surplus. The expected sign of the government budget surplus is negative.

The results were broken down on an individual basis. France, for example, the government surplus, the forward premium, politics dummy, and the first order lag or capital flight were all statistically significant and took the expected sign (Ibid). Spain yielded similar results. The determinants previously discussed were able to explain about 60% of the flight

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\(^{12}\) Overvaluation in previous studies used an “arbitrary” base year based on the belief that currency markets were fairly calm during that year. Gibson and Tsakalotos (1993) use the forward premium of the individual currencies. Thus an expected drop in the forward premium and therefore spot rate would tend to motivate capital flight.
capital during the sample period (Ibid.). On the other hand, these determinants were only able to explain 35% of flight capital from Portugal.

1.8 Concluding Remarks

From the overwhelming amount of evidence and empirical analysis undertaken, capital flight episodes due exist and have happened all around world. Most of the countries discussed above are classified as developing countries and thus exhibit somewhat similar results. Of course, empirical methods vary by author and differences in financial situations allowed for different empirical findings. Currency overvaluation, covered interest, and inflation were statistically significant and took the expected signs in a majority of the studies. These are three of the most common variables used in regression analysis to explain capital flight movements. It should be noted that many of the variables are calculated by taking the difference from the host country and the United States. Flight capital not only goes to the U.S. but other safe havens as well. Moreover, country specific circumstances for the U.S. could occur that may decrease the difference, in absolute value, between the host country and the U.S. In this case, the results may suggest that interest rate or other economic differentials with the U.S. are not significant but does not indicate that covered differentials overall are not a contributing factor in explaining capital flight.
Part 2: Empirical Approach

A panel data analysis of Portugal, Italy, Greece, and Spain (P.I.G.S) from 2002 to 2011 is undertaken and provided below in the empirical section. However, before capital flight estimates and determinants can be revealed, the methodologies for calculating capital flight must be examined. The previous literature review did not specify the capital flight calculation method used in order to minimize confusion. Therefore, different capital flight estimates for the same countries over the same time span are possible and evident in the academic literature.

2.1 Methodologies Overview

It follows that from the variety of definitions of capital flight presented in the literature that there exist several methods for calculating capital flight. Measuring capital flight is like holding sand in your hand, some particles of sand always fall through the cracks.

Using one method over another can change the capital flight estimates quite drastically. A previous study found that using different definitions resulted in a disparity by a factor of two (Eggersted et al. 1993). An estimate by one calculation method was half of the estimate of another calculation method. After a description of the estimation methods, one should have a better understanding of the differences in estimations. Therefore, it is common to present the results from the most common capital flight calculation methods.
Figure 2 visual depicts the different methods of calculating capital flight. The difficulty in calculating capital flight is finding the avenues. Asset classes on the far left show the avenues that outward capital can take. This includes some flight capital but more importantly normal outflows. These normal outflows are not intended to be included in flight capital. The broadest

**Figure 2: Methods of Calculating Capital Flight**

Source: Staff Studies World Economic Outlook August 1987
measure, known as the residual or World Bank Method, is developed from the balance of payments identities. The private claims measure takes a more narrow approach to measurement of capital flight. This measures the external claims of the private sector. Finally, the narrow approach uses the errors and omissions category and the short-term non-bank outflows. The beauty of this chart is the simplicity in showing the approaches and the development of measurement of capital flight.

The following is from Claessens and Naude (1993) at the World Bank and will be used to depict capital flight estimation techniques:

**Figure 3: Table for Claessens and Naude (1993)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Current Account</td>
</tr>
<tr>
<td>B.</td>
<td>Net Equity Flows, which consists of both Net Foreign Investment and Portfolio Investments (corporate equities)</td>
</tr>
<tr>
<td>C.</td>
<td>Other Short Term Capital</td>
</tr>
<tr>
<td>D.</td>
<td>Portfolio Investments, Other Bonds</td>
</tr>
<tr>
<td>E.</td>
<td>Change in deposit money banks’ foreign assets</td>
</tr>
<tr>
<td>F.</td>
<td>Official reserves</td>
</tr>
<tr>
<td>G.</td>
<td>Net Errors and Omissions</td>
</tr>
<tr>
<td>H.</td>
<td>Net official external borrowing</td>
</tr>
<tr>
<td>H’</td>
<td>Change in external debt from World Bank Tables</td>
</tr>
</tbody>
</table>
2.2 Direct Measure

The hot money method is meant to show capital that reacts quickly to short term risks. There has been a number of Hot Money variations put forth. Loungani and Mauro (2000), from the IMF, provide updated calculation method based on the fifth edition of the balance of payments\(^{13}\). Three variations of the hot money method are presented. The three variations use the net errors and omissions line as the foundation for the estimate. Each method is a function of the previous method estimate. For instance, Hot Money 2 is a function of Hot Money 1 estimate plus “net flows of non-FDI, non-portfolio investment assets and liabilities held by banks” (Baek et al. 2008). Hot Money 3 (broadest of all hot money estimates) is Hot Money 2 plus net flows of debt securities in the portfolio section of the financial account in the balance of payments.

<table>
<thead>
<tr>
<th>Hot Money 1</th>
<th>Hot Money 2</th>
<th>Hot Money 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Errors and Omissions plus net flows of non-FDI and non-portfolio investment of entities other than the monetary authorities, general government, and banks</td>
<td>Hot money 1 plus net flows of non-FDI and non-portfolio investments held by banks.</td>
<td>Hot Money 2 plus portfolio investment in the form of debt securities.</td>
</tr>
</tbody>
</table>

Source: (Loungani et al. 2000)

\(^{13}\) For precise calculation see Baek and Yang (2008)
Another name for this method is the Cuddington (1986) approach. Gibson and Tsakalotos in their 1993 paper state “[Cuddington Method] eliminates the medium/long-term “normal” capital flows” (Gibson et al. 1993). The basic Hot Money 1 method calculation is as follows:

\[- (G + C)\]

The estimate is multiplied by a negative in order to show capital flight as a positive estimate. This is due to the accounting methods of the BOP (Balance of Payments). A negative net errors and omissions is a sign of unrecorded capital outflows (capital flight). In addition, a debit (negative) is in the financial account of the BOP is an increase in foreign assets. Therefore, the negative of the sum of net errors and omissions plus other short term capital is considered capital flight.

This method, like all capital flight methods, is not without criticism. First, in most developed capital markets, the secondary market for securities is seen as a close substitute for short term securities (Kant 1996). Thus, some flight capital may go unrecorded. Moreover, the use of net errors and omissions is not without condemnation. Net errors and omissions do contain unrecorded or concealed capital outflows, but also includes measurement error and registration delays (Ibid).
2.3 Indirect Measures

The World Bank Method (WBM) is known as the broad measure or the residual measure. WBM “measures the residual of the sources of funds over the uses of funds” (Claessens et al. 1993). Sources of funds include foreign direct investment and change in external debt (foreign borrowing). Uses of funds include imports and additions to reserves. The method is derived from the identity (eq. 1). Variables correspond to table 1 above.

\[
\text{Equation 1: } A + B + C + D + E + F + G + H' = 0
\]

\[
\text{Equation 2: } C + D + E + G = - (A + B + F + H')
\]

Capital Flight = C + D + E + G

\[
\text{Equation 3: Capital Flight = - (A + B + F + H')}
\]

Equation 2 says the sum of private capital flows plus net errors and omissions (capital flight plus normal portfolio decisions) is equal to the negative sum of the current account, net equity flows, increases in reserves, and change in external debt (Claessens et al. 1997). Capital flight estimates can be derived from both sides of the equation; however, the right side of the equation is the most common in the academic literature and utilizes data that is deemed the most reliable. The benefit of this method is that all official capital outflows are considered. However, the benefit is also the drawback as all official capital outflows are considered. Normal outflows may be included in this measure. This measure is seen as the maximum amount of
capital flight. Or in other words, forms an upper boundary on the measurement of capital flight ("Staff Studies for the World Economic Outlook" 1987). This method, like the following method, is highly sensitive to the external debt calculation. Large swings in external debt can drastically affect capital flight estimates.

Dooley uses the following method to calculate capital flight. First, calculate the aggregate stock of private and official claims on non-residents from the balance of payments data. Then, add the cumulated net errors and omissions. This new sum is the total external claims derived from the balance of payments data. However, Dooley notes that the balance of payments data on external debt maybe be underestimated significantly. In Dooley’s 1987 paper entitled “Capital Flight: A Response to Differences in Financial Risks”, he notes that “external debt in 1984 [for countries studied] as estimated from balance of payments data was only 60 percent as large as external debt estimated by World Bank data” (Dooley 1987). This is important due to the fact that acquisitions of external claims can be financed by external debt. Thus, the external claims may not have been included in the balance of payments data. Dooley addresses this issue by calculating the unrecorded stock of external claims (Ibid). This is the difference between external debt as given by the World Bank and external debt culminated from the balance of payments. Using the depiction from Claessens and Naude from above, the difference between World Bank calculated external debt and BOP external debt is represented by $H' - H$. Dooley assumes this difference “represent increases in private financial claims on non-residents” (Ibid). The sum of the unrecorded stock of external claims and total external claims as given by balance of payments data is the new total stock of external claims. Next,
divide the capitalized investment income receipts as given in the balance of payments by the weighted average market yields on external claims. Finally, the difference between this aforementioned calculated value and the new total stock of external claims is recognized as aggregate capital flight.

If an individual reports income on his/her investment abroad this is not considered capital flight according to Dooley. This method is sensitive to the accuracy of stock of external claims and to the extent that the funds are outside the reach of domestic authorities is more country specific (Schneider 2003). The stock of external claims cumulated from the balance of payments is superfluous as the stock of external assets is given the international investment position (IIP). World Bank debt data for developed countries is not available and instead is cumulated from the liabilities in the international investment position. Therefore, the assumption that World Bank debt is more accurate compared to the IMF data is now void.

The weighted average market yield discussed previously is difficult to calculate to say the least in the newer editions of the balance of payments. The fifth edition of the balance of payments had acknowledged difficulties compiling the maturities of the securities and thus no longer included this information (Kar et al 2008). In addition, the asset yield mix is no longer presented in the newer editions and thus a new weighted average market yield is needed. The weighted average market yield is crucial to the Dooley estimate as it is used to calculate the stock of external claims derived from investment income receipts. As a solution to this problem, I attempt to use the U.S. ten year Treasury note as the market yield. This yield is often

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14 Foreign Direct Investment is subtracted while net errors and omissions are added.
considered a global benchmark. A lower weighed average market yield than the “true” value results in biased upward capital flight estimates. A higher weighted average market yield than the “true” value results in estimates that are biased downward. The results are presented in the empirical section below.

I make the case the best method of calculating capital flight was pioneered by Cuddington (1987) and updated to the newer editions of the balance of payments by Loungani et al. (2000). First, this method allows for the inclusion of unreported financial flows through the net errors and omissions line. The acquisition of equities as a portfolio decision is excluded. Secondly, this method does not rely on the external debt figures cumulated from either the International Investment Position presented in the balance of payments yearbook or the World Bank debt tables. The capital flight estimates are derived solely from the Balance of Payments data. Moreover, asset acquisitions included in the Hot Money method are considered short term investments and as a result reflect short term risks.

2.4 Trade Misinvoicing

Trade misinvoicing is often added as a supplement to the previously mention capital flight estimate techniques. This supplemental measure is not calculated through the balance of payment statistics but instead through direction of trade (DOT) statistics provided by the IMF. Trade misinvoicing can occur in two ways. Exports are underinvoiced and imports are overinvoiced. For example, an individual may export assets abroad and report a lower value for
the sale. The remaining money is used to acquire an external claim without notifying the domestic authorities. Trade misinvoicing was not included in the capital flight estimates in this paper.\textsuperscript{15} A trade openness variable is included in the empirical section to proxy the existence and magnitude of trade misinvoicing.

\textbf{2.5 Capital Flight Estimates Data}

Capital flight estimates are based off the balance of payments data released by the IMF (International Monetary Fund). The sixth edition is the newest version released by the IMF in 2008. This was an update to the previous fifth version that was released in 1993. The pioneer literature on capital flight and as a consequence the calculating methods were based on the fourth edition of balance of payments that was retired in 1993. The changes to the balance of payments were a result of many changes to global financial system and accounting improvements. Changes include the increased use of financial derivates and the overall exponential growth in the volume of financial markets transactions ("Balance of Payments Textbook" 1996).

The World Bank International Debt Statistics do not provide data on the developed countries used in this study. Moreover, countries in the OEDC are omitted. The data for gross external debt (World Bank Method) was cumulated from the International Investment Position that debuted in the fifth edition of the balance of payments. The Balance of Payments manual

\textsuperscript{15} For further information regarding trade misinvoicing see Claessens et al. (1997).
fifth edition states “[R]ather, it is more relevant to view only the nonequity components of the position as debt (i.e. all recorded liabilities other than equity securities and direct investment equity capital, included reinvested earnings). Such a view is in general concordance with the core definition of gross external debt in the joint study External Debt...by the IMF, World Bank, OECD, and Bank for International Settlements” ("Balance of Payments Textbook" 1996). This method of calculating external debt is new in the academic literature. Previous capital flight literature focused on developing countries where World Bank debt statistics were available. Differences between external debts cumulated through the international investment position versus that of the World Bank were not undertaken are unknown. When developed, OECD, countries are studied, external debt must be cumulated through the IIP.

Target2 balances will be discussed in detail in the following section. The net Target2 balances are usually disclosed on the balance sheet of the respective central bank. However, this is not always the case. The Target2 balances are not listed under identical names nor found in similar locations on the websites of the central banks in the euro zone. This makes data collection extremely difficult. For this reason, The ECB uses an “imperfect proxy” when examining Target2 balances in the euro zone. Using the International Financial Statistics provided by the IMF, the difference between “currency issued” and “currency put in circulation” is subtracted from “net claims on the Eurosysten” ("Monthly Bulletin October 2011" 2011). This method was utilized in this paper.
2.6 Introduction to Euro Zone Crisis

Before the capital flight estimates and model are presented, it would be prudent to give a brief back story on how the Euro zone debt crisis began. The financial crisis that began in the United States in 2008 did not spare the global markets. It was reported on November 30, 2009 by BBC News that the debt of Dubai World (a large property development) would not be guaranteed by Dubai ("Dubai World debt 'not guaranteed' by government" 2009). The Finance Minister of Dubai is quoted as saying “[Creditors ] think Dubai World is part of the Government, which is not correct” (Ibid). Therefore, Dubai as a result of Dubai World lost credibility in the world markets and unofficially led the global investment community to examine sovereign debt.

However, financial differences already existed between the core and peripheral countries of the euro zone created financial stress for the peripheral countries. Peripheral countries, P.I.G.S, have run current account deficits for the better part of the last decade and thus have been net borrowers. One must understand how capital flows within the euro zone to understand possible capital flight avenues. Before the financial crisis, the P.I.G.S. countries were able to finance their current account deficits through capital imports or financial account surpluses. However, after the interbank market dried up during the financial crisis, commercial banks were forced to the lender of last resort, the National Central Bank (Sinn et al. 2012).
Euro zone countries such as Greece, Spain, and Ireland had already been instructed in April 2009 to reduce their budget deficits ("Timeline: The unfolding eurozone crisis" 2012). Until the crisis, international credit markets were willing to lend money to the P.I.G.S. at artificially low rates due to the relative safety of using the euro. However, after governmental default entered the picture, yields on government debt jumped. The yield on a three year Greek government bond jumped by 51% from November 2009 to December 2009 ("Government benchmark bond prices and yields" 2010). Moreover, from November 2009 to November 2010 the yield increased by 434%. In other words, Greece had to offer a higher interest rate to entice investors to hold its’ debt. With higher borrowing cost and economic contraction, budget deficits increase. Thus, the euro zone crisis is born.\footnote{Box 1, in the appendix, contains a timeline detailing key events during the financial crisis through 2011.} \footnote{Box 2, in the appendix, contains graph depicting the current account deficit of the P.I.G.S.} A graph showing the central government debt as a percent of GDP for each of the P.I.G.S. countries is shown below. Greece and Italy have the highest central government debt to GDP out of the P.I.G.S. countries.
2.7 Capital Flight Estimates

Capital flight estimates for Portugal, Italy, Greece, and Spain (P.I.G.S.) were calculated from 1999 – 2011 using three estimation methods\(^\text{18}\). These methods include the World Bank Method, Hot Money method (1-3), and the Dooley Method. The fourth quarter balances of payment statistics for 2012 were not yet released during the writing of this paper. A negative capital flight estimate is indicative of repatriated capital and ultimately a capital inflow into the

\[^{18}\text{Country-specific graphs are available in the appendix in boxes 5-8.}\]
domestic economy. A positive number is indicative of capital flight and the acquisition of external claims.

Figure 6: P.I.G.S. Capital Flight Estimates
From a simple glance Dooley method estimates are not in line with the World Bank and Hot money 3 estimates. While the World Bank and Hot Money methods differ in magnitudes, the directions of the capital flight flows are very similar. Capital flight estimates as a percent of GDP for P.I.G.S. were between 7% and 18% for 2010 and between 14% and 23% for 2011. On average, the capital flight estimates for the Hot Money 3 method are below the World Bank estimates. The differences in the magnitudes lie in the calculation method.

<table>
<thead>
<tr>
<th>Years</th>
<th>HM 3</th>
<th>World Bank</th>
<th>Dooley</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>-8.22%</td>
<td>5.30%</td>
<td>20.80%</td>
</tr>
<tr>
<td>2000</td>
<td>-6.61%</td>
<td>-0.62%</td>
<td>30.72%</td>
</tr>
<tr>
<td>2001</td>
<td>-3.19%</td>
<td>-4.41%</td>
<td>19.19%</td>
</tr>
<tr>
<td>2002</td>
<td>-1.49%</td>
<td>-24.50%</td>
<td>29.58%</td>
</tr>
<tr>
<td>2003</td>
<td>-2.18%</td>
<td>-32.10%</td>
<td>22.70%</td>
</tr>
<tr>
<td>2004</td>
<td>-5.13%</td>
<td>-12.61%</td>
<td>25.00%</td>
</tr>
<tr>
<td>2005</td>
<td>-5.28%</td>
<td>5.72%</td>
<td>16.52%</td>
</tr>
<tr>
<td>2006</td>
<td>-10.41%</td>
<td>-20.18%</td>
<td>20.25%</td>
</tr>
<tr>
<td>2007</td>
<td>-9.26%</td>
<td>-19.92%</td>
<td>11.16%</td>
</tr>
<tr>
<td>2008</td>
<td>-1.93%</td>
<td>2.69%</td>
<td>-31.15%</td>
</tr>
<tr>
<td>2009</td>
<td>-5.03%</td>
<td>-10.14%</td>
<td>3.58%</td>
</tr>
<tr>
<td>2010</td>
<td>6.99%</td>
<td>18.33%</td>
<td>-5.88%</td>
</tr>
<tr>
<td>2011</td>
<td>22.85%</td>
<td>13.67%</td>
<td>-37.13%</td>
</tr>
</tbody>
</table>

* Reported as a Percent of GDP
The magnitude and direction of the capital flight estimates using the “updated” Dooley method are drastically different than the Hot Money and World Bank estimates. This could be a sign that the use of the 10 year U.S. Treasury note does not generate an accurate estimate of the stock of external claims as represented by the investment income receipts. A market interest rate cannot adequately represent the yield on the external investments. Furthermore, the results reveal that it is not realistic to assume that on average, the external investments in 2011 are represented by the 10 Year U.S. Treasury note or yet alone any benchmark rate. The “updated” Dooley method does not capture the current capital flight episodes taking place in the troubled P.I.G.S. countries. Unless a new estimation procedure is developed to accurately reflect the yields on external investments, then the Dooley method may be lost in time. The updated editions of the Balance of Payments statistics have rendered the Dooley method much more cumbersome and unreliable.

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19 “Updated” refers to external debt cumulated from IIP and not the BOP and a new market interest rate.
The correlations between the capital flight estimation methods are presented above in Figure 8. As expected, the Hot Money 3 correlation is highest with the Hot Money 2 method. However, the World Bank is also moderately correlated with the Hot Money 3 measure. The correlations are relatively low and suggest that differences may arise in the empirical section depending upon the chosen capital flight estimation method. It is rather obvious that the Dooley method has a negative correlation with both the Hot Money 3 method and World Bank method. Nevertheless it is moderately correlated with the Hot Money 1 method. The panel data analysis focuses on the southern peripheral countries of the Euro Zone.
2.8 Capital Flight Estimates from the Hot Money Methods

Figure 9: Hot Money 3 Estimates

![Graph showing hot money 3 estimates from 1998 to 2012 for Portugal, Italy, Greece, and Spain.]

Figure 10: Hot Money Averages 2009-2011

<table>
<thead>
<tr>
<th></th>
<th>Hot Money 1 (%) of GDP</th>
<th>Hot Money 2 (%) of GDP</th>
<th>Hot Money 3 (%) of GDP</th>
<th>Hot Money 3 (%) of GDP (Year 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portugal</td>
<td>2.57%</td>
<td>11.78%</td>
<td>18.65%</td>
<td>46.61%</td>
</tr>
<tr>
<td>Italy</td>
<td>0.26%</td>
<td>0.45%</td>
<td>0.51%</td>
<td>8.15%</td>
</tr>
<tr>
<td>Greece</td>
<td>0.12%</td>
<td>11.15%</td>
<td>14.19%</td>
<td>29.01%</td>
</tr>
<tr>
<td>Spain</td>
<td>-0.38%</td>
<td>0%</td>
<td>-0.27%</td>
<td>7.61%</td>
</tr>
</tbody>
</table>
Hot money 3 is the broadest of the hot money measures. As the Hot Money estimates are functions of each other, the estimates tend to increase in absolute value from Hot Money 1 to Hot Money 2 and so on. Column four in the table above shows the Hot Money 3 estimates for capital flight for the year 2011. The Hot Money estimates provide evidence of capital flight episodes in the P.I.G.S. countries as expected due to economic hardships faced by the citizens in these respective countries. The Italian and Spanish economies were affected by the Euro Zone debt crisis after Greece and Portugal.\textsuperscript{20} This is reflective in the Hot Money capital flight estimates. Refer to figure 9 above. Spain and Italy do not to begin to experience capital flight flows until 2011. Therefore, the true capital flight picture may not be seen solely by examining the 2009-2011 average capital flight estimates from the table above. Spain and Italy in 2011 reported capital flight estimates of 7.61% and 8.15% of GDP respectively. Portugal and Greece were exhibiting large capital flight episodes during the years 2009 – 2011. This flight capital depletes the capital base of the country and decreases investment. During the years 2006 and 2007 when the global economy was expanding rapidly, the P.I.G.S. countries were displaying large capital inflows. Capital inflows could include repatriated capital flight. Portugal averaged capital inflows of 25% of GDP during the years 2006 and 2007.

\textsuperscript{20} Refer to the Timetable of Key Euro Zone Debt Crisis dates available in Box 1 in the Appendix
It appears that the World Bank method follows more of a business cycle trend. Capital flight estimates spike in 2010 and the onset of the financial and debt crisis in Europe. Greece and Portugal have increased capital flight flows to roughly 30% and 25% of GDP respectively. Interestingly, Italy and Spain have decreased capital flight flows in 2011. Moreover, it appears that Italy had capital inflows of almost 10% of GDP! The Hot Money 3 method estimated capital flight flows of 8% of GDP. Capital flight estimates measure by the World Bank method are a

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21 Full table of Capital Flight estimates using the World Bank method are in Box 3 in the Appendix.
function of the change in external debt coupled with other sources/uses of funds, a large
external debt will impact capital flight estimates drastically.\textsuperscript{22} Perhaps this is the case for Italy.
While Spain experienced capital flight flows during 2011, the flows were less than the capital
flight estimates from 2010. These results differ from the Hot Money 3 estimates.

\begin{center}
\begin{tabular}{|c|c|c|}
\hline
\textbf{Countries} & \textbf{World Bank Capital Flight} & \textbf{WB 2011 Estimates} \\
 & \textit{2009-2011 Averages} & (\% of GDP) \\
 & (\% of GDP) & (\% of GDP) \\
\hline
Portugal & 7.74\% & 23.10\% \\
\hline
Italy & -1.81\% & -7.44\% \\
\hline
Greece & 14.74\% & 33.23\% \\
\hline
Spain & 7.27\% & 5.80\% \\
\hline
\end{tabular}
\end{center}

An important question is how do these capital flight estimates compare to previous capital
flight episodes around the globe? After all, the circumstances surrounding the Euro Zone debt
crisis are not unique. Many countries have experienced debt fueled capital flight episodes. On
the other hand, a capital flight episode occurring within a common currency area is not well
documented if it is documented at all in previous academic literature.

\textsuperscript{22} External Debt table available in the appendix in Box 4.
Looking at Portugal, Italy, Greece, and Spain (P.I.G.S) as an average, capital flight estimates are in line and perhaps above average when compared to other maximum estimates of capital flight. It must be noted that the capital flight estimates computed in this paper only go to 2011. The crisis is still ongoing and it is highly possible that capital flight flows have increased in 2012 and maybe into 2013. The maximum estimate of capital flight in this sample is Portugal at over 46% of GDP in 2011. Greece came in second with 2011 capital flight estimates of 29% of GDP. China, for example, had capital flight estimates of up to 30% of GDP in 1991 and 1992 (Zheng and Tang 2009). Malaysia had capital flight estimates of 37% following the Asian Tiger crisis in 2000 (Ibid.). Comparison to other capital flight estimates around the world is difficult in that many academic papers only publish aggregate data. For instance, Venezuela had capital flight estimates of 132.1% of GDP from 1973 to 1987 (Pastor 1990). Aggregate estimates for this paper are not fully realized as the euro zone debt crisis is still ongoing.

Empirical Analysis on Determinants

Now that it has been established that capital flight has occurred in the latter part of the sample years in the distressed P.I.G.S. country, an empirical analysis on the determinants of capital flight is undertaken. From the previous empirical studies on capital flight, we know that capital flight responds to changes in economic or political risks that may affect the real value of an individual’s asset. The popular determinants from the literature are included.
2.10 Determinants

The variable trade openness is the sum of exports and imports of both services and goods. The trade openness variable is scaled by GDP. The data was cumulated from the balance of payments. Trade openness is a proxy for trade mis invoicing. As trade increases, so does the opportunity for flight capital through trade mis invoicing. The expected sign for trade openness is positive. As trade makes up a large portion of these economies, the coefficient is expected to be quite large.

Domestic inflation figures for the respective countries were taken from the OECD. The logged differences of the consumer price index for the respective countries were used to calculate inflation. Inflation is included as an explanatory variable due to its effects on the real value of an asset. In addition, excessive inflation may represent an inflation tax that is used by the government in order to decrease the real value of government debt denominated in the host countries currency. As inflation in the domestic economy increases, capital flight should also increase. Thus, the expected sign is positive. Conversely, high inflation has not been a prevailing theme for euro zone and it would be not be surprising to see the inflation has not contributed to capital flight.

Financial incentive (Pastor 1990) or financial repression (Dooley 1986) is included to show incentives of capital to flee to other countries. In a low yield environment, capital flees to a more attractive yield. The financial incentive variable is the three month deposit rate. The financial incentive is different than the other financial incentive variables included in the
literature as the deposit rate of the host country is not compared to another country. Financial markets are more interconnected than ever and as a result there exist many other locations to safeguard financial assets other than that of the United States. For this reason, the three month Euro deposit rate was included also so that there is no comparison with another country. A negative coefficient would indicate that capital flight increases when the euro deposit rate decreases. The expected sign of the coefficient is negative.

Currency overvaluation is one of the three most popular determinants for capital flight used in the academic literature. Two different variables were used as a way to proxy currency valuation. The use of a base exchange rate to compare past and future exchange rates was not utilized in this paper. To pick an arbitrary base exchange rate as the exchange rate in equilibrium is an unrealistic assumption. In this paper the forward discount/premium of the Euro to the U.S. dollar and the real effective change rate as indexed by the largest trading partners are used to proxy overvaluation.

The three month forward premium/discount is taken from the Central bank of the Netherlands. Using a transformation, all the forward premium/discount values were multiplied by 100 due to the very small values. If the U.S. dollar is at a forward premium to the euro then the U.S. dollar is expected to appreciate and thus is more expensive. The vice-versa is true if the U.S. dollar is at a forward discount. If an individual viewed currency overvaluation as a problem, the U.S. dollar at a forward discount to the euro would encourage capital flight. However, if currency overvaluation is not considered an issue then the U.S. dollar at a forward discount to the euro would encourage an inflow of capital. If the currency is seen as more expensive
relative to another currency this may indicate the currency is overvalued. The expected sign of
the forward discount premium is positive as I am interested in currency overvaluation.

The euro variable is the real effective exchange rate indexed using the exchange rates of
the largest Euro trading partners. The data is available on the European Central Bank website. If
the real effective exchange rates increases relative to the trading partners then this may
indicate the currency is overvalued. The opposite is true if the real effective exchange rate
decreases. The expected sign on the Euro coefficient is positive. An indication of currency
overvaluation would induce capital flight.

As a sign of future tax increases, the general government deficit/surplus as a percent of
GDP is used to explain capital flight. A higher government deficit as a percent of GDP could
signal future revenue raising measure by the government in order to have continued access to
the financial markets and stay within the government debt limits stated in the Maastricht treaty
(Nelson et al. 2010). The expected sign for debt is positive. Capital flight should tend to increase
given an increased probability of future tax increases or tightening of tax evasion.

The yield on a ten year government bond for the respective countries was included to
show the financial risk present in the country. A higher government yield indicates a loss in
confidence of both domestic and international investors in the domestic government’s ability to
repay debt. This variable could also be considered a sign of future tax increases. The ability to
borrow in the international market is imperative. As a result, if confidence in the government’s
financial position deteriorates, the government may be forced to implement revenue increasing
measures. As the government yield increases capital flight would tend to increase.
2.11 The Model

Capital flight will be modeled after equation 1 below. The dependent variable, capital flight, will be the estimates from the Hot Money 3 method for the first three regression equations (1-3). The following three equations (4-6) will use the World Bank method estimates. Both of these estimates are in U.S. billions of dollars. A base regression model will include the most popular determinants in the capital flight literature. The two sequential equations will be slight extensions to the base model and include other explanatory variables. The sample includes the years 2002-2011.

Previously empirical analyses have attempted to turn the capital flow estimates to stock estimates by the use of the U.S. Treasury note. However, these studies make a strong assumption that the stock of capital is 0 at an initial year. I do not find this a realistic assumption. Therefore, capital flight flow estimates are used in this paper. Equation 1 is as follows:

\[ CF_{it} = X'_{it} \beta + \varepsilon_{it} \]

Where \( CF_{it} \) = Capital Flight flows for country \( i \) at time period \( t \).
\( X'_{it} \beta \) = 1 x K vector of explanatory variables and respective coefficients
\( \varepsilon_{it} \) = error term for country \( i \) at time period \( t \).
More specifically, I start with a base model (1) regression that includes trade openness, inflation, the deposit rate, the euro indexed exchange rate, and the yield on the 10 year government note. Following the base model regression I proceed to add two additional explanatory variables separately, the forward premium/discount of the U.S. dollar (2) and the government surplus/deficit as a percent to GDP (3). These would be regression equations 2 and 3 respectively.

A random effects regression with the use of an instrumental variable is used to estimate the coefficients on the explanatory variables. Previous studies have used Pooled OLS and Random Effects models to estimate the coefficients. Pooled OLS models are the most popular as data availability for developing countries during the height of the capital flight literature in the late 1980’s and early 1990’s was severely lacking. Therefore, Pooled OLS models helped to alleviate data availability issues. Random effect models assume the sample of countries is drawn at random from a larger set of available countries. Moreover, inference on random effect models allow for the estimates to be seen as reflective of all countries and not just the ones included in the sample. A random effects model is the most appropriate for this study. The results are presented in the table below.\(^23\)

\(^{23}\) Hausman test verified a random model is the most appropriate. In addition, test for multicollinearity suggest that multicollinearity is not an issue. A determinants correlation matrix is available in Box 9 in the appendix.
### 2.12 Model Results

#### Figure 13: Determinants of Capital Flight

<table>
<thead>
<tr>
<th></th>
<th>Hot Money 3</th>
<th>World Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>206.93***</td>
<td>232.52***</td>
</tr>
<tr>
<td></td>
<td>(80.61)</td>
<td>(87.00)</td>
</tr>
<tr>
<td>Inflation</td>
<td>13.75</td>
<td>15.90**</td>
</tr>
<tr>
<td></td>
<td>(11.20)</td>
<td>(7.87)</td>
</tr>
<tr>
<td>Deposit Rate</td>
<td>-22.69***</td>
<td>-27.66***</td>
</tr>
<tr>
<td></td>
<td>(5.08)</td>
<td>(6.69)</td>
</tr>
<tr>
<td>Euro</td>
<td>-0.57</td>
<td>-0.33</td>
</tr>
<tr>
<td></td>
<td>(0.57)</td>
<td>(0.40)</td>
</tr>
<tr>
<td>10 Year Gov. Note</td>
<td>12.11*</td>
<td>10.19**</td>
</tr>
<tr>
<td></td>
<td>(6.48)</td>
<td>(4.34)</td>
</tr>
<tr>
<td>Forw. Prem./Disc.</td>
<td>-54.94</td>
<td>-35.25*</td>
</tr>
<tr>
<td></td>
<td>(36.72)</td>
<td>(21.30)</td>
</tr>
<tr>
<td>Gov. Surplus/Deficit</td>
<td>-915.84**</td>
<td>-1741.47***</td>
</tr>
<tr>
<td></td>
<td>(463.66)</td>
<td>(583.06)</td>
</tr>
<tr>
<td>Constant</td>
<td>-119.28***</td>
<td>-142.4***</td>
</tr>
<tr>
<td></td>
<td>(53.24)</td>
<td>(43.35)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.40</td>
<td>0.46</td>
</tr>
<tr>
<td>Observations</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Robust Standard Errors in Parenthesis

*** (1%) **(5%) *(10%)

(1) Base Model

(2) Extension using Forward Premium/Discount

(3) Extension using Government Surplus/Deficit
The trade openness coefficient takes a positive sign in all 6 models. Increases in international trade provide increases in avenues and opportunities for capital to flee the domestic economy. The coefficients on trade openness are very large. That is, a one percent increase in trade openness as a percent of GDP increases capital flight between 206 and 302 billion U.S. dollars using the Hot Money 3 method. If the World Bank method is used, the trade openness coefficient ranges between 350 and 514 billion U.S. dollars. Therefore, using the World Bank estimates as the dependent variable induces a larger coefficient on trade openness. The sum of exports and imports of both goods and services for the P.I.G.S. countries are between 50% and 70% of GDP in my sample. Specifically, these economies are open and connected to the international community. This is to be expected as these countries are part of the OECD. Trade mis invoicing seems to contribute significantly to capital flight estimates. Trade openness is statistically significant at the 1% level in all 3 of the Hot Money models. The coefficient is statistically significant in the World Bank model, however, not at the same strength.

Not surprising, an increase in inflation increases capital flight. The coefficients on inflation vary significantly between regression models. As more explanatory variables are added, the coefficient on inflation variable increases. Using the Hot Money 3 estimates, a one percent increase in inflation increases capital flight between 13 to 19 billion U.S. dollars. If the World Bank estimates are utilized the coefficient increases significantly. A one percent increase in inflation increases capital flight between 49 and 58 billion U.S. dollars. Inflation directly decreases the real value of an individual’s asset and thus should play a large part in influencing
capital flight. The inflation rate for the sample hovers around the 3% range. Yearly inflation figures for countries present in previous academic studies were much higher; however, even with much more modest inflation data, the coefficient is statistically significant in 5 out of the 6 models. It is well known that NCB’s and as a result the ECB were drastically expanding their balance sheets to provide liquidity to the market. Perhaps this expansion in central bank assets signaled to domestic residents should pay particular interest in inflation data.

The three month deposit rate of the Euro has a negative coefficient in all six models. Once again, the size of the coefficient varies drastically depending upon the technique used to calculate capital flight. As the deposit rate decreases, capital would be expected to flow to higher yielding locations. Higher yields were available on longer maturity bonds and the secondary markets for these bonds are fairly liquid and may provide a close substitute. As the deposit rate increases by one percent, capital flight tends to decrease by 17 to 22 billion U.S. dollars. As for the models using the World Bank estimates, the coefficient ranged from 44 to 65 billion U.S. dollars. This variable proved statistically significant in all six models. Covered interest was popular in previous literature as it was published in the late 80’s and the U.S. at that time was by far the largest economy in the world.

The first three determinants yielded somewhat similar results. The sign on the coefficients were the same and differences in statistical significance were fairly negligible. The euro variable, on the other hand, has a negative sign on the coefficient in the Hot Money models and a positive sign in the World Bank models. First, I will start with the Hot Money
results. As the real effective exchange rate of the euro\textsuperscript{24} increases one unit, capital flight decreases between .57 and 2 billion U.S. dollars. It is possible that the appreciation in the euro provided a confidence boost to the domestic residents. To be precise, an increased confidence in the economy and financial situation of the euro zone as a whole. The coefficient in the first three models was not statistically significant. Let’s not forget that this variable was included to see if perhaps overvaluation of the euro relative to other currencies would encourage capital flight. The results suggest that residents of these respective countries did not see currency overvaluation as an issue. Now, turning the attention to the World Bank results. The coefficients in models 4-6 are positive and much larger than the coefficient using the Hot Money method. A one unit increase in the euro exchange rate increases capital flight by 3 to 6 billion U.S. dollars. This result suggests that currency overvaluation was indeed an issue. The appreciation in the domestic currency did not feel justified by the domestic residents and thus the residents believed a future deprecation was likely. In models 4 and 5, the coefficient is statistically significant at the 1% level. With the addition of the government surplus/deficit variable in model 6, the coefficient was no longer statistically significant.

I tend to side with the Hot Money model results. In previous literature, many of the countries studied in the capital flight research use a peg or crawling peg exchange rate policy. Therefore, the exchange rate was set by the monetary authorities and perhaps did not reflect the view of the market. An expected downward adjustment in the currency peg would

\textsuperscript{24} Indexed to major trading partners.
encourage capital flight. As the Euro is a free floating currency, currency overvaluation is not much of an issue as the value of the currency is efficiently set in the foreign exchange market.

The yield on the 10 year proxies financial confidence and trust in the government’s ability to repay its’ debt. The Hot Money model yields consistently positive coefficients. Conversely, the World Bank model yields a mixture of positive and negative coefficients. The coefficients in model 3 and 6 are almost exact opposites. Like the euro variable, I will begin with the Hot Money results. A one percent increase in the yield of the 10 year government note increases capital flight between 7 and 12 billion U.S. dollars. Previously mentioned, the yield on the government’s debt can be used as a proxy for future tax increases. Therefore, the positive coefficient is consistent with economic logic. The coefficient is statistically significant in models 1-3. Comparing these results to the World Bank results generates many differences. The coefficient decreases as more explanatory variables are added and becomes negative in models 5 and 6. These results suggest that the yield on government debt did not influence domestic residents’ decision to place capital outside the reach of domestic authorities. The coefficients are not statistically significant. Moreover, I am more inclined to accept the Hot Money results over the World Bank results.

Recall if the forward premium/discount is positive then the dollar is at a forward discount to the euro. The coefficient is negative irrespective of the capital flight estimation model. Furthermore, the size of the coefficient is fairly similar in both models. With the Hot Money model, if the forward premium/discount increases by one hundredth then capital flight decreases between 35 and 43 billion U.S. dollars. The World Bank model yields coefficients of
28 and 66 billion U.S. dollars. That is, if the euro is more expensive than the dollar then capital flight is reduced. This result is in line the Hot Money result from the euro variable. As the euro appreciated capital flight decreased. If the euro is projected to appreciate relative to the dollar in the future then capital flight decreases. Obviously, this result contradicts the euro results in the World Bank model, specifically models 4 and 5. The coefficient is only statistically significant at the 10% level in model 3.

The coefficient on the government surplus/deficit variable was negative for both models. This is consistent with economic logic and with the results from the yield on the government debt variable. Relative size of the coefficient does vary significantly. The coefficient using the Hot Money method implies a one percent increase in the government surplus as a percent of GDP decreases capital flight by 915 billion U.S. dollars. The coefficient is even larger when the World Bank model is utilized. A one percent increase in the government surplus as a percent of GDP decreases capital flight by over a trillion U.S. dollars! Both coefficients are statistically significant. The coefficient using the World Bank model warrants further analysis as this is by far the largest coefficient in the regression results. Nevertheless, this result is consistent with the results for the 10 year debt yield variable. The possibility of future tax increases seemed to weigh heavily upon on the minds of domestic residents.

On average, the Hot Money models (1-3) yield higher R-squared values and imply that more capital flight variation is explained when Hot money estimates are the dependent variable. Stated previously, the Hot Money estimates have produced capital flight estimates that are most consistent with expectations.
2.13 Implications and Short Comings

One of the main questions is how can these results be used in order to mitigate capital flight flows? How much of these determinants are in the hands of the government? During a financial crisis, expansionary policies may increase inflation, decrease the deposit rate, and decrease the exchange rate. The question becomes does the expansionary monetary policy provide a jump start to the economy that outweighs the negative effects of capital flight flows. This will have to be decided on a case by case basis. The lack of capital controls are a staple of common currency unions and as a result encourage the free flow of capital between countries. Now, there can be something said for the perception of future tax increases due to a high budget deficit. As the budget deficit increased as a percent of GDP so did capital flight flows. Governments must understand that individuals are rational beings and see a high government debt as an increased likelihood for future tax increases.

There are potential shortcomings in this empirical analysis. Each of the three equations had forty observations, an admittingly low number of observations for panel data analysis. Quarterly balance of payments data is difficult to come upon. Moreover, high frequency balance of payments data had negligible added explanatory power when used by Cheung and Qian (2010). Equation three has the highest R-squared value of .58, but also includes the most explanatory variables. The model was able to explain 58% of the variation in capital flight flows. However, many of the variables that are statistically significant take the expected sign are backed by economic reasoning.
Part 3: Target2 Net Balances

3.1 Background

Examining capital flight for countries in the euro zone can not be completed without examining the Target2 imbalances that have recently gained academic attention. Target2 (T2) is a real time gross settlement platform owned by the ECB and has been in use since 1999 ("Target2" 2013). It was formerly known as Target. Transactions across borders within the euro zone through commercial banks are completed using the Target2 system. Each commercial bank in the euro zone has an account at their respective central bank. The Target2 balances represent central bank liquidity. For instance, a net Target2 liability reflects a shortage of central bank liquidity as the net liabilities reflect a net outflow of euros.

Much debate is ongoing concerning the large Target2 imbalances that began to develop during the current financial crisis. Two theories for the development of the imbalances have gained momentum in the academic literature. First, Sinn and others believe the T2 imbalances arise from the financing of the current account deficit following the tightening of the interbank market during the financial crisis (Sinn et al. 2011). Others believe that differential funding and liquidity conditions have contributed to the imbalances (Auer 2012). The ECB in their 2011 annual Target report stated “This increase in Target2 negative balances is due to the fact that in the countries in question payment outflows in the euro have not been matched by payment inflows in euro ("Target Annual Report 2011" 2012).” To avoid debate, I take the ECB view that the one-way capital flows of euros have contributed to the imbalance. Using capital flight

\[25\] Thanks to Sinn et al. (2011)
estimates, I hope to show that while current account deficits do contribute to the Target2 balance, the vast majority of net Target2 liabilities incurred are due to capital flight.

In this paper I do not focus on the financing of these flows. Sinn states “[T]he share of the stock of central bank money created by the GIIPS climbed from 31 % at the beginning of 2007 to 93 % by the end of 2011 (Sinn et al. 2012).” These loans from the NCBs to the commercial banks were granted on the basis of reduced collateral requirements consented by the ECB\textsuperscript{26}. The need for refinancing operation may be due to any number of reasons. Cecchetti et al. (2012) show that from 2008 to 2012, German banks reduced their exposure to the P.I.G.S. countries by over 281 billion euros (Cecchetti et al. 2012). In other words, as German banks and other commercial banks reduced exposure to commercial banks in the P.I.G.S. countries, these commercial banks were forced to receiving financing from the lender of last resort, their NCB. It is a widely held belief that capital has been fleeing the peripheral euro zone countries (P.I.G.S) and flowing to the core euro zone countries (Germany, France, and others).\textsuperscript{27}

\textsuperscript{26} For more information see ECB Website under Collateral
\textsuperscript{27} See Box 10 in the appendix.
The figure above depicts the central banks Target2 liabilities of the P.I.G.S. countries. A positive value indicates a net liability to the ECB.\textsuperscript{28} From 2002 to 2006 the net balances were fairly close. In 2007 and onwards, P.I.G.S. countries increased their respective central bank liabilities with the European Central Bank (ECB). These liabilities can be considered loans to the European Central Bank. Note that the financial crisis began in 2008 and helped ignite the euro zone debt crisis 2009. Liabilities began to increase drastically after the euro zone debt crisis began.

\textsuperscript{28} Negative Target2 liabilities indicate a claim on the ECB.
3.2 Determinants

Auer (2012) and others have noted that Target2 imbalances seem to be correlated to current account deficits (Sinn et al. 2011) and a “sudden stop” of private capital inflows found in the “other investment” category of the Balance of Payments. The other investment is defined as “a residual category that includes positions and transactions other than those included in direct investment, portfolio investment, financial derivatives and employee stock options, and reserve assets” ("Balance of Payments Textbook" 1996). This includes currency and deposits, other equity, and loans. Hot Money 3 method is a function of the net errors and omissions, banks and the “other sectors” in the other investment category, and portfolio investment of debt securities. Therefore, Hot Money3 measure appears correlated to the net Target2 liabilities. A look at the graph below shows the relationship between capital flight estimates and target2 liabilities. The correlation is extremely strong post 2007 with a value of almost 1 (.996). Pre-crisis (2002-2007) the correlation drops to a value of .62. A correlation value extremely close to 1 implies that a one unit increase in T2 net liabilities is accompanied by a one unit increase in capital flight. The increase in liabilities, most likely financed by money creation post 2007, has moved in tandem with capital flight estimates. Correlation does not reflect causality; nonetheless, the timing and magnitude of the relationship can not be ignored.

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29 Capital flight estimates and T2 balances are averages of the P.I.G.S. countries.
A panel data analysis is utilized in order to show how much of each dollar in the net Target2 liabilities can be contributed to capital flight and the current account deficit. The dependent variable is the net Target2 balances and is in billions of U.S. dollars. The current account balance is multiplied by a -1 to show how an increase in the current account deficit affects the net Target2 balance. The current account deficit is in billions of U.S. dollars. By looking at figure 14, it becomes clear that Spain and Italy have the largest net Target2 liabilities; however, these are also the largest economies in the sample. In order to prevent these economies from driving the results, all the variables are scaled by their respective GDP.

30 Net Target2 balance multiplied by -1 in order to show positive liabilities.
effects regression model was utilized in order to show the impact of capital flight and the current account deficit on the net Target2 balances. Results are presented in figure 16 below.

3.3 Determinants Results

<table>
<thead>
<tr>
<th></th>
<th>Pre 2008</th>
<th>Post 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capital Flight</strong></td>
<td>0.14</td>
<td>0.77**</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.23)</td>
</tr>
<tr>
<td><strong>Current Account Deficit</strong></td>
<td>0.29</td>
<td>-1.2</td>
</tr>
<tr>
<td></td>
<td>(0.38)</td>
<td>(1.01)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>0.01</td>
<td>0.26**</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.08)</td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
<td>0.44</td>
<td>0.32</td>
</tr>
<tr>
<td><strong># of Obs.</strong></td>
<td>24</td>
<td>16</td>
</tr>
</tbody>
</table>

Figure 16: Determinants of The Net Target2 Balance

The results imply that something significant has changed from pre 2008 and post-2007. Pre-2008, both the flow of capital flight and the current account balance have positive coefficients. The coefficient on the current account deficit is about 100% larger than the coefficient on capital flight. A one percent increase in the current account deficit as a percent of

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31 Hausman test verified fixed model appropriate
GDP increases the net Target2 liabilities by .29% of GDP. A coefficient of .14 on capital flight implies a one percent increase in capital flight flows as a percent of GDP increases the net Target2 balance by only .14% of GDP. Both the net Target2 balance and the current account deficit are statistically insignificant. The F-test reveals that all the regressors in the model are not statistically different from zero. In addition, it appears that regressors are positively correlated with the error term and therefore the estimates are not consistent. The inconsistent estimates were not fixed as I am only interested in the effect capital flight has had on the net Target2 balances. From the P.I.G.S. capital flight estimates presented previously, we know that capital flight is only a recent phenomenon that began due to the euro zone debt crisis. Pre-2008 results were shown in order to show the before and after effect of the presence of capital flight.

There is a much different story when one is to look at the post-2007 results. The capital flight variable has a positive coefficient and much larger than the pre-2008 coefficient. The coefficient on capital flight has increased by a factor greater than 4! This suggests that if capital flight increases by one percent of GDP then the net Target balance increases by .77% of GDP. A very high coefficient is not unexpected as post 2007, the correlation of capital flight as estimated by the Hot Money 3 method and the Net Target2 liabilities was almost one. The variable is statistically significant at the 5% level. Surprisingly, the current account deficit has a

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32 F-Test (2,3) Prob > F = 0.40  
33 Using the Hot Money 3 method.  
34 F-Test (2,3) Prob > F= 0.05
negative coefficient and the coefficient has decreased by a factor of 5. The coefficient on the current account deficit is not statistically significant.

Others such as Sinn (2011) and Auer (2012) found the current account deficit and the “other investment” category were statistically correlated with the net Target2 balances post 2007. Therefore, my results differ slightly from Auer (2012) and others. Auer (2012) refers only to the “other investment” category in the balance of payments and not to the existing literature capital flight estimation techniques. However, my results are in line with Whelan (2013) which states “capital flight towards Germany, rather than current account surpluses and deficits, provides the explanation for most of the change in TARGET2 balances” (Whelan 2013). Nevertheless, Whelan (2013) arrives at this conclusion without calculating capital flight directly but instead looking specifically at capital outflows. But, as this paper described, not all outflows of capital are considered capital flight. Outflows of capital may include foreign direct investment, portfolio, and other BOP categories. In other words, capital flight estimate techniques have yet to be utilized in the analysis of Target2 imbalances. As the large net Target2 imbalances began to develop on the onset of the financial crisis, is reasonable that capital flight made up a large portion of the negative Target2 liabilities for the P.I.G.S. countries. Moreover, as countries such as Germany and the Netherlands have experienced large inflows of Euros and built up large net Target2 claims on the ECB, this further reconfirms capital flight’s role in the imbalances.
3.4 Implications

What can be taken from this result is that measures of liquidity within a common currency area, such as the euro zone, are directly related to capital flight flows. More specifically, during times of economic or political distress, large imbalances of liquidity reflect capital flight. The most correlated capital flight estimation technique to the imbalances in liquidity (Target2) is the Hot Money 3 method. As a result, future empirical research on capital flight episodes in a common currency area should utilize the Hot Money method.

Like any study, there exist potential problems in these results. Post-2007 only contains 16 observations. Ideally, an empirical test on net Target2 imbalances would use quarterly or even monthly data to generate more observations. This would provide statistically stronger results. However, I used annual capital flight data from the BOP and annual Target2 balance data.

Conclusion

It has been shown that the P.I.G.S. countries have experienced capital flight and are likely still experiencing capital flight as this paper is being written. Portugal has experienced the largest estimated capital flight flows of 46%\textsuperscript{35} of GDP in 2011. Capital flight in Portugal is often overlooked as countries such as Greece receive much more of the media attention. Greece and Portugal experienced large capital flight flows of 15% and 19% of GDP respectively in 2010.

\textsuperscript{35} Hot Money 3 Method
while Spain and Italy were having capital inflows. This is consistent with the euro zone debt crisis timeline as Spain and Italy were affected by the euro zone debt crisis after Greece and Portugal. As of 2011, all of the P.I.G.S. countries were experiencing capital flight flows of greater than 7% of GDP.

Many of the proven capital flight determinants in the academic literature hold true for the capital flight episode currently taking place in the euro zone. Inflation and deposit interest rates seem to play a role in contributing to capital flight. The amount of trade as a percent of GDP was statistically significant and suggests that as economies increase international trade, trade mis invoicing increases as well. This result is consistent with previous studies. The two variables used to test currency overvaluation yielded conflicting results depending on which estimation technique was used to calculate the dependent variable. Currency overvaluation is popular in the academic literature and has produced results that justify its existence in the literature. However, placing more weight with the Hot Money estimates leads to a conclusion that currency overvaluation was not a significant contributing factor to capital flight.

The most interesting result and main contribution of this paper revealed that capital flight has helped to create the large Target2 imbalances. Even at a minimum, there is a strong correlation between capital flight and the Target2 balances. Others have shown that the current account deficits along with the “other investment” category in the Balance of Payments are correlated to the net Target2 liabilities. Capital flight estimation techniques have not been used on the analysis of Target2 balances. On average, 77% of the net Target2 liabilities for the P.I.G.S. countries are a result of capital flight.
There is still much work to be done in the field of capital flight in a common currency area. The large Target2 imbalances are a highly debated phenomenon in the academic community and many of the papers cited in this paper were published in 2012. As more countries are looking at joining the euro in the next few years, a focus on the effect of capital mobility and central bank liquidity should be undertaken in order to see the effects on the euro zone. If much of the added liquidity provided by the NCB is used to replace liquidity lost due to capital flight then liquidity provisions must be addressed. Specifically, the effects of reducing collateral standards. Sinn (2012) argued the reduced collateral and increase in Target2 balances was a way of providing a mini-rescue package should be further researched. As this crisis is still ongoing, it is yet to be seen if the T2 imbalances normalize after this current debt crisis concludes. After this crisis is over a thorough analysis on capital flight determinants should be reexamined.
References


Table of Appendix

Box 1: Timeline of Key Euro Zone Event ................................................................. v
Box 2: Current Account Balance as a % of GDP ..................................................... vi
Box 3: Table of World Bank Estimates ................................................................. vi
Box 4: Change in External Debt Table ................................................................. vii
Box 5: Portugal Capital Flight Graph ................................................................. viii
Box 6: Italy Capital Flight Graph ........................................................................ viii
Box 7: Greece Capital Flight Graph ..................................................................... ix
Box 8: Spain Capital Flight Graph ..................................................................... ix
Box 9: Determinants of Capital Flight Correlation Matrix ................................. x
Box 10: Target2 Balances including Germany and the Netherlands .................. x
Box 1

Timeline of Key Events during the Euro Zone Debt Crisis Through 2011

• April 2009 – Greece, Ireland, Spain instructed to reduce their respective budget deficits.
• December 2009 – Greece debt begins to be downgraded by credit agencies
• January 2010 – EU reports “irregularities” in accounting procedures. Government deficit revised upwards by almost a factor a four.
• May 2, 2010 – Greece receives 110 Billion Euro bailout package
• November 2010 – Ireland receives a 85 Billion Euro bailout package
• May 2011 – Portugal receives a 78 Billion Euro bailout package
• July 2011 – Greece receives second bailout package worth 109 Billion Euros
• August 2011 – Government yields on Italian and Spanish debt jump
• September 2011 – Spain passes “Golden Rule” amendment for the purpose of improving government budget deficit.
• September 2011 – Italy passes austerity budget
• October 2011 – “Three Pronged” agreement reached among European Leaders to solve financial crisis.

Source: BBC News
Box 2

Current Account as a % of GDP

Source: OECD

Box 3: World Bank Estimates

<table>
<thead>
<tr>
<th></th>
<th>Portugal</th>
<th>Italy</th>
<th>Greece</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>7.71%</td>
<td>4.55%</td>
<td>7.01%</td>
<td>1.92%</td>
</tr>
<tr>
<td>2000</td>
<td>-5.51%</td>
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<td>-2.59%</td>
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<tr>
<td>2001</td>
<td>-10.18%</td>
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<tr>
<td>2002</td>
<td>-28.23%</td>
<td>-16.62%</td>
<td>-28.38%</td>
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</tr>
<tr>
<td>2003</td>
<td>-53.76%</td>
<td>-21.08%</td>
<td>-27.57%</td>
<td>-25.96%</td>
</tr>
<tr>
<td>2004</td>
<td>-11.45%</td>
<td>-12.71%</td>
<td>-12.96%</td>
<td>-13.32%</td>
</tr>
<tr>
<td>2005</td>
<td>13.62%</td>
<td>1.92%</td>
<td>5.58%</td>
<td>1.75%</td>
</tr>
<tr>
<td>2006</td>
<td>-27.20%</td>
<td>-20.35%</td>
<td>-12.14%</td>
<td>-21.02%</td>
</tr>
<tr>
<td>2007</td>
<td>-23.17%</td>
<td>-11.96%</td>
<td>-22.46%</td>
<td>-22.10%</td>
</tr>
<tr>
<td>2008</td>
<td>4.24%</td>
<td>5.30%</td>
<td>-0.05%</td>
<td>1.26%</td>
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<tr>
<td>2009</td>
<td>-16.51%</td>
<td>-4.97%</td>
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<td>-4.57%</td>
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<tr>
<td>2010</td>
<td>16.63%</td>
<td>10.61%</td>
<td>25.50%</td>
<td>20.58%</td>
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<tr>
<td>2011</td>
<td>23.10%</td>
<td>-7.44%</td>
<td>33.23%</td>
<td>5.80%</td>
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### Box 4: Change in External Debt Estimates

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<tr>
<th>Year</th>
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<th>Greece</th>
<th>Spain</th>
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</thead>
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<tr>
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<td>$3,668</td>
<td>$17,980</td>
<td>$3,120</td>
<td>$31,216</td>
</tr>
<tr>
<td>2000</td>
<td>$20,492</td>
<td>$36,610</td>
<td>$13,407</td>
<td>$75,000</td>
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<tr>
<td>2001</td>
<td>$22,733</td>
<td>$5,400</td>
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<tr>
<td>2002</td>
<td>$46,944</td>
<td>$212,060</td>
<td>$58,130</td>
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<tr>
<td>2003</td>
<td>$80,143</td>
<td>$344,430</td>
<td>$56,377</td>
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<tr>
<td>2004</td>
<td>$41,508</td>
<td>$199,420</td>
<td>$48,993</td>
<td>$243,962</td>
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<tr>
<td>2005</td>
<td>-$11,737</td>
<td>$39,100</td>
<td>$11,305</td>
<td>$114,358</td>
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<td>2006</td>
<td>$72,285</td>
<td>$439,940</td>
<td>$67,545</td>
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<td>2007</td>
<td>$82,998</td>
<td>$355,280</td>
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<tr>
<td>2008</td>
<td>$11,069</td>
<td>-$59,840</td>
<td>$52,372</td>
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<td>2009</td>
<td>$61,347</td>
<td>$147,930</td>
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<tr>
<td>2010</td>
<td>-$22,857</td>
<td>-$90,990</td>
<td>-$41,361</td>
<td>-$212,670</td>
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<tr>
<td>2011</td>
<td>-$27,200</td>
<td>$75,329</td>
<td>-$70,817</td>
<td>-$123,606</td>
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</table>

*Values in Millions of U.S. Dollars

- Box 4 shows the change in external debt as cumulated from the international investment position (IIP) in the balance of payments. On average, from the years leading up the financial crisis the P.I.G.S. countries were increasing total external debt. From 2010 and onwards, the countries began to deleverage and total external debt decreases across the board.
Box 9: Determinants Correlation Matrix

T0=Trade Openness, Inf= Inflation, DR= Deposit Rate, Euro=Euro Exchange Rate, Debt10=Yield on the 10 Year government note, Dollar=The forward premium/discount of U.S. dollar to euro, and GovDebt=The government debt/surplus as a percent of GDP.

<table>
<thead>
<tr>
<th></th>
<th>TO</th>
<th>Inf</th>
<th>DR</th>
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<th>Debt10</th>
<th>Dollar</th>
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<td>1.00</td>
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</tr>
<tr>
<td>Euro</td>
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<td>-0.04</td>
<td>1.00</td>
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<td>Debt10</td>
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<tr>
<td>Dollar</td>
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<td>0.09</td>
<td>-0.11</td>
<td>1.00</td>
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<tr>
<td>GovDebt</td>
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<td>0.52</td>
<td>0.47</td>
<td>-0.37</td>
<td>-0.32</td>
<td>0.13</td>
<td>1.00</td>
</tr>
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</table>

Box 10

Target2 Balances

*ECB Target2 Balance Calculation Method