THE DETERMINANTS OF ORIGINAL SIN

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

DENİZ ARINSOY MEMİŞ

IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ECONOMICS

SEPTEMBER 2012

Approval of the Graduate School of Social Sciences

_____

Prof.Dr. Meliha ALTUNIŞIK
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____

Prof. Dr. Erdal ÖZMEN
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

_____

Prof. Dr. Erdal ÖZMEN
Supervisor

Examining Committee Members

Prof. Dr. Erdal Özmen	(METU,ECON)	_____
Assoc. Prof. Dr. Elif Akbostancı	(METU,ECON)	_____
Dr. F. Pınar Erdem	(CBT)	_____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name Last name: Deniz ARINSOY MEMİŞ

Signature:

ABSTRACT

THE DETERMINANTS OF ORIGINAL SIN

Arınsoy Memiş, Deniz
M. S., Department of Economics
Supervisor: Prof. Dr. Erdal Özmen

September 2012, 84 pages

Original sin in economy literature is defined as the inability of countries to borrow in domestic currency from abroad (even from local markets with long maturities and fixed-rate). There are two dimensions of the problem, international and domestic. In this thesis, some of theories on determinants of international original sin phenomenon are investigated. The results suggest that absolute size of the economy is a significant determinant of the international original sin. Financial and economic development is also found to be necessary in order to redeem from the original sin problem. Existence of strong policies and institutions, monetary credibility, and flexible exchange rate regime are found as other significant factors in terms of explaining the phenomenon. Countries that faces credit market imperfections and poor contract enforcement more prone to original sin problem.

Keywords: Original sin, Currency Mismatches, International Financial Markets

ÖZ

TEMEL GÜNAH PROBLEMİNİN NEDENLERİ

Arınsoy Memiş, Deniz
Yüksek Lisans, Ekonomi Bölümü
Tez Yöneticisi: Prof. Dr. Erdal ÖZMEN

Eylül 2012, 84 sayfa

Temel günah problemi ekonomi literatüründe ülkelerin uluslararası piyasalarda kendi döviz cinsinden borçlanamamaları (hatta yerel piyasalarda uzun vadeli olarak) tanımlamıştır. Problemin uluslararası ve yerel olmak üzere iki boyutu bulunmaktadır. Bu tezin amacı temel günah probleminin nedenlerine ilişkin öne sürülen bazı teorilerin sınanmasıdır. Çalışmanın sonucunda ülke ekonomisinin büyüklüğünün ülkelerin temel günah probleminin uluslararası bileşeninde önemli bir etken olduğu tespit edilmiştir. Ülkenin ekonomik ve finansal gelişmişlik düzeyinin problemin çözümünde önemli olduğu bulunmuştur. Güçlü politika ve kurumların, kredibilitesi yüksek bir para politikasının ve dalgalı kur rejiminin varlığı sorunun açıklanmasında önem arz eden diğer faktörler olarak belirlenmiştir. Etkin çalışmayan kredi piyasasının varlığı ve sözleşmelerin

uygulanmasında yaşanılan aksaklıklar ülkeleri söz konusu problem açık hale getirmektedir.

Anahtar Kelimeler: Temel Günah Problemi, Döviz Kuru Uyumsuzluğu, Uluslararası Finansal Piyasalar

To My Son

ACKNOWLEDGEMENTS

I would like to thank to my supervisor Prof. Dr. Erdal Özmen for his guidance, comments and encouragement in the preparation of the thesis.

I would also like to thank to Assoc. Prof. Dr. Elif Akbostancı and Dr. F. Pınar Erdem for their participation to my examining committee and for sharing their valuable comments and suggestions.

Finally, I am grateful to my husband Hamdi Alper MEMİŞ for his invaluable support, encouragement and patience during the preparation of this thesis.

TABLE OF CONTENTS

LIST OF TABLES

TABLES:

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

Almost all countries around the globe fund their public and private investments from capital markets. Developing countries particularly need funding in order to fuel their developments and to complete their infrastructure needs. Most of the countries prefer domestic markets for the financing of the necessary expenditures. However, some of the domestic markets are not developed enough to provide necessary funds. In addition, maturities of the borrowing instruments in these markets are very short compared to international markets. On the other hand, countries also benefit from external sources in order to smooth the consumption or diversify their risks. Therefore, even developed countries with deep domestic capital markets utilize funds from international capital markets.

International debt markets constitute an important segment of the international capital markets. When the activities in international debt markets are analyzed, it is seen that most of the countries borrow abroad in foreign currency. In other words, these countries benefit from external funding opportunities at the expense of currency risk. However, the main reason for most of the countries to issue debt in foreign currency is their inability to finance their needs in their local currency at the desired amounts and structure. The inability to borrow in domestic currency from abroad (even from local markets with long maturities and fixed-rate terms) referred as original sin in the economic literature (Eichengreen and Hausmann 1999).

Original sin is a global phenomenon. It is not limited to a small number of countries. On the contrary, only a small number of countries do not suffer from this problem. Major economic powers like United States of America (US) and Japan and financial centers like Switzerland and United Kingdom are free from this problem as expected. However, countries like South Africa and New Zealand also do not suffer from the original problem. Therefore, variety in the characteristics of these countries suggests that is not easy to determine the reasons for the original sin problem.

There are also important consequences of the original sin. First of all, countries face with serious currency and maturity mismatches in their balance sheets. International original sin increases countries vulnerability to a significant extent during the currency crises. Most of the emerging countries experienced currency crisis during the 90's thanks to their significant currency mismatches. For the countries with original sin problem, effectiveness of monetary policy also diminishes during the adverse shocks. Monetary authorities cannot benefit from lender of last resort facility in the existence of significant amount of foreign currency denominated debt.

In addition, original sin creates a vicious cycle for countries. Original sin adversely affects the ratings of the countries. As a result of low ratings, countries face with difficulties in issuing debt in their own currency at long maturities. Inability to issue debt in local currency at relatively longer maturities adversely affects the development of local markets and increases the dependency to the external markets. Given these adverse consequences of original sin on economic and financial stability, it is very important to determine the reasons for the phenomenon and to create solutions in the light of these determinants.

The aim of this thesis is to shed a light on the determinants of the international original sin. In the literature there is wide range of explanations for the problem. In this study some of the plausible reasons for original sin are tested. The theories that are analyzed in this study are regarding to the size of the country, weaknesses in country policies and institutions, monetary credibility of the country, exchange rate policy, doubts about fiscal solvency of the country, financial development level, foreign trade volume, existence of credit imperfections and poor contract enforcement and exchange rate misalignments. In addition, financial integration level of the country is considered as another plausible reason.

This study is organized as follows. In Chapter 2 the literature on the original sin is reviewed. Development in debt markets, particularly international debt markets is discussed in Chapter 3. In addition, definition and alternative measures of original sin together with developments in original sin is given in this chapter. In Chapter 4 the theories that stand out in the finance literature is tested. Chapter 5 summarizes the main results and conclusions.

CHAPTER 2

LITERATURE SURVEY

Original sin phenomenon is first introduced by Eichengreen and Hausmann (1999) to define the situation of inability of countries to borrow abroad in their own currency or to borrow long term even domestically. After its introduction, consequences, determinants and the possible solutions of the problem are widely discussed in the international finance literature.

Original sin has important consequences that lead to economic instability for emerging countries. It results in mismatches on the national balance sheets, hence movements in exchange rates and interest rates have aggregate wealth effects. The wealth effects limit the effectiveness of monetary policy (Aghion, Bacchetta and Banerjee, 2001; Cespedes, Chang and Velasco, 2002). In the existence of high levels of foreign debt, central banks try to limit the exchange rate volatility. Therefore, emerging countries could not benefit from the exchange rate flexibility compared to their advanced counterparties. Countries with original sin are more vulnerable to economic shocks and effects of shocks are more persistent for these countries. In addition, original sin is associated with lower credit ratings that limit the access to capital markets or aggravate the terms of borrowing. All of these factors adversely affect the growth prospects and results in higher volatility of output and capital flows (Eichengreen, Hausmann and Panizza, 2007).

One important consequence of original sin is the resulting currency and maturity imbalances in the economy. In the countries with original sin, the economic agents

could not find sufficient long-term local currency sources to fund their investments. This results in reliance on short term or foreign currency denominated debt to finance these investments (Burger and Warnock, 2003).

Foreign currency debt may lead to significant currency mismatches in the balance sheets of the agents given that the revenues arising from investments undertaken are generally in local currency. If most of the economic agents face with currency mismatches in their balance sheets then the country may accumulate net foreign debt (Burger and Warnock, 2003).

On the other hand, if a firm chooses to finance its needs using short-term local currency funds, another source of vulnerability could arise: maturity mismatches. Given the longer investment horizon of projects, short term debt will result in the need to renew debt more frequently, which increases the exposure of the firm to the changes in interest rates.

Balance sheet fragility arising from currency and maturity mismatches may lead to self-fulfilling crisis. The original sin in the economy worsens the situation during the stress periods. This is partly attributable to the co-movement of real exchange rates and real output. Depreciation of the local currency deteriorates the balance sheets of companies with high levels of foreign denominated debt through two main channels. First, redemptions arising from foreign denominated debt (measured in local currency) substantially increase. In other words, purchasing power of domestic output on foreign claims is reduced significantly. This may have an adverse effect on the liquidity position of these companies.

Second, the level of debt is elevated significantly which have negative effects on companies' balance sheet ratios. In response, companies reduce their investments. This results in the decline of the future output. Diminishing output levels create a

pressure for further currency depreciation (Burger and Warnock, 2003). In addition, public debt denominated or indexed to foreign currencies has crowding out effect on firms' financial stability. It reduces borrowing capacity of the private firms and therefore, it affects the stability of the output produced (Aghion, Bachetta and Banerjee, 2001).

Aguiar (2005) shows that balance sheet imbalances played an important role in the Mexican peso crisis of 1994. In general, foreign currency debt stabilizes the profits of the exporters. However, during the Mexican peso crisis, the amount of debt assumed by exporters reached to a level that exceeded the level implied by optimal hedging strategy. In addition, non-exporters who did not use hedging instruments created significant amounts of net liabilities in foreign currency. Therefore, overall balance-sheet mismatches were one of the main factors that triggered the crisis.

There are other studies which underline the relationship between high levels of foreign currency debt and occurrence of crisis. Eichengreen, Hausmann and Panizza (2005a) suggest that emerging countries are more prone to financial crises than mature economies due to their debt composition. Aghion, Bacchetta and Banerjee (2001) argue that high levels of foreign currency debt increases the likelihood of the crises associated with large recessions and currency devaluations. Reinhart, Rogoff and Savastano (2003) state that foreign currency borrowing increases the vulnerability of emerging countries to external shocks. Flandreau and Sussman (2004) emphasize that the effects of exchange rate crises can be explosive if a country has high levels of foreign currency denominated debt.

The relationship between real output and short term interest rates creates a similar vulnerability for the economy. Policy moves associated with the increases in short term interest rates generally results in declines in real output which in turn

decreases capacity to pay. The existence of foreign currency debt increases the risks arising from the debt indexed to short-term interest rates since the central banks are likely to control exchange rate fluctuation by increasing the volatility of domestic interest rates (Hausmann, 2004).

In the past, we witnessed circumstances where high levels of short term borrowing made financial crises deeper and more difficult to manage. For example, one of the major sources of vulnerability in the Russian crisis of 1998 was identified as the excessive reliance on short term domestic instruments by Mehl and Reynauld (2005). Jeanne (2000) mentions that short term sovereign debt in Mexico and short term liabilities of banking and corporate sectors in South Asian economies made these countries more vulnerable to the crises they had faced.

In general, during the external shocks policy makers ease monetary and fiscal policies, loose the exchange rate, and finance their growing external deficit by borrowing from abroad in order to smooth consumption and stabilize production. However, countries with high levels of foreign denominated debt cannot allow their real exchange rates to adjust since the fluctuations in exchange rates may create doubts about the capacity to pay and reduces willingness of investors to fund these deficits (Eichengreen, Hausmann and Panizza, 2007). Therefore the existence of original sin limits the capacity of policy makers to implement countercyclical policies during the external shocks.

The existence of original sin decreases the effectiveness of the monetary policy as well. Cespedes, Chang and Velasco (2003) show that effects of adverse shocks are larger and more persistent for countries with higher original sin and monetary policy becomes less effective as a shock absorber in these cases. Similarly, Jeanne and Zettelmeyer (2002) suggest that foreign currency liabilities reduce the effectiveness of traditional domestic policy instruments during the economic

shocks. Hausmann, Panizza and Stein (2002) argue that the impact of original sin on exchange rate policy increases if the pass through effect from exchange rates to prices is low.

Original sin not only diminishes the "lender of last resort" role of central banks but also limits the independency of the monetary policy during liquidity crises. Central banks cannot use its policy tools to stabilize the inflation in the presence of high levels of foreign currency or short term debt. Hausmann, Panizza and Stein (2001) suggest that developing countries aim at controlling the volatility of exchange rates due to their reliance on foreign currency debt. The authors suggest that emerging countries are floating with "life jacket" while developed countries have ability to float freely1. Calvo and Reinhart (2000) and Reinhart, Rogoff and Savastano (2003) also present that some emerging countries formally float their currency, but in practice they set forth policies to keep exchange rates within a predetermined band in order to limit the burden arising from the existing liabilities.

Some central banks aim at stabilizing exchange rate movements by holding a large amount of foreign currency reserves. Thus, countries with higher original sin face also with higher volatility in the level of international reserves. However, this strategy is usually associated with cost of carry and accumulated reserves may not be sufficient even in a fixed exchange rate regime if the regime becomes untenable (Eichengreen, Hausmann and Panizza, 2005a). In addition, intervening to short term interest rates in order to limit the volatility in exchange rates is another common measure taken by central banks (Hausmann, Panizza and Stein, 2002). In

[1] Eichengreen, Hausmann and Panizza (2007) and Bordo and Flandreau (2003) also show that the original sin is an explanation of fear of floating phenomenon

this case, high fluctuation in the interest rates poses another threat if a country also has high levels of short term local currency debt.

Another unfavorable result is the lower credit ratings for the countries suffering from original sin. Foreign currency denominated debt implies currency risk whereas short term domestic currency debt is associated with roll-over and interest rate risks. All of these risks are important factors that determine the debt service capacity of the country. Therefore, countries that suffer either from international or domestic dimension of original sin have higher risk premiums and lower credit ratings (Hausmann, 2004). A supporting argument is presented by Eichengreen, Hausmann and Panizza (2007). The authors find that there is a strong negative correlation between original sin and credit ratings. The authors present that a drop in OSIN from 1 to 0 is associated with a five-notch improvement in credit ratings.

In addition to lower credit ratings, original sin results in further deterioration in the creditworthiness of the countries during the exchange rate shocks. Countries face with difficulties to pay the foreign denominated debt and need additional sources to match the increased foreign claims during stress periods. These additional funding needs together with the market perception that the country is having a hard time to perform its obligations, lead to a further deterioration in the creditworthiness of the country. A possible decline in the credit rating of the country limits the access of the borrower to the markets. Thus, countries with higher foreign claims experience higher liquidity crunch during the exchange rate turmoil (Eichengreen, Hausmann and Panizza, 2005a, 2007).

On the other hand, there are also some studies that focus on the positive aspects of foreign currency denominated liability structures. For example, Tirole (2003) finds that the existence of foreign denominated debt is a factor that increases the

governments' accountability. Bohn (1990) and Cowan and Duo (2003) suggest that existence of dollar denominated liabilities lead governments to implement more disciplined monetary policies. Furthermore, since it is very costly for governments to allow their currencies to depreciate in the presence of foreign debt liabilities, countries hesitate to pursue inflationary policies.

There are two main approaches that explain the rationales for the reliance of emerging countries on foreign currency borrowing. The first approach is based on the premise that macroeconomic policies of the government are the dominant factor in the existence of original sin whereas the second approach refers to micro foundations in the economy.

One popular explanation for the inability of countries to borrow long-term in domestic currency is the weakness in policies and institutions. Countries with limited historical presence in capital markets can better manage market expectations through first capacity building activities. The rule of law, legal infrastructure to protect property rights and independent monetary policy adds to the credibility of the country that would in turn enable the country to borrow long-term in domestic currency. Tirole (2003) also mentions that the rule of law is an important factor that affects foreign investors' decision to invest in local currency instruments. In addition, financial stability, sound macroeconomic policies and strong institutions are necessary to deploy foreign funding (Eichengreen, Hausmann and Panizza, 2007).

On the other hand, weak policies and institutions depress the marginal productivity of the capital and thus, limit the attractiveness of the country for the foreign investors (Eichengreen, Hausmann and Panizza, 2007). Goldstein and Turner (2004) suggest that institutional factors have influence on currency mismatches. First of all, macroeconomic and exchange rate policies are

implemented more effectively by well-developed institutions. In addition, well developed institutions are better in governing microeconomic incentives. Better governed microeconomic incentives and effective policy designs are very important in enhancing the confidence of investors to domestic currency. Therefore, countries must pursue better policies and increase the institutional development level in order to address problems related to balance sheet mismatches.

Reinhart and Reinhart (2003) also elaborate on the issue by linking the original sin to the credibility of the policy makers. The authors emphasize that credibility of future policies rather than past legacy determines the global interest to the domestic currency. Improvement in the structure of institutions or positive attitude toward the rule of law may redeem the stain of the past defaults.

A historical analysis on the interaction between the level of development and original sin is presented by Bordo, Meissner and Redish (2003). The authors use country examples to examine this interaction. Before the World War I, countries such as USA, Canada, Australia, New Zealand and South Africa had been suffering from external dimension of the original sin problem. The external debt of the USA had gold clauses in that era. Canada, Australia, New Zealand and South Africa had foreign currency denominated debt. The authors emphasize that these countries did not suffer from original sin problem compared to today's emerging countries since these countries had sounder fiscal and monetary institutions and their debt management policies were more credible. Although, these countries relied on external debt in foreign currency, the amounts were relatively small compared to their domestic markets. Therefore, the currency mismatches were relatively small in these countries. In addition, authors state that these countries

were less exposed to maturity mismatches thanks to their ability to borrow long-term debt in domestic markets.

Although sound macroeconomic policies and well developed institutions is one of the popular explanations of the original sin problem, Flandreau and Sussman (2004) suggest that they are not sufficient enough to explain the phenomenon. The authors present Russia, Spain and Austria-Hungary as examples of the countries which did not have sound macroeconomic or political record. Though, these countries were able to issue local currency debt. On the contrary, currencies of the some reputable countries such as Denmark, Norway and Sweden are rarely preferred abroad as issuing currencies.

Another popular explanation for the root causes of the original sin is referred to poor domestic monetary policy. Poor monetary credibility is an important factor on both international and domestic side. Foreign investors hesitate to invest in local currency instruments if the monetary and fiscal authorities are inflation prone. Under poor monetary regime, authorities are more likely to manipulate the value of local currency. Therefore, developing a reputation for price stability is an important step for redemption. Burger and Warnock (2003) state that achieving the price stability may result in increased interest of foreign investors to local currency instruments.

Monetary policy is also an important factor from domestic investors' standpoint. Ize and Levy Yeyati (1998) approach to the problem from the portfolio effect perspective. They suggest that weakness in monetary policy increases the demand for foreign currency assets. The dominance of foreign currency assets results in increasing liability dollarization. Arteta (2002) also shows that countries with a history of high inflation are more prone to dollarization.

Reinhart, Rogoff and Savastano (2003) suggest that high inflation and severe macroeconomic instability adversely affect the confidence of residents to the domestic currency. In this kind of environment, investors prefer foreign currency instruments in order to protect the future value of their investments. This also creates a tendency for governments to issue foreign currency debt. The authors also emphasize that achieving low inflation for a short period is not sufficient so as to decrease the degree of dollarization in the economy. Instead, countries with history of chronic inflation problems need to maintain low inflation levels for a long period to redeem from the problem. Burger and Warnock (2004) indicate that countries with better inflation performance have larger local currency bond markets and thus, they rely less on foreign markets.

Jeanne (2003) has presented a model in which original sin comes from lack of monetary credibility. The author argues that credible monetary policy regime enables the country to borrow in long term from domestic markets. Reliance on long-term funding from local markets naturally reduces the dependence on foreign currency instruments and thus, the original sin problem.

Eichengreen, Hausmann and Panizza (2007) argue that although fear of inflation reduces the willingness of foreign investors to invest in local currency instruments, it is not sufficient to explain original sin phenomenon. The authors stress that if price stability is sufficient to redeem from foreign currency borrowing then inflation indexed local currency debts of well-behaved countries would be more common. However, instead of inflation indexed instruments, investors prefer instruments denominated in few major currencies.

Exchange rate regime is also an important factor that is linked with the original sin problem. In some studies it is found that original sin stems from the fixed

exchange rate regime while the other studies have contradictory findings in which original sin is attributed to the flexible exchange rate regime.

Burnside, Eichenbaum and Rebelo (2001), Goldstein (2002) and Eichengreen and Hausmann (1999) argue that fixed exchange rate regime serves as an implicit guarantee mechanism. There is an incentive for the firms to borrow excessively in foreign currency under pegged exchange rate regime since they believe that the value of the currency will be protected by the government. This way of thinking creates moral hazard problems.

On the contrary, Arteta (2002) suggests that liability dollarization is an adverse outcome of the floating exchange rate regime. Households try to insure themselves against the exchange rate flexibility by investing in foreign currency assets. In order to manage the currency risk, banks increases foreign currency loans. Therefore, flexibility of exchange rate regime increases the liability dollarization.

Chamon and Hausmann (2004) argue that the central bank's behavior in choosing between exchange rate and interest rate adjustments can play a very significant role in market's choice of currency combination of the debt. Countries that suffer from original sin are the countries where the central bank focuses on stabilizing the exchange rate at the expense of high volatility in interest rates.

In fact, the exchange rate policy response to financial shocks depends on the portion of the firms that are indebted in foreign currency (Jeanne, 2000). If a country has large amounts of foreign currency liabilities, then the Central Bank will choose to stabilize the exchange rate at the expense of high interest rate volatility. Even in some countries with high foreign currency denominated debt, central banks have tendency to manipulate the value of currency in order to erode the real value of the claims (Eichengreen and Hausmann, 1999). In other words,

monetary policy is going to be tailored for the existing liability combination. Conditions of new borrowing is then determined by the central bank`s policy towards exchange rate fluctuation. As a result, a lender will prefer foreign currency debt in a country with a high foreign denominated debt (Chamon and Hausmann, 2004).

Calvo and Guidotti (1990) mention that lenders refuse to provide funds in domestic currency because of the possibility of devaluation in emerging countries. Even residents may prefer to invest in foreign denominated assets in order to protect themselves against currency depreciation. In other words, residents diversify their income risk by lending to domestic borrowers in foreign currency. Since residents' income in domestic currency declines during stress periods, foreign currency assets can compensate these losses in these periods (Eichengreen and Hausmann, 1999).

Interestingly, not only lenders but also borrowers prefer foreign currency denominated debt under the possibility of devaluation. Domestic currency debt generally has higher real payment when there is no devaluation, whereas foreign currency denominated debt imposes higher costs when there is a large devaluation. The difference between nominal interest rates on foreign and domestic currency debt increases when the probability of devaluation increases. Large scale devaluations may trigger default for the borrower firms. Since firms only consider non-default states, higher differences in real interest rates imply higher demand for foreign currency borrowing.

Devaluation expectations create a tendency for borrowers to shift from long-term domestic currency instruments to alternative instruments such as indexed debt, short term borrowing or foreign currency debt. If a country does not have well developed financial markets that allow indexed debt then the country is

constrained by only short term or foreign currency debt (Jeanne and Zettelmeyer, 2002).

Fiscal solvency is considered as another factor for the original sin. Corsetti and Mackowiak (2005) argue that the composition of public liabilities has a decisive role on macroeconomic factors and the magnitude of exchange rate adjustment during the stress periods. The authors conclude that the interaction of weak public finances and original sin leads to a vicious cycle. High levels of public debt in foreign currency necessitate large devaluations or high inflation rates to restore the fiscal equilibrium. In other words, a government with a weak fiscal position has an incentive to debase its currency in order to decrease the real value of its obligations. The market expectation of large devaluations or high inflation rates makes local currency lending less attractive. This results in further increases in foreign denominated debt stock.

Mehl and Reynaud (2005) elaborate on the issue by stressing that the domestic component of original sin is more severe when the debt burden of the country is high. Governments with high levels of debt generally have higher risk premiums which pose a constraint to the ability to borrow in longer terms. In addition, lenders have concerns about governments' attitude towards inflation since they may inflate debt obligations. The authors suggest that soundness of fiscal policies is one of the determinants of domestic public debt composition.

Another approach to original sin problem is to explain the phenomenon by the development levels of the financial markets in the countries. Bordo, Meissner and Redish (2003), Burger and Warnock (2003) and Kahn (2005) state that financially underdeveloped countries suffer from original sin. Caballero and Krishnamurthy (2003) state that financially underdeveloped countries offer limited range of debt

instruments to investors hence they are unattractive for both domestic and foreign participants.

On the other hand, deeper domestic capital markets help extend the choice of instruments that may address currency and maturity mismatch problems. Development of domestic financial system enables long term borrowing, thus it is an important step for redemption from domestic component of the problem. In addition, deeper domestic markets decrease the reliance on external markets. Therefore, they help redeem form international original sin (Kahn, 2005).

However, presence of deep and liquid local bond markets would not be sufficient to redeem from the original sin problem unless market participants have confidence in domestic currency. In an economy where the domestic currency is not considered strong, foreign currency denominated or short term borrowing instruments may be preferred in local markets. Therefore, financial development together with confidence in local currency could address the problem of original sin. Kahn (2005) emphasizes that although there is an expansion of domestic bond markets in many emerging economies; most of the bonds issued are either in short term or indexed to foreign currency.

In order to build deep and liquid domestic markets, countries must adopt securities market regulations, discourage insider trading and market manipulation, increase transparency, establish independence and credibility of monetary and fiscal institutions and build a good track record on the policies implemented (Eichengreen and Hausmann, 1999). La Porta et al. (1997) emphasize that a good legal environment is a precondition for the development of the bond market. Similarly, Burger and Warnock (2003) argue that local bond market development is strongly related to the rule of law. In addition, local currency bond markets become more attractive to foreign investors with the adoption of creditor

friendly policies. In emerging countries, local authorities have efforts to establish benchmark yield curves and develop regular programs for the issuance of government bonds to facilitate the development of domestic bond markets (Mehl and Reynaud, 2005).

Attracting foreign investors and engagement of corporate investors such as domestic pension funds are important steps to widen the investor base. Hausmann and Panizza (2010) state that since the financial crisis of 2008, some countries have increased their presence in domestic bond markets and their long-term fixed rate debt is increasing relative to other instruments. However, authors stress the limited participation of foreign investors to these markets. Burger and Warnock (2003) argue that limited participation of the foreign investors is due to the volatility in returns and low credit ratings. The authors have shown that US investors do not prefer local currency denominated bonds of countries with higher past and prospective returns volatility.

Eichengreen, Hausmann and Panizza (2007) suggest that although development of local markets decreases the dependence to external markets and in turn help redeem from original sin, this preference is not the optimal solution for these countries. International borrowing and lending enables countries to smooth the consumption, diversify the risks and increase investments. Therefore, even developed countries like USA should benefit from capital inflows in spite of the fact that the country has a well-developed domestic financial market.

Broda and Levy Yeyati (2003) state that in general, bankruptcy laws or deposit insurance schemes do not differentiate the foreign currency assets from the domestic ones. This equal treatment of foreign and domestic claims in the event of default leads to a decrease in foreign currency interest rates. This induces banks to cheaper foreign currency funding since banks do not pay the higher cost

associated with foreign currency deposits in the event of default. Therefore, higher dollarization is the outcome of the mispricing arising from currency-blind insurance systems rather than the moral hazard consequences of these schemes.

Moral hazard problems related to government actions could be another explanation for the original sin problem. Government guarantee schemes create moral hazard problems that lead to increasing foreign currency debt. Schneider and Tornell (2004) and Burnside, Eichenbaum and Rebelo (1998) indicate that firms are willing to increase their risk exposure by borrowing in foreign currency when there is an expectation that government will enforce bailout guarantee mechanisms in case of defaults. South Asian crisis can be given as an example for the moral hazard problem created by bailout guarantees.

Tirole (2002) discusses the liability dollarization problem from "dual and common agency" perspective. He suggests that a foreign investor's return depends not only on private counterparty's behavior but also on behavior of borrower's government. However governments do not entirely consider foreigners' welfare since they do not have any voting rights. Therefore, the expected return of the foreign investors may be affected by the moral hazard problem of the governments. For instance, if the government is failing to take steps that would decrease the risk of currency devaluation, then foreign investor's return from local currency lending would be adversely affected.

Although most of the studies focus on macroeconomic factors to explain the original sin problem there are some other studies that focus on microeconomic incentives. Chamon (2002) disagrees with the idea that foreign denominated debt stems from the moral hazard problem of the government. He suggests that moral hazard problem of individual borrowers' is the underlying reason for excessive foreign currency debt.

Aghion, Bacchetta and Banerjee (2001) argue that an individual borrower does not consider vulnerabilities created by its borrowing composition decision; rather it determines currency composition of its debt with respect to currency composition of the rest of the economy. The individual borrower could not affect the occurrence of the crisis by itself. However, shifting to domestic currency borrowing increases the cost of borrower. Therefore, it is not optimal for firms to borrow in domestic currency although domestic currency borrowing is the socially efficient option.

As discussed previously, devaluation risk makes local currency debt more expensive than foreign denominated debt. The expected cost advantage of foreign denominated debt is higher in the countries that have higher devaluation risk. Although, foreign currency liabilities poses higher payments than domestic currency liabilities after large-scale devaluations, entrepreneurs find foreign currency borrowing optimal due to ex-ante lower interest rates (Jeanne, 2000).

Although foreign denominated debt has expected cost advantages, domestic currency liabilities improve international risk sharing and can prevent defaults after the economy was hit by the shocks as the value of domestic currency is low during the stress periods and high during the good ones. However, firms make their decision according to the good state of economy -choose foreign debt at expected lower cost- since they either default or partially repay their debt in the bad state of the economy. This moral hazard problem of the individuals defines the currency profile of the debt portfolio of the country (Chamon, 2002; Aghion, Bachetta and Banerjee, 2004).

Brown, Ongena and Yesin (2009) show that when banks have imperfect information regarding the level and currency denomination of revenues of borrowers, more local currency earners switch to foreign currency loans as the

firms do not bear the full cost of the corresponding default risk. In other words, the imperfect information regarding the private firms' revenues results in mispricing of the risks and makes foreign borrowing cheaper to the issuer.

In Eastern Europe countries, households borrow in Euros, Swiss Francs or Japanese Yen in order to benefit from the substantially lower interest rates. Since these households are not engaged with exporting activities, they bear high levels of currency risk (Brown, Ongena and Yesin, 2009).

There are several studies that discuss the relationship between foreign currency debt and signaling. Ross (1977) mentions that foreign currency borrowing abroad entails more regularity costs. Thus, better firms will borrow in the foreign currency in order to signal their quality. A similar argument is presented by Besancenot and Vranceanu (2004). The authors argue that foreign lenders are not able to analyze a firm's financial position with its all aspects and a signaling mechanism is needed to identify the firms with high corporate governance and financial strength. Therefore, a good firm may accept higher clearance cost of the foreign debt in order to benefit from the expected lower yields on the issue. If the difference between clearance costs of domestic and foreign currency debt is not significant enough, low quality firms would also prefer foreign currency borrowing. This tendency results in excessive foreign currency borrowing regardless of the financial positions of the issuers and diminishes the signaling effect.

A number of studies emphasize that the foreign currency debt arises from commitment problems. For example, Jeanne (2000) argues that foreign currency debt gives the borrower more incentives to continue their business activities since policy makers could not protect the issuers from early termination of their activities by using exchange rates. Therefore, lenders anticipate foreign currency

borrowing as a commitment device and they require lower interest rates on the debt. If the expected cost of early termination is smaller than the benefits associated with lower interest rates of foreign currency debt, then borrowers will prefer foreign currency borrowing. Foreign currency debt is a commitment device not only for individual borrowers but also for governments. Calvo (2001) and Cowan and Do (2003) suggest that governments may issue foreign currency debt in order to reveal their commitment to stable exchange rates.

Flandreau and Sussman (2004) argue that the original sin problem does not stem from the lack of credibility or commitment problem of the governments; rather it is tied to the market liquidity. Currencies that are backed by liquid money markets are attractive to the investors since they can be easily converted to the investors' local currency. In addition, there is usually a liquidity premium associated with debt instruments issued in less liquid markets. Therefore, countries prefer more liquid currencies instead of their local currency in order to decrease the cost of borrowing.

Eichengreen, Hausmann and Panizza (2007) argue that original sin is a consequence of structural features of global financial markets rather than the inefficiency of domestic policies or institutions. Portfolios around the world are dominated by assets denominated in several currencies. The transaction costs and decreasing marginal benefit of each additional currency results in portfolios where diversification is tried to be achieved with only limited number of currencies (Kahn, 2005). Eichengreen, Hausmann and Panizza (2007) emphasize that the concentration of global portfolios in assets denominated in very few currencies is beyond the direct control of individual countries.

Flandreau and Sussman (2004) also suggest that there is an exclusive club of vehicle currencies and investors prefer to hold and trade bonds denominated in

these currencies. Authors state that the status of key currency was path dependent on historical trade, trade finance relations and in some cases political and military finance. They claim that in order to solve original sin problem a country should emerge as a powerful economy with large trade flows such as the Japanese case in the post Second World War era. Eichengreen, Hausmann and Panizza (2005b) also support this idea with an example. They state that Britain was the leader in industry, trade and lending in the past. Therefore, sterling was one of the few currencies that were used for the denomination of international claims.

The other factors that are linked to original sin are related to the access to the global capital markets and the shape of yield curves. Reinhart, Rogoff and Savastano (2003) state that increased access to global capital markets results in the rise in dollarization. Mehl and Reynaud (2005) show that domestic dimension of original is severe when the yield curve is inverted.

A wide range of proposals including setting measures to enhancing transparency and establishment of the global central bank are suggested in order to redeem from the original sin problem (Jeanne, 2000). At a first glance, countries can use regularity policies to restrict capital accounts to prevent the problems arising from currency mismatches. Although redemption from original sin can be achieved through these options, it should be noted that these options have alternative costs. Hausmann and Panizza (2003) suggest that capital controls can reduce original sin since they narrow the range of alternative funding or investment opportunities. Therefore, capital controls can force residents to hold long term domestic currency bonds (Haussman and Panizza 2003).

However, restricting the capital accounts result in capital flight. This means forgoing the benefits of foreign finance. The investments decline and financial costs increases under these circumstances (Reinhart, Rogoff and Savastano, 2003).

In addition, Mehl and Reynaud (2005) indicate that lifting capital controls is expected to reduce original sin by contributing to the widening of the investor base for foreigners.

Alternatively, countries may accumulate high level of international reserves or borrow shorter terms in order to decrease the effects of currency mismatches. Holding massive amounts of reserves generally impose high opportunity costs. On the other hand, reliance on short term domestic debt is also not a best solution for the problem since it creates maturity mismatches (Eichengreen, Hausmann and Panizza, 2005b).

Goldstein and Turner (2004) argue that sound fiscal and debt management policies are important in redemption from original sin. Kahn (2005) suggests that regional bond markets may increase participation of non residents in domestic bond markets. The developments in Asian bond markets could be given as an example for these kinds of initiatives.

Hausmann (1999) states that abandoning national currency in favor of an international or supranational currency such as USD or Euro can help countries redeem from original sin problem. As of 2002, Panama is an example of a dollarized economy with the largest domestic credit market in all Latin America and the Panamanian markets offer fixed-rate mortgage loans up to 30-year. However, dollarization leads to loss of monetary autonomy and flexibility of exchange rate policies. Central banks lose seigniorage revenues and could not able to intervene to the liquidity crisis by printing money.

In addition, international organizations can contribute to the solution by issuing instruments denominated in emerging market currencies. Eichengreen, Hausmann

and Panizza (2005b) emphasize that international financial institutions have played significant role in the international bond issuances in exotic currencies.

Eichengreen and Hausmann (2003) state that solution to the problem is beyond the control of the individual countries and international initiative is necessary to overcome the problem. The authors propose an international solution for the phenomenon. Their plan consists of four steps. First step is the creation of an inflation indexed basket of currencies of developing and emerging countries. In the second stage multilateral institutions such as the World Bank should issue debt denominated in this index. They can also convert some of their existing claims into this index. In the next step G-10 sovereigns issue some portion of their debt in this instrument and swap their currency exposure with the countries in the index. This will deepen and broaden the EM markets. Final step is to encourage institutional investors and mutual funds to create structured products from this index for further development of the market.

Ozmen and Arinsoy (2005) find that although, flexible exchange rates and strong macroeconomic policy stance with sound institutions are necessary for the redemption from the original sin, they are not sufficient by themselves. Redemption from the problem requires an international solution such as reform of the international financial system that allows complete markets for currencies of countries with sound macroeconomic conditions and better institutions.

For the domestic component of the phenomenon, Mehl and Reynaud (2005) claim that domestic original sin can be reduced substantially by establishing sound macroeconomic policies, enhancing investor base and providing attractive long term yields. These factors play an important role in reducing the risks arising from long term debt and thus, they increase the demand for longer term instruments. This naturally reduces domestic original sin.

On the other hand, the adverse effects of original sin can be mitigated by hedging currency exposures (Eichengreen, Hausmann and Panizza, 2007). Investors prefer a hedge strategy to direct lending in domestic currency since this allows investors to separate country risk from currency risk. When, local currency debt is issued by highly rated foreign counterparties and foreign currency debt is issued by residents, these risks are separated. Hence, both the volatility of returns and the cost of borrowing decline (Haussman and Panizza, 2003). Chamon (2002) states that South Africa could able to issue foreign liabilities in its own currency by using swap mechanisms.

CHAPTER 3

THE FACTS ABOUT ORIGINAL SIN

Most of the debt issued is denominated in several well-known currencies such as US dollars (USD), Pound, Euro, Swiss Franc and Japanese Yen. Although, the largest portion of the debt belongs to the home countries of these currencies, there are many other countries that issue debt instruments in these five currencies. This is mainly attributable to the inability of the other countries to borrow abroad in their own currencies and this situation is known as original sin in the economics literature. Original sin is a global phenomenon and almost all countries are affected from the problem to some extent. On the other hand, there are significant efforts of some countries to increase their ability to borrow abroad in the last decade.

In the first section of this chapter, developments in the debt markets in the last decade are discussed. The developments in the international markets are also elaborated in this section. In the following section, original sin phenomenon and alternative original sin indicators are described. In the last section of this chapter, the developments in the original sin values of the countries are analyzed.

3.1 Developments in the Debt Markets:

Globalization process that the world economy is getting through has significantly increased the importance of capital markets. Debt securities[2] around the world

[2] Include the securities that issued in both domestic and international markets.

constitute 37 percent of the all capital market instruments. Since 2001 the size of debt securities more than doubled and reached to USD 94.8 trillion as of 2010. This increase is slightly higher than the increase in gross domestic product (GDP) around the world. The size of the debt securities to world's GDP was 135 percent at the beginning of the century whereas it increased to 151 percent as of 2010 (Figure 1). This figure stresses the increasing importance of the debt markets.

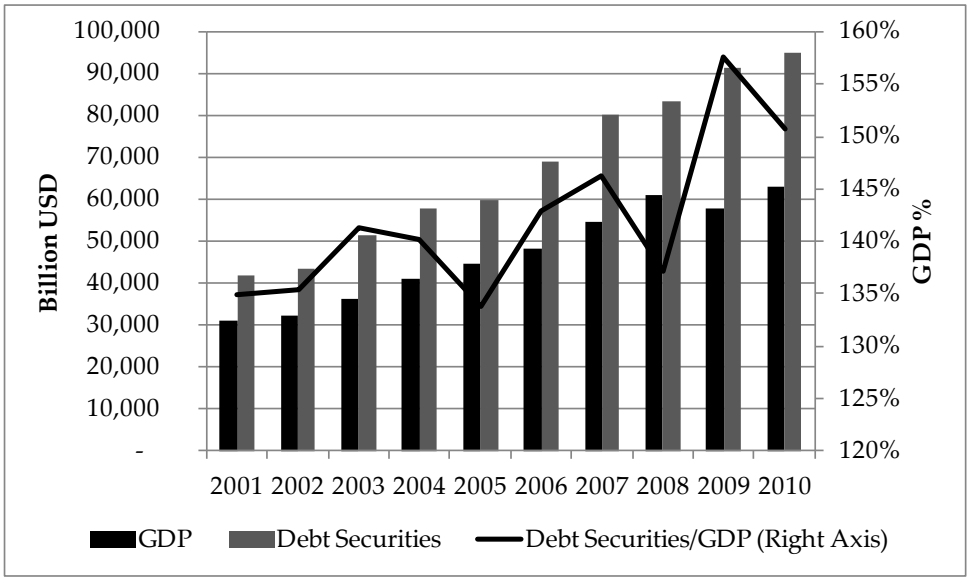

Figure 1: Gross Domestic Product and Debt Securities (2001-2010)[3]

The debt securities of US reached to USD 32.5 trillion as of 2010. This corresponds to a 76 percent increase compared to 2001. Euro area follows US with a debt size of USD 24.8 trillion. Since 2001 debt securities of emerging countries increased about four times and reached to USD 8.9 trillion as of 2010 (Figure 2).

[3] Source: International Monetary Fund (IMF) – Global Financial Stability Reports

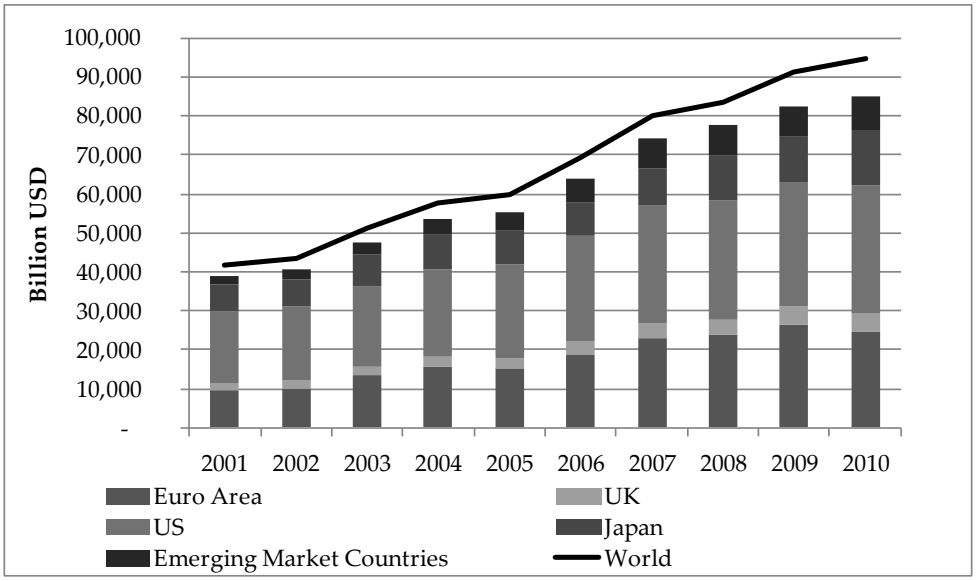

Figure 2: Issuer Breakdown of Debt Securities (2001-2010)[4]

Although the debt security issuances of emerging market economies increased almost four times during 2001-2010, the issuances of emerging markets still makes up only a small amount of total debt securities compared to their developed counterparties. As of 2010, Euro area, US, UK and Japan constitute 80.4 percent of the debt security markets whereas other developed countries and emerging economies have only 10.2 percent and 9.4 percent shares respectively (Figure 3).

[4] Source: International Monetary Fund (IMF) – Global Financial Stability Reports

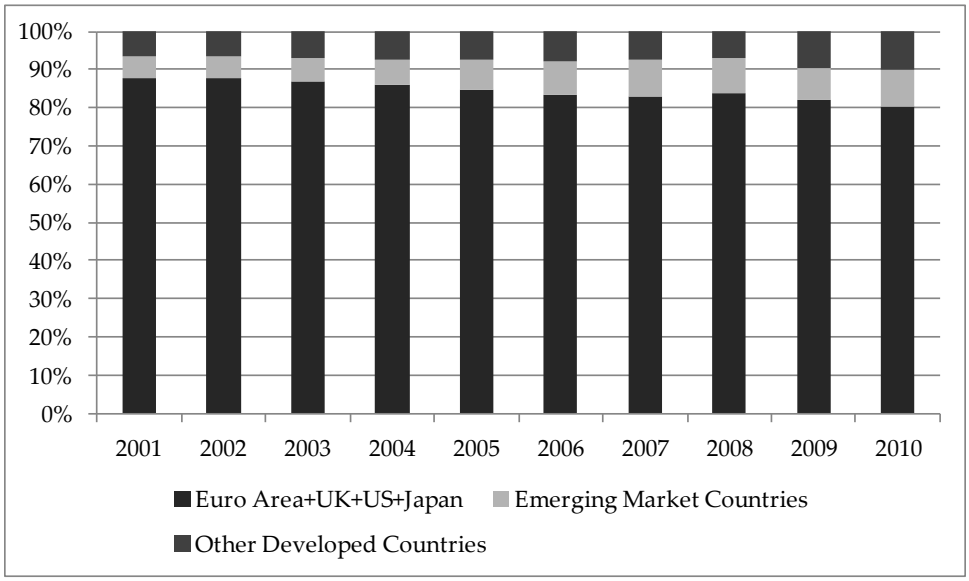

Figure 3: Debt Securities by Issuer (2001-2010)[5]

The large share of Euro area, US, UK and Japan in all issuances may be attributable to the significant contribution of these countries to the world's economy. However, their dominancy in debt security markets is beyond their contributions. On the contrary, emerging market economies are under presented in debt security markets relative to their share in world's GDP (Figure 4).

[5] Source: International Monetary Fund (IMF) – Global Financial Stability Reports

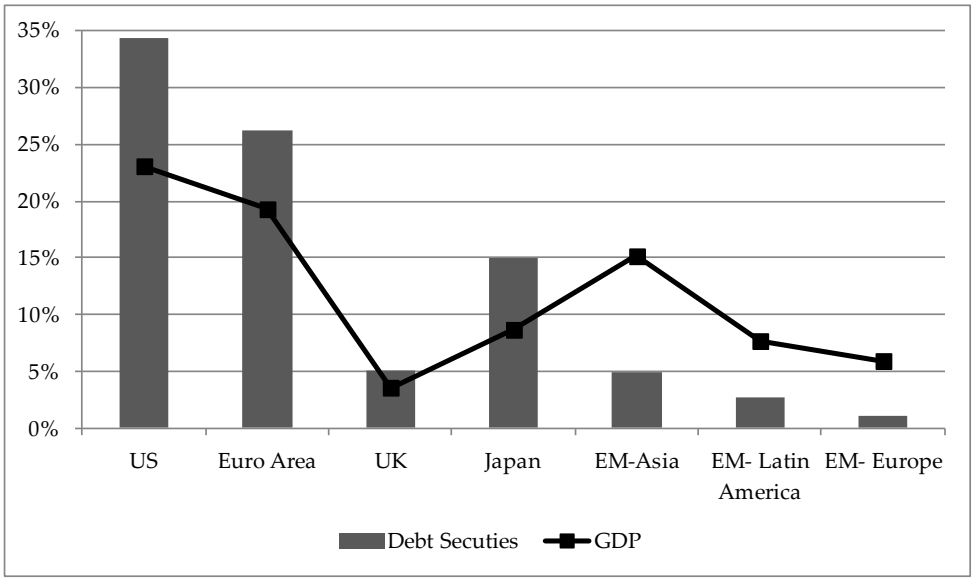

Figure 4: Debt Security Markets and GDP Shares of Countries[6]

During 2001-2010 period growth in debt security issuances of developing countries is mainly driven by domestic market issuances. International market issuances increased twice while domestic market issuances increased more than four times (Figure 5). There are several plausible reasons for this situation. Emerging markets prefer to borrow from domestic markets in order to eliminate the currency risk. Most of the emerging countries experienced currency crisis during 90's. Thus, they may accept interest rate risk and borrow at relatively shorter maturities in domestic currency to avoid adverse effect of currency fluctuations.

[6] Source: International Monetary Fund (IMF) – Global Financial Stability Reports

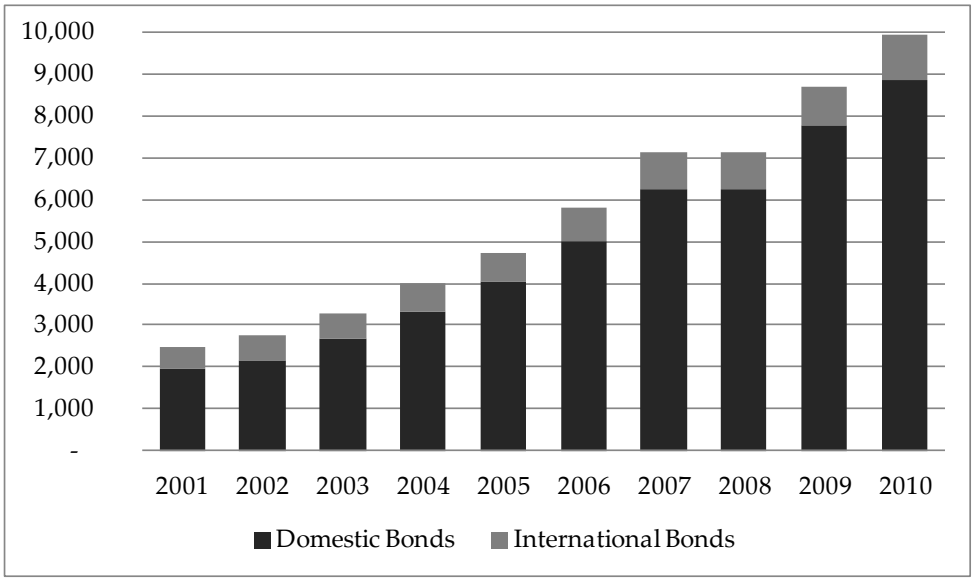

Figure 5: Debt Securities Issued by Developing Countries[7]

Maturity extensions in local markets create incentive for issuers to focus more on their domestic markets. Figure 6 displays the evolution of average maturity of domestic central government debt issued by emerging countries. There is an increasing trend in the maturities. In 1993, the average maturity of the securities that are issued in local markets by emerging countries was 7.5 years. This figure increased to 10.5 years in 2010.

[7] Source: International Monetary Fund (IMF) – Global Financial Stability Reports

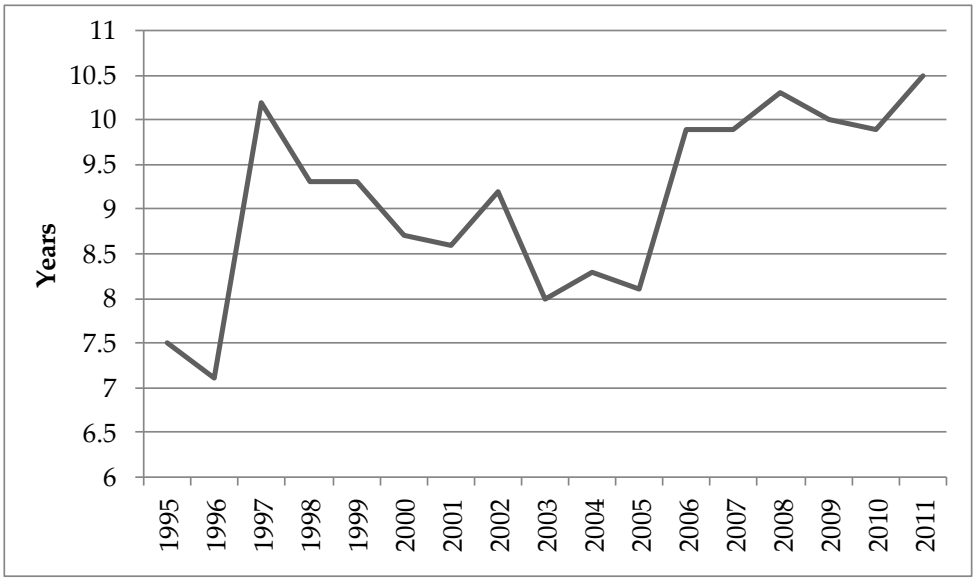

Figure 6: Maturity of Debt Securities Issued by Developing Countries[8]

Moreover, participation of foreign investors is an important factor in local market development. Normally, the securities that issued in local markets and held by foreign investors should be classified as external debt. However, it is not easy to track down the ultimate holders of these securities and in general, the bonds issued in domestic markets are considered as local bonds regardless of the holder structure of these bonds (Panizza, 2008).

Although the development of domestic markets does not increase the ability of countries to borrow abroad in their own currencies by itself, it has positive effects on the ability of the countries to deal with international dimension of original sin problem. The development in domestic markets decreases the dependency to the international markets, thus it enhances the external balances of these countries.

[8] Source: Bank of International Settlements (BIS)

3.1.1 International Capital Markets:

The size of international debt security market[9] is USD 27.7 trillion as of 2010. The market is dominated by Euro area countries, US, UK, Japan and Switzerland (residents of top 5 currencies) with a size of USD 22 trillion as of 2010. However, there is USD 26 trillion outstanding debt securities issued in the currency of these countries. In other words, Euro, USD, Pound, Japanese Yen and Swiss Franc are also preferred by other countries in their international debt security issuances (Figure 7).

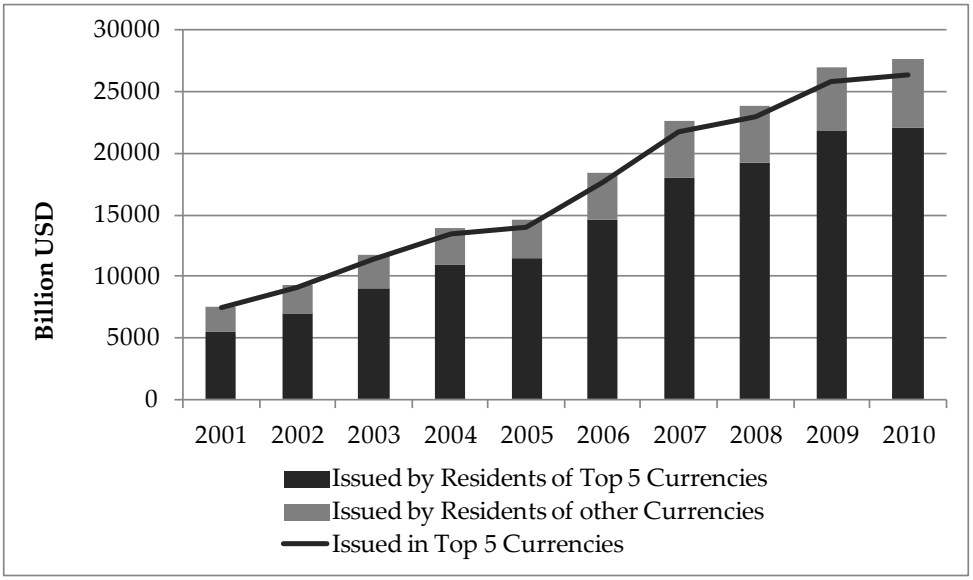

Figure 7: International Debt Securities w.r.t Currency and Residency (in USD)[10]

[9] Money market instruments, bonds and notes

[10] Source: Bank of International Settlements (BIS)

The concentration of securities in top five currencies is not a new phenomenon but recently, there is a very gradual decline in their domination. As of 2001, the share of debt securities issued in top five currencies was 98 percent whereas the share of the debt securities issued by the residents of top five currencies was around 73 percent. As of 2010, the share of top five currencies in the international debt securities declined to 95 percent despite the fact that the share of debt securities issued by the residents of top five currencies increased to 80 percent (Figure 8).

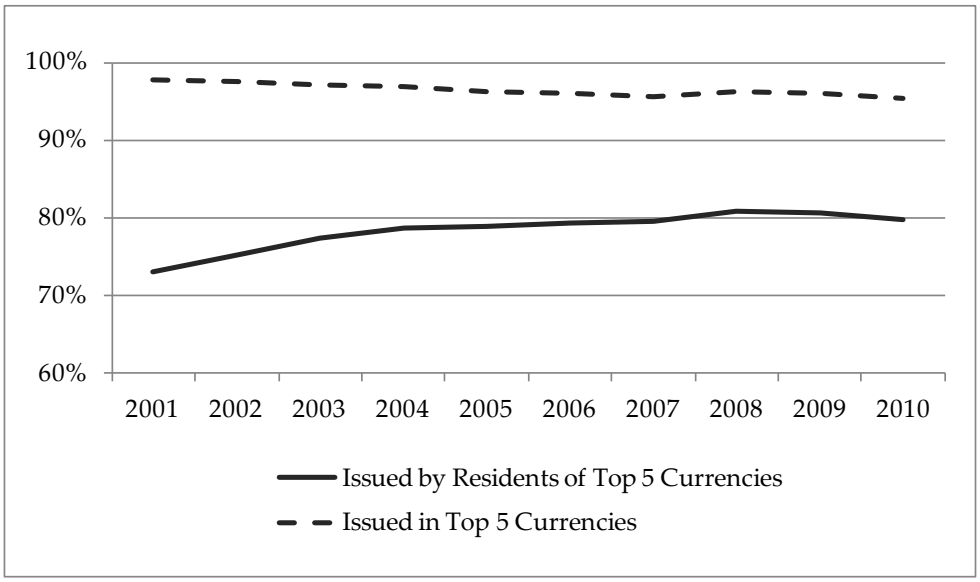

Figure 8: International Debt Securities w.r.t Currency and Residency (in%)[11]

[11] Source: Bank of International Settlements (BIS)

3.2 International Dimension of Original Sin:

In the previous section the discussions indicate that most of the countries issue debt securities in one of the top five currencies. In other words, most of the countries have difficulties to issue debt in their own currencies. This phenomenon is commonly regarded as the international original sin. This is one of the dimensions of the original sin phenomenon introduced by Eichengreen and Hausmann (1999). As it was discussed in Chapter 2 inability of countries to borrow abroad in their own currencies is an important factor in economic and financial stability of the countries. The rest of this study focuses on the international dimension of the original sin phenomenon.

3.2.1 Measuring International Original Sin:

Eichengreen, Hausmann and Panizza (2005) developed three indexes in order to measure the international dimension of the original sin.

First indicator of original sin is:

$$\text{OSIN1}_i = 1 - \frac{\text{Securities issued by country } i \text{ in currency } i}{\text{Securities issued by country } i}$$

This index takes values between zero and one. If a country issues all of its securities in foreign currency then it would get one, if a country issues all of its securities in domestic currency then it would get zero. This index only covers the debt securities. It does not include any hedging instrument.

Hedging instruments enable countries to change the original terms of their debt securities. For example if a country issues a bond in foreign currency and swaps it into the local currency, the resulting net cash flows will be in the local currency for

the issuer. Hence the currency risk is hedged, and adverse effects of borrowing abroad in foreign currency no longer exist. Therefore an index that captures hedging instruments is a better indicator in terms of measuring original sin.

In order to address these problems the authors have developed two other indexes. The coverage problem is handled by introducing Index A.

$$\text{Index A}_i = \frac{\text{Securities and loans issued by country } i \text{ in major currencies}^{12}}{\text{Securities and loans issued by country } i}$$

Index A includes also the debt in the form of loans. The main assumption in this calculation is that all the debt issued in currencies other than five major currencies is denominated in local currency.

In order to capture hedging instruments, the authors introduced Index B.

$$\text{Index B}_i = 1 - \frac{\text{Securities in currency } i}{\text{Securities issued by country } i}$$

However, this measure can take negative values for the countries where the debt issued in local currency is more than the debt issued by the residents of that country.

Therefore, the authors developed OSIN3 index where all negative values are substituted with zero.

$$\text{OSIN3}_i = \text{Max}(0, 1 - \frac{\text{Securities in currency } i}{\text{Securities issued by country } i})$$

OSIN2 index use Index A and OSIN3 measures:

[12] Major currencies are: USD, Euro, Japanese Yen, Swiss Franc, Pound

$$\mathrm{OSIN2}_i = \mathrm{Max}(\mathrm{IndexA}_i, \mathrm{OSIN3}_i)$$

Although this measure has a wider coverage, it is a less precise measure due to data limitations on bank loans. Therefore OSIN1 and OSIN3 are widely used in the related literature. In the following section and rest of this study OSIN3 measure is used for the calculation of original sin and OSIN refers to the OSIN3.

3.2.2 Developments in International Original Sin:

Most of the developing countries face with difficulties in issuing debt in their own currencies in international markets. For the developing countries weighted average of the OSIN is 0.80 and more than half of these countries have OSIN of 1 as of 2010.

Since international bond markets are denominated by five major currencies, US, UK, Japan, Switzerland and countries that belong to Euro area enjoy extremely low OSIN values. As of 2010, weighted average of OSIN for these financial centers is 0.07.

Average OSIN of other developed countries is 0.57. Although in the developed countries original sin problem is not as severe as in developing counties, still their average OSIN is quite high compared to the average OSIN of the financial centers (Figure 9).

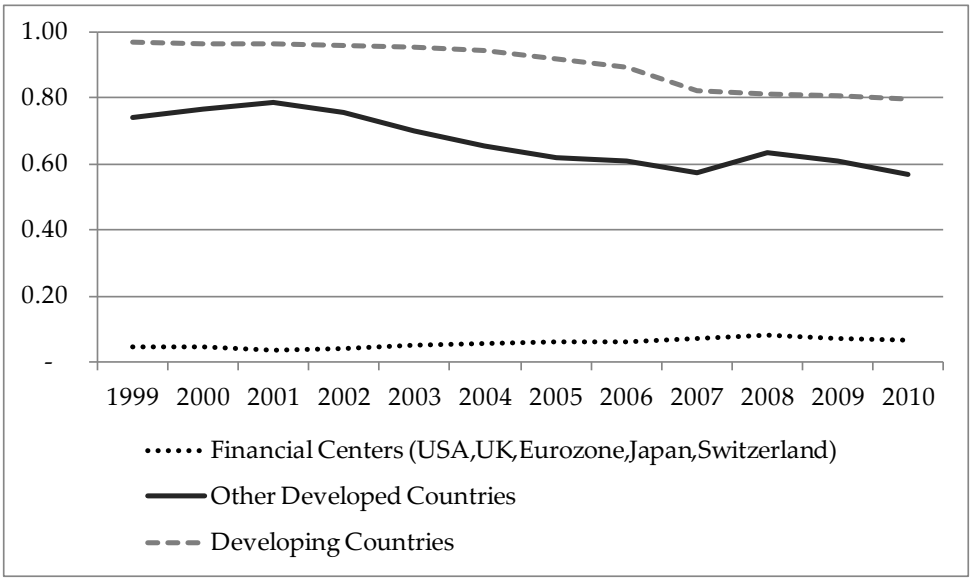

Figure 9: Evolution of Original Sin in Country Groups[13]

When the evolution of original sin in the developing countries is further analyzed, it is seen that almost all developing countries have very high levels of original sin values at the beginning the 21th century (Figure 10). The average original sin values for all regions declined remarkably in the last decade. However, the redemption for developing countries is quite limited and OSIN average of the emerging countries is still very high compared to financial centers. During the last decade, the largest reduction was in Europe region. This was followed by Latin American and Caribbean countries.

As of 2010 the lowest OSIN averages belongs to the developing countries in Europe with 0.74 and highest OSIN averages belongs to Asia and Pacific region with 0.87[14].

[13] Source: Bank of International Settlements (BIS)

[14] "Africa and Middle East" category seems to have lower average original sin values; this is driven by South Africa's very low original sin. Debt securities issued by South Africa

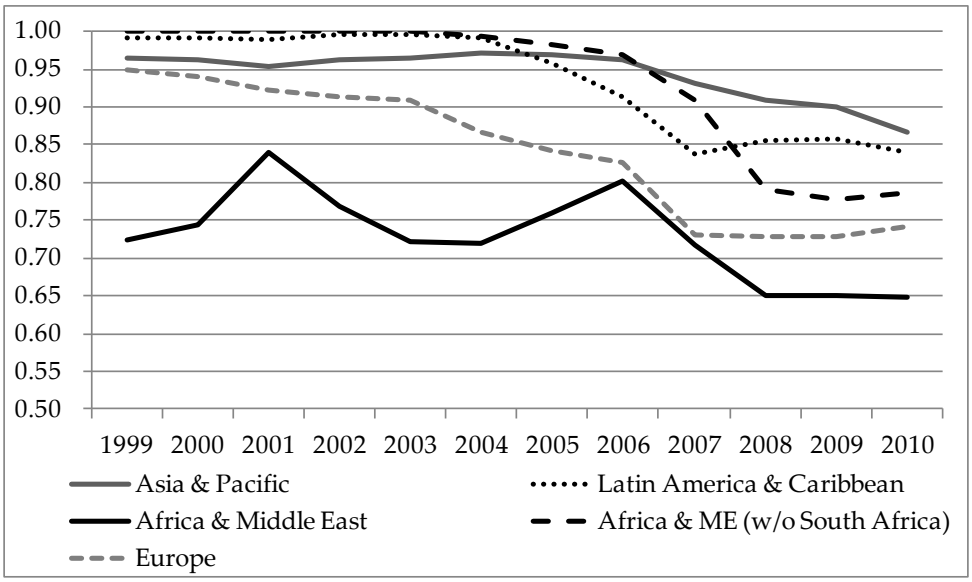

Figure 10: Evolution of Original Sin in Developing Countries[15]

In general, developing countries face with severe original sin problems; however some of the developing countries managed to achieve lower original sin values over last decade. South Africa, Czech Republic and Poland are examples of the developing countries with low original sin values. Swap opportunities played an important role in the low OSIN values of these emerging countries. Hausmann and Panizza (2003) point out that according to JP Morgan reports the debt instruments denominated in currency of these countries are issued by highly rated

constitute 23 percent of the issuances on the average through 1999-2010. Although all other countries have original sin of one until 2005, average of the category is lower than the average of other categories thanks to very low OSIN of South Africa.

[15] Source: Bank of International Settlements (BIS)

multinationals. Then these securities are swapped into hard currencies with the government or other issuers of these countries.

In this chapter it is highlighted that most of the countries around the world are having difficulties in finding local currency debt in external markets. This problem is not limited to the developing countries, in fact only a small number of countries enjoys extremely low levels of original sin. Since it is a global phenomenon, determining the reasons for the problem have a great importance.

CHAPTER 4

THE DETERMINANTS OF INTERNATIONAL DIMENSION OF ORIGINAL SIN

In the previous chapters it is displayed that most of the countries are unable to borrow abroad in their own currency, even in short term. The largest economies are expected to immune this problem is given their contributions to world GDP. This is valid for US, Japan and Euro Area. However, despite the fact that China is the second largest economy after US, it also suffers from the original sin problem. On the other hand, Switzerland is amongst the immune countries although its contribution to the world's economy is limited.

Surprisingly, some countries such as New Zealand, Czech Republic and South Africa are able to borrow abroad in their currencies more than a decade. Recently, debt instruments in the currencies of some other countries including Turkey and Thailand is available in international debt markets. The original sin values of these countries are lower than some of their rich counterparties like Norway, Sweden and Denmark. Therefore, it is not easy to identify the main determinants of the original sin.

The worldwide original sin phenomenon poses important problems for the countries. Original sin results in currency and maturity mismatches. Economic instability and vulnerability is higher under the existence of original sin. Monetary policy becomes less effective as a shock absorber during economic crisis in these countries. Countries suffering from original sin phenomenon have generally lower

credit ratings which in turn create difficulties for countries to borrow in their own currencies.

In order to reduce adverse effects of original sin countries may take extreme measures such as restricting capital inflows, or accumulating excess amounts of international reserves. Although these measures help prevent from the consequences of original sin, they bring high costs to economy. Short term domestic borrowing can be considered as an alternative source of financing in order to deal with the original sin problem. However it leads to fragility due to possible maturity mismatches. Therefore, in order to redeem from the problem, increasing countries ability to borrow abroad in their own currencies at longer maturities can be seen as a more robust alternative. At this point, it should be noted that proposing solutions to the problem requires identification of the determination of the original sin, in the first place.

In the extensive literature on the issue, weaknesses in policies and institutions, monetary credibility, choice of exchange rate policy, fiscal solvency, level of financial development, volume of foreign trade, credit imperfections and poor contract enforcement and exchange rate misalignments are commonly considered as the plausible reasons for original sin problem. Hausmann and Panizza (2003) find that the determinants are beyond the countries control and only absolute size of the economy is only robust explanation of the phenomenon.

In this chapter each of these plausible causes are investigated. In addition, given the improvements in the original sin indicators of the most countries, effect of financial integration on original sin is also investigated. Analyses performed are limited to the international dimension of the problem and OSIN3 index that is discussed in Chapter 3 is used throughout this section. International money

market instruments, bonds and notes are included in original sin calculations since information on other types of debt such as bank loans are not available. It is assumed that these instruments are representative for all debt stock. Number of countries that are included in the analysis is 77[16]. OSIN of each country is calculated as averages for 2005-2007 periods due to availability problems of the data on some of the explanatory variables. Countries that belong to Euro area are not included in the analyses as it is not possible to assign financing in Euros to individual countries that form the monetary union. In addition, since these countries do not have independent monetary authorities, treating Euro similar to other countries' currencies is problematic. OSIN is bounded with zero and one hence in statistical tests double-censored Tobit estimation technique is used. Detailed information on data set is provided in the Appendix B.

4.1. Size of the Economy:

Absolute size of the economy is one of the plausible explanations for the original sin problem. IMF quotas are determined by size of the economies therefore it can be used as a proxy for the size of the economy. The result of Tobit test for the IMF quotas (in logs) (SIZE) shows that SIZE is statistically significant in explaining original sin. Robustness of the test result is verified by including financial center dummy variable which is used for major financial centers: USA, UK, Japan, and Switzerland (FCEN) in the analysis (Table 1).

[16] List of countries given in Appendix A

Table 1: Tobit Results – Size of the Economy

	Eq1		Eq2	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	2.814	0.000	2.306	0.000
SIZE	(0.267)	0.000	(0.190)	0.000
FCEN			(0.717)	0.006
log L	*(0.471)*		*(0.522)*	
AdjR2	*0.411*		*0.273*	

4.2. Weaknesses in Policies and Institutions:

One school of thought suggests that lack of strong institutions and weaknesses in policies results in original sin. Sound macroeconomic policies and strong institutions are important factors in investment decisions as they improve the financial stability and enhance investors' confidence. In order to analyze the relationship between original sin and weaknesses in policies and institutions, government effectiveness (GE) and regulatory quality (RQ) indicators from the World Governance Indicators (2011) are used. Both indicators take values between -2.5 (weak) and 2.5 (strong).

The scatter plot of GE and original sin (OSIN) is given in the

Figure 11 All the countries (except Hong Kong) with an OSIN below than 0.80 have positive values for GE. For the countries that have OSIN of 1 the GE is distributed more evenly where 22 countries have negative and 15 countries have positive GE values. The government effectiveness is lower in the countries that suffer from original sin when the average values for GE are considered. The average GE value

for the countries that have OSIN below than 1 is 0.71, whereas it is -0.21 for the countries that have OSIN of 1 (Figure 11).

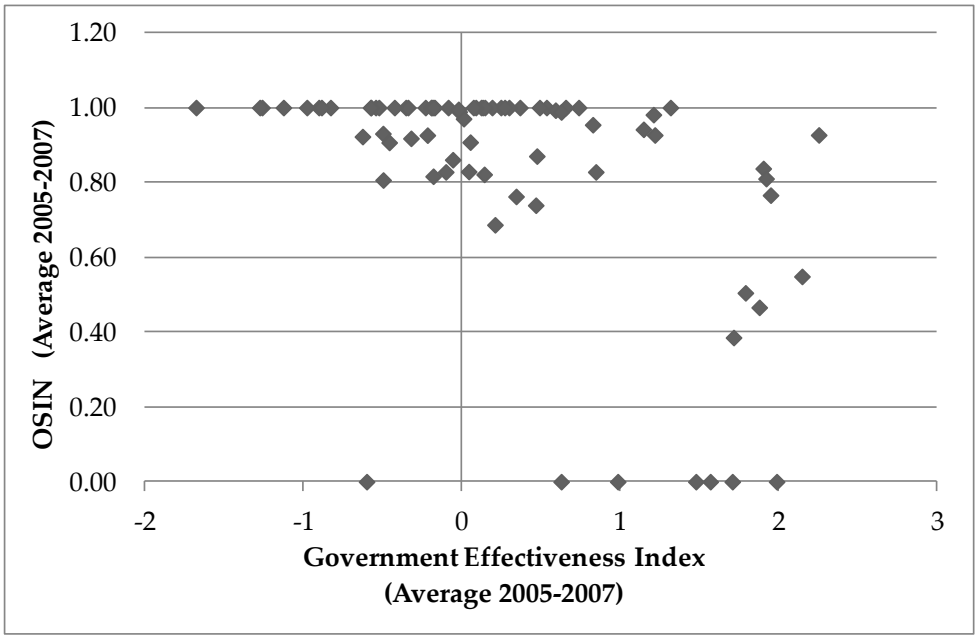

Figure 11: Government Effectiveness vs Original Sin

Figure 2 presents the scatter plot of RQ and OSIN. The pattern is quite similar to the relation between GE and original sin. That is, all the countries (except Hong Kong) with an OSIN below than 0.80 have positive values for RQ. The poorest regularity quality values belong to the countries that do not have ability to borrow from abroad in their own currencies. The average RQ value for the countries that have OSIN below than 1 is 0.66 and -0.15 for the countries with OSIN of 1 (Figure 12).

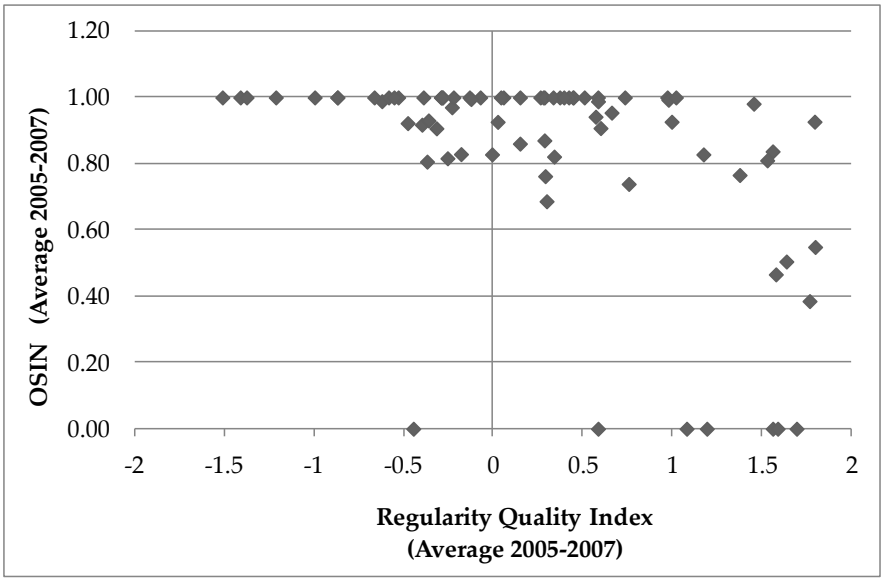

Figure 12: Regularity Quality vs Original Sin

Table 2 presents the estimation results of the double-censored Tobit test. A new variable (STRENGTH), constructed by using the principal component of GE and RQ, is also included in the analysis The results of the test suggest that all three independent variables are both economically and statistically significant in explaining OSIN.

Robustness of the results is verified by including SIZE and FCEN to the analysis (Table 2). Inclusion of control variables, SIZE and FCEN, does not affect the significance of the variables. Therefore, the analysis suggests that improvement in institutional framework and constructing strong policies may help countries to redeem from the original sin problem.

Table 2: Tobit Results - Weakness in Policies and Institutions

	Eq3		Eq4		Eq5	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Constant	1.143	0.000	1.157	0.000	1.048	0.000
GE	(0.358)	0.000				
RQ			(0.398)	0.000		
STRENGTH					(0.235)	0.000
log L	*(49.697)*		*(49.930)*		*(49.452)*	
AdjR2	*0.232*		*0.245*		*0.247*	
	Eq6		**Eq7**		**Eq8**	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Constant	2.139	0.000	2.216	0.000	2.104	0.000
GE	(0.229)	0.000				
RQ			(0.266)	0.000		
STRENGHT					(0.154)	0.000
SIZE	(0.157)	0.000	(0.166)	0.000	(0.161)	0.000
FCEN	(0.416)	0.063	(0.375)	0.090	(0.388)	0.080
log L	*(26.037)*		*(25.230)*		*(25.343)*	
AdjR2	*0.520*		*0.547*		*0.537*	

4.3. Level of Development:

Another school of thought suggests that the development level rather than the absolute size of countries is related to the ability of countries to borrow abroad. Gross domestic product per capita is a well-known proxy for level of development. There is a remarkable difference in the average GDP per capita between countries with OSIN of 1 and the others. The average GDP per capita for the countries with an OSIN below than 1 is USD 20,281 whereas this value is USD 7,546 for the countries with an OSIN of 1. This result is supported by scatter plot in the

Figure 13. The concentration of the countries with high original sin around lower GDP per capita values stands out in the figure.

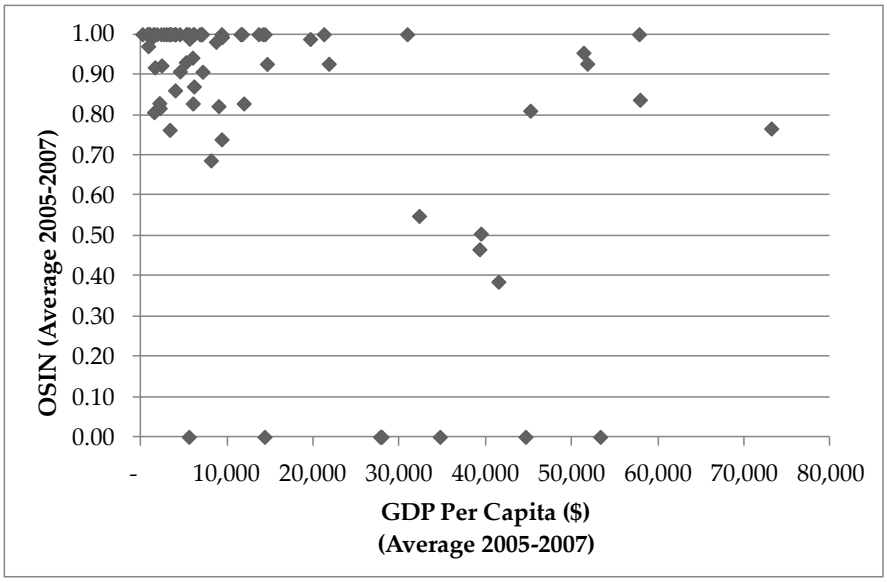

Figure 13: GDP per capita vs Original Sin

The significance of level of development is tested by using natural logarithm of the GDP per capita (LGDPC). Double-censored Tobit test results support the relationship between the level of economic development and original sin. GDP per capita is both economically and statistically significant in explaining OSIN (Table 3). The significance of LGDPC still exists after inclusion of SIZE and FCEN variables to the analysis. Therefore, the analysis suggests that economic development leads to a reduction in OSIN.

Table 3: Tobit Results – Level of Economic Development

	Eq9		Eq10	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	3.164	0.000	3.241	0.000
LGDPC	(0.240)	0.000	(0.120)	0.004
SIZE			(0.173)	0.000
FCEN			(0.513)	0.038
log L	*(52.239)*		*(31.357)*	
AdjR2	*0.196*		*0.448*	

4.4. Monetary Policy Credibility:

Another set of explanation links original sin to the monetary credibility. Countries with high inflation history suffer from low credibility of their currency. Investors normally hesitate to invest in a currency when monetary authorities are likely to manipulate the value of that currency. In order to analyze this relationship, average of log inflation for the 1997-2007 (ALINF) and maximum of log inflation for the same period (MLINF) are used as the proxies for monetary credibility. Figure 14 presents the scatter plot of OSIN and ALINF. Countries that do not suffer from OSIN have lower average inflation rates compared to the ones that suffer from the phenomenon.

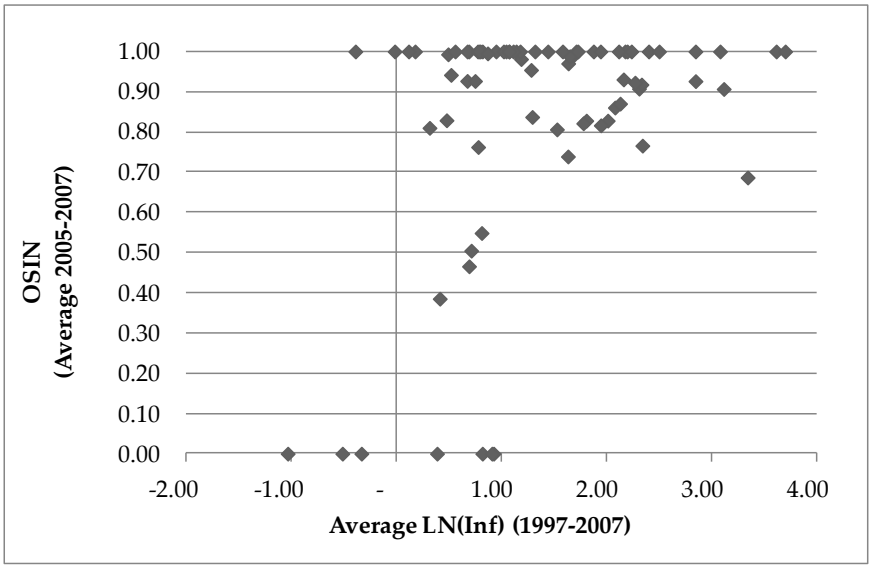

Figure 14: Average Log Inflation vs Original Sin

A similar pattern is present between OSIN and MLINF (Figure 15). There is no country that experiences inflation over 100 percent (corresponds to MLINF of 4.61) during the 1997-2007 period with OSIN lower than 0.7.

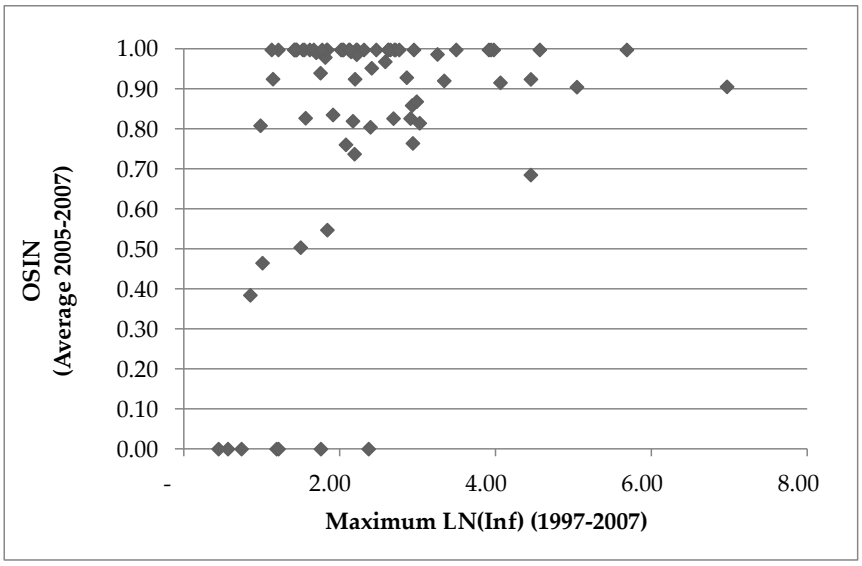

Figure 15: Maximum Log Inflation vs Original Sin

The variables ALINF and MLINF are both statistically and economically significant in explaining original sin as suggested by Tobit regression results given in Table 4. This significant relation disappears for MLINF variable when I take into analysis control variables (SIZE and FCEN). However, relation is still significant at 95 percent confidence level between average inflation and original sin even after the inclusion of control variables. Therefore, the analysis conveys that that low inflation history help countries to redeem from original sin problem.

Table 4: Tobit Results – Monetary Policy Credibility

	Eq11		Eq12		Eq13		Eq14	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Constant	0.743	0.000	0.734	0.000	2.107	0.000	2.138	0.000
ALINF	0.207	0.005			0.130	0.016		
MLINF			0.125	0.033			0.065	0.119
SIZE					(0.191)	0.000	(0.191)	0.000
FCEN					(0.489)	0.058	(0.582)	0.026
log L	*(58.537)*		*(60.283)*		*(32.968)*		*(34.643)*	
AdjR2	*0.133*		*0.080*		*0.480*		*0.450*	

4.5. The Exchange Rate Policy:

The exchange regime is also considered as one of the reasons of the original sin problem. Two approaches tries to address the relationship between exchange rate regime and original sin. In some studies, fixed exchange rate regime is claimed to provide an implicit guarantee that results in excess borrowing in foreign currency whereas in some other studies it is suggested that flexible exchange rate regime increases the riskiness of investing in domestic currency. Thus, the outcome is higher demand for foreign currency denominated assets in this case. In order to

analyze the relationship between exchange rate regime and the original sin problem, the classification presented by Ilzetzki, Reinhart and Rogoff (2008) is followed[17].

Exchange rate regime is found to be a statistically significant variable in terms of explaining original sin problem. It is also found that the strong relation still exists after the inclusion of the control variables. The negative sign of the exchange rate regime coefficient indicates that a more flexible exchange rate regime leads to lower original sin (Table 5).

Table 5: Tobit Results – Exchange Rate Policy

	Eq15		Eq16	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	1.596	0.000	2.329	0.000
ERR	(0.223)	0.000	(0.115)	0.006
SIZE			(0.151)	0.001
FCEN			(0.619)	0.010
log L	*(54.164)*		*(31.991)*	
AdjR2	*0.158*		*0.484*	

4.6. Fiscal Solvency:

Another class of explanation focuses on the fiscal solvency in order to explain the original sin phenomenon. Two well-known indicators, namely general government gross debt to GDP (DGDP) and general government gross debt to government revenue (DREV) are used to explore the relationship. As a starting point, the scatter plots between OSIN and fiscal solvency variables are analyzed in

[17] The details on the proposed classification are given in Appendix B.

Figure 6 and Figure 17. The scatter plots in this case do not suggest any pattern that may indicate a significant a relationship between OSIN and the fiscal solvency variables.

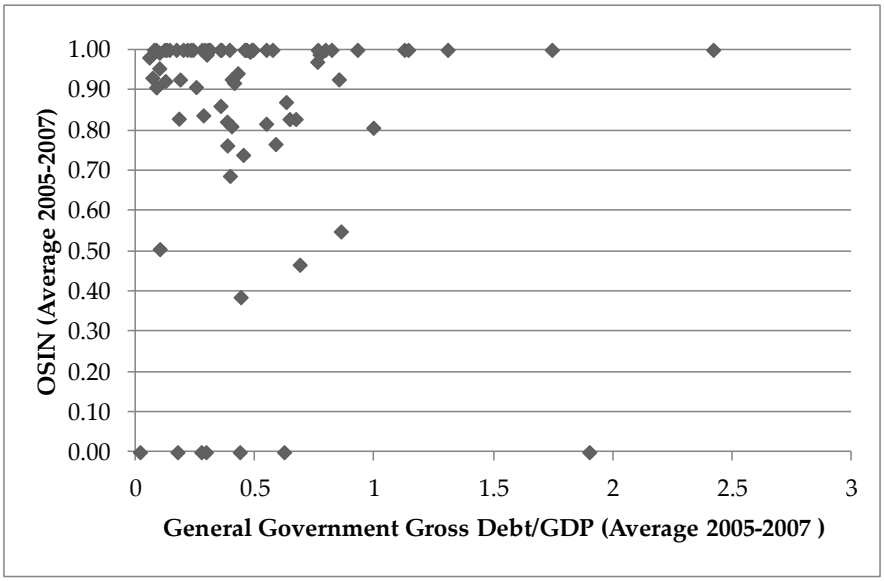

Figure 16: General Government Gross Debt to GDP vs Original Sin

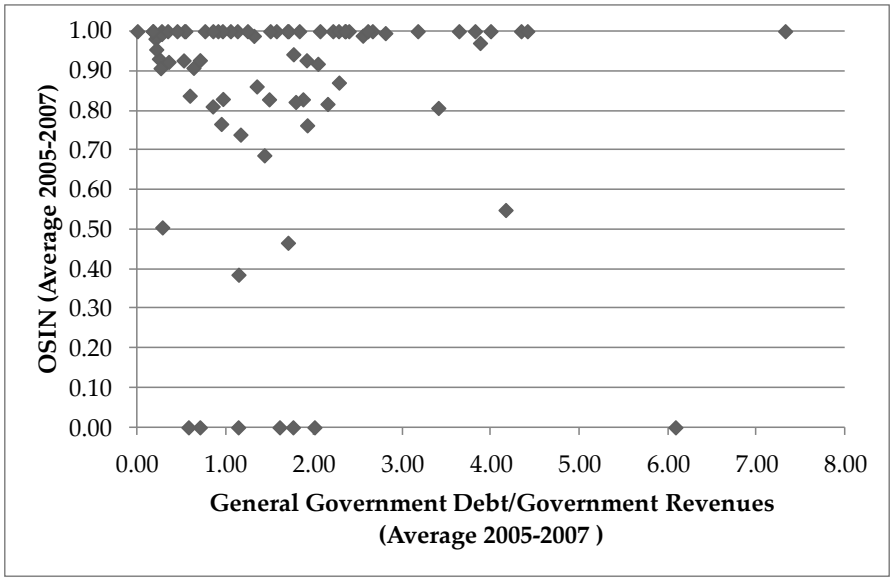

Figure 17: General Government Debt to General Government Revenues vs Original Sin

In Tobit regression, not only DGDP and DREV but also a variable that is constructed by using the first principal component of these variables (FISCAL) is tested. Tobit test results suggest that there is no significant relation between fiscal solvency variables and the original sin (Table 6). This also applies to the constructed variable, FISCAL. Furthermore, increase in debt levels of countries must adversely affect the ability of countries to borrow in their own currencies. However the signs of the coefficients for DREV and FISCAL are not as expected from an economic standpoint. Thus, there is confirming evidence that original sin is not related to the fiscal solvency of the countries.

Table 6: Tobit Results – Fiscal Solvency

	Eq17		Eq18		Eq19	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Constant	0.993	0.000	1.052	0.000	1.018	0.000
DGDP	0.072	0.695				
DREV			(0.015)	0.76		
FISCAL					(0.009)	0.87
log L	*(61.123)*		*(61.155)*		*(60.526)*	
AdjR2	*(0.047)*		*(0.036)*		*(0.041)*	

4.7. Financial Development:

Level of financial development for a country is considered as another plausible reason for the original sin problem. Financial development level is very important in terms of enhancing investors' confidence to the currency. Domestic credit to private sector as a percent of GDP is one of the common proxy that is used for the measuring financial development of the country. Hence, this ratio (FINDEV) is

chosen as the proxy in order to explore this relationship. The scatter plot of FINDEV versus OSIN is presented at Figure 18. The average FINDEV of the countries with an OSIN below than one is 88 percent. However, the same ratio is only 44 percent for the countries with an OSIN of 1.

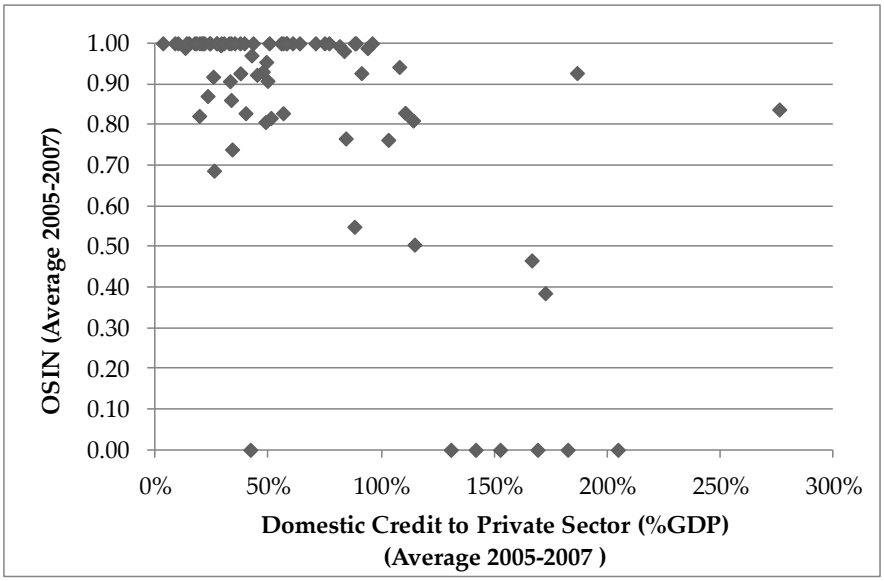

Figure 18: FINDEV vs Original Sin

The Tobit test results are given in Table 7. Financial development proxy is found to be statistically significant and the coefficient of the variable has a negative sign as expected. In other words, an improvement in the financial development level of a country results in a lower original sin for that country. The relationship is also statistically significant after the inclusion of the control variables.

Table 7: Tobit Results – Financial Development

	Eq20		Eq21	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	1.414	0.000	2.365	0.000
FINDEV	(0.604)	0.000	(0.335)	0.000
SIZE			(0.170)	0.000
FCEN			(0.337)	0.179
log L	*(46.658)*		*(29.206)*	
AdjR2	*0.376*		*0.489*	

4.8. Foreign Trade:

Some studies suggest that foreign trade is an important factor affecting the currency preferences of the investors in international financial markets. According to these studies, investors prefer to hold currencies that are widely used in the international trade and thus, countries with a low trade volume suffer more from the original sin.

In order to investigate this relationship, total foreign trade as a percentage of GDP (TRADE), retrieved from the World Bank database, is used. Singapore with a TRADE value of 425 percent and Hong Kong with a value of 397 percent are considered as outliers and these countries are not included in the analysis.

The scatter plot presented at Figure 19 does not exhibit any significant relationship between trade volume and original sin. That is, the TRADE values of countries with high OSIN are quite randomly distributed.

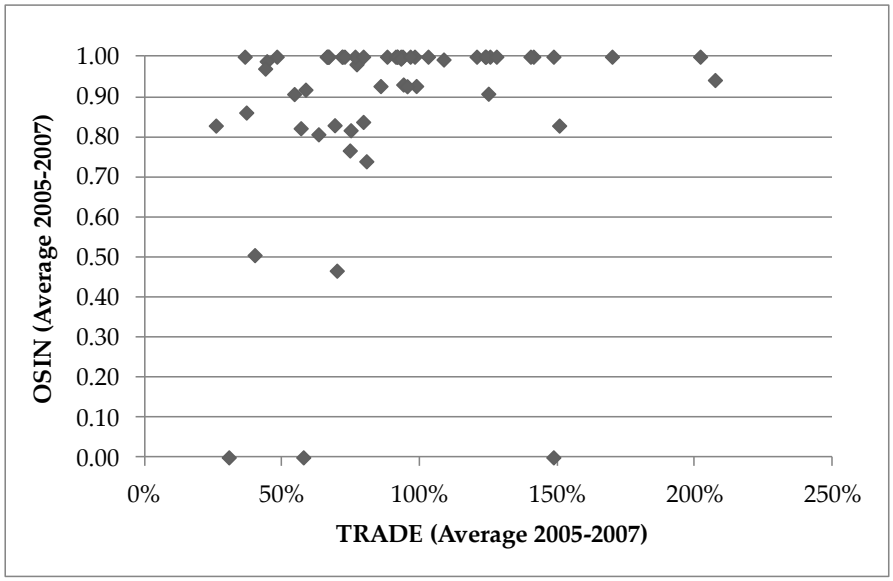

Figure 19: Total Foreign Trade to GDP vs Original Sin

The Tobit test results also confirm the observations drawn from the simple scatter plot. In other words, there is not any evidence that higher volumes of foreign trade leads to lower original sin problem as the test results do not indicate an economically meaningful relationship between the trade volume and original sin problem. The coefficient of TRADE variable found to be positive as opposed to our expectations but the relationship seems to be statistically significant (Table 8). However, when the control variables SIZE and FCEN are included into the analysis the sign of the TRADE coefficient becomes negative. In this case, however, the independent variable becomes statistically insignificant. Therefore it can be concluded that foreign trade has no explanatory power in explaining original sin problem.

Table 8: Tobit Results – Foreign Trade

	Eq22		Eq23	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	0.658	0.000	2.378	0.000
TRADE	0.442	0.018	(0.042)	0.775
SIZE			(0.195)	0.000
FCEN			(0.716)	0.005
log L	*(54.644)*		*(34.254)*	
AdjR2	*0.040*		*0.414*	

4.9. Credit Market Imperfections and Poor Contract Enforcement:

Some studies stress that investors become reluctant to lend to the corporations in the countries where there are credit market imperfections and poor contract enforcement. I choose to test this hypothesis by using two indices: rule of law index that is retrieved from the World Governance Indicators (2011) and creditor rights index from Djankov et al (2007). The rule of law (RL) index takes values from -2.5 (weak) to 2.5 (strong) and the creditor right index (CRI) takes values from 0 (weak creditor rights) to 4 (strong creditor rights).

The scatter plot in Figure 20 indicates a negative relationship between the rule of law and original sin. All the countries that have original sin lower than 0.75 have positive values for RL. The average RL value for the countries that have original sin below than one is 0.57 whereas this ratio is -0.27 for the countries with an original sin of 1.

Figure 20: Rule of Law vs Original Sin

On the other hand, countries that satisfy all the criteria set for grading and get full grade of 4 from creditor right index have remarkably low average value of OSIN. Although the average value of OSIN declines with increasing creditor rights grade, the differences between other categories are not as remarkable as category 4 (Table 9).

Table 9: Breakdown of Average OSIN by Creditor Rights Index

Creditor Rights Index	Average OSIN
0	0.95
1	0.84
2	0.83
3	0.78
4	0.56

Tobit test results convey a strong relationship between the rule of law and original sin. This strong relationship still exists after the inclusion of control variables. On the other hand, the relationship between creditor right index and original sin is not as strong as in the case of the rule of law. Furthermore, this relationship no longer exists after inclusion of control variables (Table 10). It can be concluded that only the rule of law has explanatory power on original sin phenomenon.

Table 10: Tobit Results – Credit Market Imperfections and Poor Contract Enforcement

	Eq24		Eq25		Eq26		Eq27		Eq28	
	Coeff.	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-value**
Constant	1.097	0.000	1.246	0.000	2.195	0.000	2.374	0.000	2.088	0.000
RL	(0.346)	0.000			(0.200)	0.000			(0.186)	0.001
CRI			(0.150)	0.024			(0.077)	0.107	(0.034)	0.454
SIZE					(0.171)	0.000	(0.180)	0.000	(0.148)	0.001
FCEN					(0.418)	0.070	(0.663)	0.008	(0.451)	0.050
log L	*(48.520)*		*(51.855)*		*(27.591)*		*(31.230)*		*(25.488)*	
AdjR2	*0.297*		*0.023*		*0.503*		*0.398*		*0.490*	

4.10. Real Exchange Rate Misalignments:

In some studies real exchange rate misalignments as an indicator of governments' incentives to manipulate exchange rate is considered as one of the reasons of the original sin. In order to test this hypothesis the highest level (in logs) of real US dollar exchange rate deviation from the purchasing power parity condition during 1980-2007 (LMRER) is used as a proxy.

The scatter plot in Figure 21 indicates that exchange rate misalignment and original sin move in the same direction. In other words, an increase in real exchange rate misalignments may lead to a higher original sin problem.

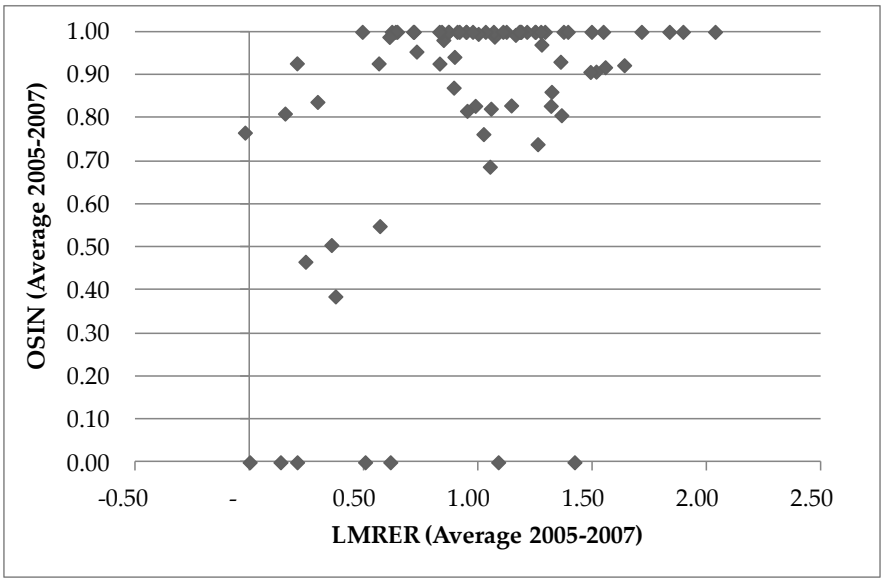

Figure 21: Real Exchange Rate Misalignment vs Original Sin

Tobit test results reported in Table 11 underpins the pattern observed in the scatter plot. The relationship between exchange rate misalignment and original sin is both economically and statistically significant. However, this relation gets weaker when control variables are added to the analysis. Therefore, the relationship between the real exchange rate misalignment and original sin can be considered as weak.

Table 11: Tobit Results – Real Exchange Rate Misalignment

	Eq29		Eq30	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	0.550	0.000	1.999	0.000
LMRER	0.496	0.001	0.225	0.054
SIZE			(0.179)	0.000
FCEN			(0.520)	0.056
log L	*(53.378)*		*(33.795)*	
AdjR2	*0.127*		*0.344*	

4.11. Financial Integration:

"Financial integration is the process through which a country's financial markets become more closely integrated with those in other countries or with those in the rest of the world."[18] Financial integration results in higher circulation of different currencies around world. Foreign investors use swap mechanisms in order to manage their currency risks that stem from local currency investments. Hence, counterparty of these swap operations should be the borrowers of related countries. This leads to a decrease in their original sin.

Sum of foreign assets and liabilities-to-GDP ratio (FINT) is used in order to measure financial integration. FINT1 is calculated as average of all countries for each year. FINT2 is calculated as average of 2005-2007 years for each country. Historical development of financial integration (FINT1) and original sin is presented in Figure 21. The figure reveals a trend in opposite directions between financial integration and original sin.

[18] http://www.iadb.org/res/publications/pubfiles/pubb-2002e_7384.pdf

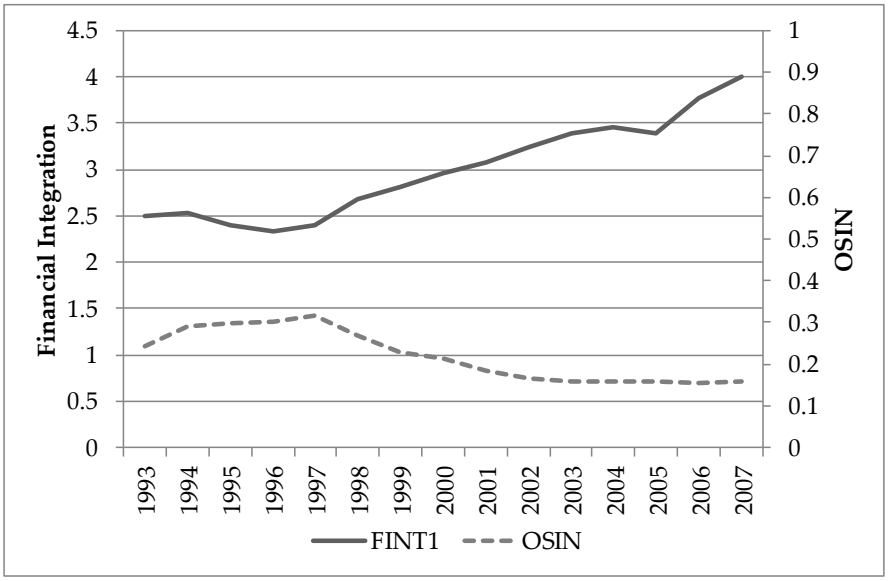

Figure 22: Historical Development Average Financial Integration and Original Sin around the World

When the relationship between financial integration and original sin is analyzed based on historical figures, financial integration is found to be statistically significant in explaining historical development of original sin (Table 12).

Table 12: Tobit Results – Historical Development of Financial Integration

	Eq31	
	Coefficient	**P-value**
Constant	0.541	0.000
FINT1	(0.107)	0.000
log L	*35.379*	
AdjR2	*0.830*	

Although financial integration explains the historical decrease in original sin values, it is not sufficient to explain the original sin differences between the countries. The scatter plot conveys a weak negative relationship between original sin and financial integration (FINT2) for 2005-2007 (Figure 23).

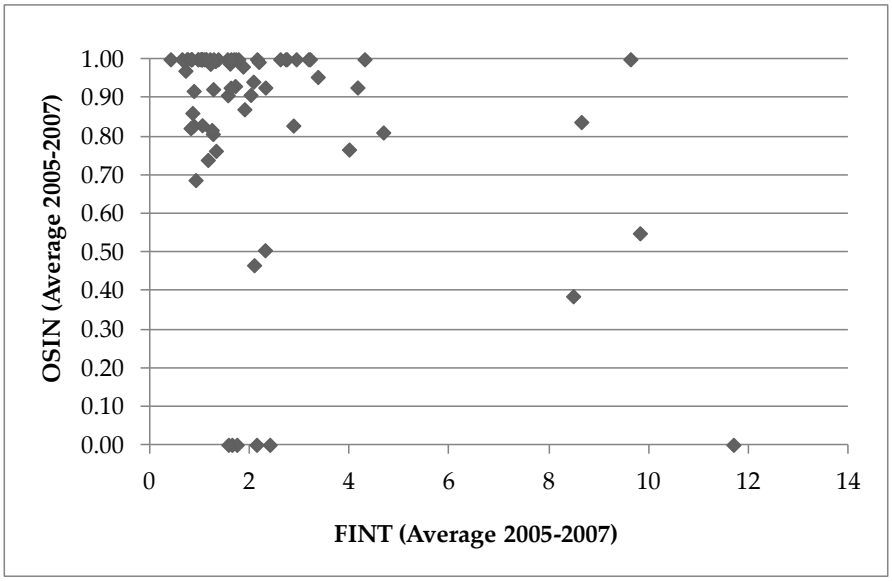

Figure 23: Financial Integration vs Original Sin

This result is also supported by Tobit regression results. The test suggests that financial integration proxy, FINT2 is statistically significant in explaining original sin at 5 percent confidence level. However, this relation becomes insignificant after the inclusion of control variables (Table 13). Therefore, it can be concluded that financial integration is not sufficient to explain the cross country differences of original sin.

Table 13: Tobit Results – Financial Integration

	Eq32		Eq33	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Constant	1.140	0.000	2.410	0.000
FINT2	(0.045)	0.021	(0.020)	0.276
SIZE			(0.200)	0.000
FCEN			(0.585)	0.034
log L	*(58.555)*		*(34.387)*	
AdjR2	*0.052*		*0.407*	

In the chapter where literature survey is presented plausible explanations for original sin phenomenon are determined as economic size of the country, level of development, weakness in policy and institutions, monetary credibility, choice of exchange rate policy, fiscal solvency of the country, level of financial development, foreign trade volume, credit imperfections and poor contract enforcement and exchange rate misalignments. Statistical and economical significance of these variables are investigated in this section.

Results suggest that as counties become economically more powerful their ability to borrow abroad in their own currencies increases. Not only absolute size but also economic and financial development also contributes to this ability as well. Strong policies and well developed institutional framework are necessary for countries to redeem from the original sin. Monetary credibility is also significant in explaining the phenomenon. More flexible exchange rate regimes lead to lower original sin values. Lastly quality of contract enforcement in a country plays important role in the ability of the country to borrow in its own currency from abroad. Other

theoretical explanations are statistically insignificant in explaining the phenomenon.

CHAPTER 5

CONCLUSION

International financial integration is increased extensively with the globalization process. Increased international capital mobility facilitates an efficient allocation of savings globally by directing financial funds to their most productive uses. International financial markets are the integral part of this process as they enable transfer of funds more easily. Almost all countries try to become more active in international financial markets with their own motivations. As part of their presence in these markets, most of the countries issue debt in international markets. However, only few of them manage to issue local currency debt in these markets. Inability of countries to borrow abroad in their own currency is known as original sin phenomenon. This phenomenon is considered as a main reason for the instability of the countries.

Original sin results in currency mismatches that increase the vulnerability of countries to external shocks and it diminishes the effectiveness of monetary policy during these shocks. High level of foreign currency debt lowers the reputation of countries which is reflected in the lower credit ratings. Investors hesitate to lend those lower rated countries in local currencies due to inherited currency risks. Hence, the problem creates a vicious cycle which is more difficult to overcome.

Almost all countries around the world suffer from the problem to some extent. Thus, it is important to determine the reasons for the phenomenon. In the economy literature different theories are discussed in order to identify underlying

reasons of the phenomenon. The first set of explanations focus on weaknesses in policies and institutions. It is argued that countries without strong institutions and policies have difficulties in terms of satisfying investor`s confidence.

The second hypothesis suggests that countries with higher level of development suffer less from the phenomenon. Third theory uses monetary credibility to explain the original sin problem. Expectancy of high inflation diminishes the willingness of investors to invest in the local currency instruments. Choice of exchange rate policy is also given as a reason for the original sin. There are two different approaches to link the exchange rate policy with original sin. Some researchers argue that flexible exchange rate results in higher original sin for the countries while others support that fixed exchange rate regime creates moral hazard problem that leads to higher original sin.

Another approach is originated from fiscal solvency perspective. According to this school of thought, countries that face high levels of indebtedness have difficulties in finding local currency external debt. Another school of thought suggests that financially underdeveloped countries have difficulties to build good reputation for their currencies. Hence it is difficult for them to find local currency debt in the international markets. According to some other discussions in the literature, past and current trade volumes of the countries determine the preferred currencies. Therefore, there should be a link between trade volume and original sin.

Other studies focus on credit market imperfections and poor contract enforcement. In these studies it is argued that investors hesitate to take currency risks of countries that do not have strong legal infrastructure or do not establish creditor rights. Real exchange misalignments can be an indicator of government incentives to manipulate exchange rate. Therefore investors are reluctant to lend in local

currencies where there is a possibility of exchange manipulation. Financial integration is considered as another plausible explanation for the phenomenon. Since financial integration enables circulation of local currencies, higher integration may lead to lower original sin. Finally, absolute size of the country is linked to original sin phenomenon by some researchers.

In this study, the plausibility of the discussed theories is investigated. Absolute size of the country is found to be very significant in terms of explaining the original sin. Countries with bigger contribution to world's economy suffer less from original sin problem. In addition, level of economic development is found to be a significant factor. That is, even if a country is not big enough in terms of absolute size, it could still redeem from the problem by achieving economic development. Not only economic development but also financial development is found to be significant. Countries that established deep financial markets not only attract foreign investors but also decrease the dependence to external markets.

On the policy side, weakness in policy and institutions results in original sin problem. This result can be attributed to investors' confidence. It can be concluded that countries that established strong institutions and policies satisfy investors' confidence to the country and its currency. In addition, in accordance with common belief it is found that inflation history makes local currency instruments unattractive to investors. Hence, monetary credibility is found to be an important step in order to redeem from the phenomenon.

According to the test results countries that have flexible exchange rate regimes tend to have lower original sin values. This may be attributable to the moral hazard problem that fixed exchange rate regime is believed to create. Lastly, quality of contract enforcement is found to be statistically significant in explaining

original sin problem. On the other hand, fiscal solvency, foreign trade, financial integration and real exchange rate misalignments are found to be insignificant in explaining phenomenon.

In conclusion, countries can overcome original sin problem by achieving economic and financial development together with strong institutions, policies and contract enforcement. Satisfying monetary credibility with choice of flexible exchange rate regime is necessary to redeem from the problem.

BIBLIOGRAPHY

Aghion P., Bachetta P. and Banerjee A. (2001) "Currency Crises and Monetary Policy in an Economic Credit Constraints", *European Economic Review*, 45, No.7 p. 1121-1150

Aghion, P. Bachetta, P. and Banerjee, A. (2004) "A Corporate Balance-Sheet Approach to Currency Crises", Journal of Economic Theory, No.119 p. 6–30

Aguiar, M. (2005) "Investment, Devaluation and Foreign Currency Exposure: The Case of Mexico", Journal of Development Economics, No.78 p. 95-113

Arteta C.O. (2002) "Exchange Rate Regimes and Financial Dollarization Does Flexibility Reduce Bank Currency Mismatches?" Board of Governors of the Federal Reserve System, International Finance Discussion Papers, No.738

Besancenot, D. and Ranceanur, R (2004) "Excessive Liability Dollarization in a Simple Signaling Model", ESSEC Research Center, DR 04001

Bohn, H. (1990), "A Positive Theory of Foreign Currency Debt", Journal of International Economics, No.29, pp. 273-292.

Broda C. and Levy Yeyati E (2003) "Endogenous Deposit Dollarization", Federal Reserve Bank of New York Staff Reports, No.160

Bordo, M., Flandreau, M., (2003) "Core, Periphery, Exchange Rate Regimes, and Globalization", National Bureau of Economic Research, Inc. No. 8584

Bordo M., Meissner C. and Redish A. (2003) "How "Original Sin" was Overcome: the Evaluation of External Debt denominated in Domestic currencies in the United

States and the British Dominions 1800-2000" National Bureau of Economic Research, Inc. No.9841

Brown M., Ongena S.and Yesin P. (2009) "Foreign Currency Borrowing by Small Firms", Swiss National Bank Working Papers, No.2

Burger, J.D. and Warnock, F. (2003) "Diversification, Original Sin and International Bond Portfolios" , Board of Governors of the Federal Reserve System, International Finance Discussion Papers, No. 755, updated version of April 2003.

Burger, J.D. and Warnock, F. (2004), "Foreign Participation in Local- Currency Bond Markets", International Finance Discussion Papers No 794, Board of Governors of the Federal Reserve System, Washington D.C.

Burnside C, Eichenbaum M. and Rebelo S. (1998) "Prospective Deficits and the Asian Currency Crisis" National Bureau of Economic Research, Inc. No:6758

Burnside, C. , Eichenbaum, M. and Rebelo S.(2001) "Hedging and Financial Fragility in the Fixed Exchange Rate Regimes" European Economic Review No.45, p.1373-1406

Caballero R. and Krishnamurthy A. (2003) "Excessive Dollar Debt: Financial Development and Underinsurance" The Journal of Finance, Vol. LVII No.2

Calvo, G. (2001) "Capital markets and the exchange rate", Journal of Money, Credit and Banking, No.33, 2, p.312-334.

Calvo, G. and Guidotti, P. (1990), "Indexation and Maturity of Government Bonds: an Exploratory Model" in R. Dornbusch, M. Draghi (eds), Capital Markets and Debt Management, Cambridge University Press, New York, p. 52-82.

Calvo, G. and Reinhart, C. (2000) "Fear of Floating: Theory and Evidence" National Bureau of Economic Research, Inc. No:7993

Cespedes L.F., Chang R. and Velasco A. (2003) "Must Original Sin Cause Macroeconomic Damnation?", Working Papers Central Bank of Chile, No.234

Chamon M, (2002) "Why can't Developing Countries Borrow from Abroad in their Currency?" unpublished manuscript, Harvard University, available at SSRN: http://ssrn.com/abstract=320001

Chamon M., Hausmann R. (2004) "Why do Countries Borrow the Way they Borrow", Eichengreen et al. Other People's Money – Debt Denomination and Financial Instability in Emerging Market Economies, University of Chicago Press, Chicago and London.

Corsetti, G. and Mackowiak, B. (2005) "A Fiscal Perspective on Currency Crises and the Original Sin" Eichengreen et al. Other People's Money – Debt Denomination and Financial Instability in Emerging Market Economies, University of Chicago Press, Chicago and London.

Cowan, K.and Do Q. (2003), "Financial Dollarization and Central Bank Credibility", the World Bank Working Paper No.3082

Djankova, S., McLiesha, C. and Shleiferb, A. (2007) "Private credit in 129 countries" Journal of Financial Economics No.84 , p. 299–329

Eichengreen B. and Hausmann R. (1999): "Exchange Rates and Financial Fragility", NBER Working Paper, No.7418

Eichengreen, B., Hausmann, R. and Panizza U. (2007) "Currency Mismatches, Debt Intolerance, and the Original Sin: Why They Are Not the Same and Why It Matters", in: Capital Controls and Capital Flows in Emerging Economies: Policies,

Practices and Consequences, National Bureau of Economic Research, Inc. and Chicago University Press, p. 121-170

Eichengreen B., Hausmann R. and Panizza U. (2005,a) "The Pain of Original Sin" in Eichengreen et al. Other People's Money – Debt Denomination and Financial Instability in Emerging Market Economies, University of Chicago Press, Chicago and London.

Eichengreen B., Hausmann R. and Panizza U. (2005,b) "The Mystery of Original Sin" in Eichengreen et al. Other People's Money – Debt Denomination and Financial Instability in Emerging Market Economies, University of Chicago Press, Chicago and London.

Eichengreen, B. and Hausmann, R. (2005) "Original Sin:The Road to Redemption" in Eichengreen et al. Other People's Money – Debt Denomination and Financial Instability in Emerging Market Economies, University of Chicago Press, Chicago and London.

Flandreau M.and Sussman N. (2004) "Old Sins: Exchange Clauses and European Foreign Lending in the 19th Century", CEPR Discussion Papers No.4248

Goldstein Morris (2002) "Managed Floating Plus", Policy Analysis in International Economic No.66 Washington DC: Institute for International Economics

Goldstein, M. and Turner, P. (2004), "Controlling Currency Mismatches in Emerging Markets" Chapter 7 Role of Institutional Factors and Microeconomic Incentives, Institute for International Economics, Washington D.C

Hausmann, R. (1999) "Should There Be Five Currencies or One Hundred and Five?", Foreign Policy, No.116 p.65-79

Hausmann, R. (2004) "Good Credit Ratios, Bad Credit Ratings: The Role of Debt Structure." Chapter 3 in Rules-Based Fiscal Policy in Emerging Market Economies: Background, Analysis and Prospects, edited by George Kopits. New York: Palgrave Macmillan

Hausmann, R. and Panizza, U. (2003) "On the determinants of Original Sin an Empirical Investigation" Journal of International Money and Finance, Volume 22, Issue 7, p 957-990

Hausmann, R., Panizza, U. and Stein E. (2001) "Why Do Countries Float The Way They Float?" Journal of Development Economics No.66 p.387-414
Hausmann, R., Panizza, U. and Stein E. (2002) "Original Sin, Passthrough, and Fear of Floating." In Financial Policies in Emerging Markets, edited by Mario I. Blejer and Marko Skreb. Cambridge: MIT Press.

Hausman R. and Panizza U. (2010) "Redemption or Abstinence? Original Sin, Currency Mismatches and Counter-Cyclical Policies in the New Millenium" Center of International Development Working Paper No.194

Ize, A. and Levy Yeyati, E. (1998), "Dollarization, Monetary Policy and the Pass-Through" IMF Working Paper 02/188

Ilzetzki, E., Reinhart C.M, and Rogoff K. (2008) "Exchange Rate Arrangements Entering the 21st Century: Which Anchor Will Hold?" (unpublished; University of Maryland and Harvard University).

Jeanne, O. (2000) "Foreign currency debt and the global financial architecture" European Economic Review No.44 p. 719-727

Jeanne O. (2003) "Why do Emerging Market Economies Borrow in Foreign Currency?" IMF Working Paper, WP/03/177

Jeanne O. and Zettelmeyer J. (2002) "Original Sin,Balance Sheet Crises' and the Roles of International Lending" IMF Working Paper, WP/02/234

Kahn, B. (2005) ""Original Sin" and Bond Market in South Africa" From: Africa in the World Economy - The National, Regional and International Challenges Fondad, The Hague, www.fondad.org

La Porta, R., Lopez-de-Silanes, F. Shleifer, A. and Vishny, R. (1997) "Legal Determinants of External Finance", Journal of Finance No.52(3) p.1131-1150.

Lane, P. R. and G. M. Milesi-Ferretti. (2007) "The External Wealth of Nations Dataset : Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004." Journal of International Economics, No.73 (2), p. 223-50.

Mehl, A. and Reynaud, J. (2005) "The Determinants of Domestic Original Sin in Emerging Market Economies" European Central Bank Working Paper Series. No.560

Ozmen, E. and Arinsoy, D. (2005) "The Original Sin and the Blessing Trinity: An Investigation" Journal of Policy Modeling No.27, p.599-609

Reinhart C., Reinhart V. (2003) "Twin Fallacies about Exchange Rate Policy in Emerging Markets" National Bureau of Economic Research, Inc. No:9670

Reinhart, C., Rogoff, S. and Savastano, M. (2003) "Addicted to Dollars", National Bureau of Economic Research, Inc. No:10015

Ross, S. A., (1977) "The Determination of Financial Structure: the Incentive-Signaling Approach" Bell Journal of Economics No.8, p.1-30.

Schneider M. and Tornell A. (2004) "Balance Sheet Effects, Bailout Guarantees and Financial Crises", Review of Economic Studies No.71(3) p.883-913

Tirole, J. (2003) "Inefficient Foreign Borrowing: A Dual- and Common-Agency Perspective", The American Economic Review, Vol. 93, No. 5, p. 1678-1702

APPENDIX A

LIST OF COUNTRIES

Argentina	El Salvador	Liberia	Seychelles
Australia	Gabon	Lithuania	Singapore
Bahrain	Georgia	Malaysia	South Africa
Barbados	Ghana	Mauritius	South Korea
Belarus	Grenada	Mexico	Sri Lanka
Belize	Guatemala	Morocco	Sweden
Brazil	Hong Kong	New Zealand	Switzerland
Bulgaria	Hungary	Nigeria	Thailand
Canada	Iceland	Norway	Trinidad & Tobago
Chile	India	Oman	Tunisia
China	Indonesia	Pakistan	Turkey
Colombia	Iraq	Panama	Ukraine
Costa Rica	Israel	Peru	United Arab Emirates
Côte d'Ivoire	Jamaica	Philippines	United Kingdom
Croatia	Japan	Poland	United States
Czech Republic	Jordan	Qatar	Uruguay
Denmark	Kazakhstan	Romania	Venezuela
Dominican Rep.	Kuwait	Russia	Vietnam
Ecuador	Latvia	Saudi Arabia	
Egypt	Lebanon		

APPENDIX B

DESCRIPTION OF VARIABLES

Variable	Description	Year
Government Effectiveness Index	Reflects perceptions of the quality of public and civil services and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. From: The World Bank -Worldwide Governance Indicators http://info.worldbank.org/governance/wgi/index.asp	Average 2005-2007
Regularity Quality Index	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. From: The World Bank -Worldwide Governance Indicators http://info.worldbank.org/governance/wgi/index.asp	Average 2005-2007
Rule of Law Index	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. From: The World Bank -Worldwide Governance Indicators http://info.worldbank.org/governance/wgi/index.asp	Average 2005-2007

Creditor Rights Index	"An index aggregating creditor rights, following La Porta and others (1998). A score of one is assigned when each of the following rights of secured lenders are defined in laws and regulations: First, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e. there is no "automatic stay" or "asset freeze." Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers. Finally, if management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights)" S. Djankov et al. (2007, pg 303) From: http://www.economics.harvard.edu/faculty/shleifer/dataset	2003
OSIN	OSIN 3 index that is calculated as described in Chapter 3. International bonds, notes and money market instruments are included in the calculation. From: Bank of International Settlements - Quarterly Review: December 2011	Average 2005-2007
SIZE IMF Quota	From: International Monetary Fund http://www.imf.org/external/pp/longres.aspx?id=3885	2006
GDP per capita	From: International Monetary Fund - World Economic Outlook Database, September 2011	Average 2005-2007
Inflation	From: The World Bank- http://data.worldbank.org/	Average 1997-2007
		Maximum 1997-2007

Exchange Rate Classification	**1:** No separate legal tender, pre announced peg or currency board arrangement, Pre announced horizontal band that is narrower than or equal to +/-2%, de facto peg **2:** Pre announced crawling peg, pre announced crawling band that is narrower than or equal to +/-2%, De factor crawling peg, De facto crawling band that is narrower than or equal to +/-2% **3:** Pre announced crawling band that is wider than or equal to +/-2%, De facto crawling band that is narrower than or equal to +/-5%, Moving band that is narrower than or equal to +/-2%, Managed floating **4:** Freely floating **5:** Freely falling **6:** Dual market in which parallel market data is missing From: Ilzetzki, Reinhart and Rogoff (2008)	2006
General Government Gross Debt	From: International Monetary Fund - World Economic Outlook Database, September 2011	Average 2005-2007
General Government Revenues	From: International Monetary Fund - World Economic Outlook Database, September 2011	Average 2005-2007
Domestic Credit to Private Sector (% GDP)	From: The World Bank- http://data.worldbank.org/	Average 2005-2007
Foreign Trade (% GDP)	From: The World Bank- http://data.worldbank.org/	Average 2005-2007
Real USD exchange rate deviation from PPP	From: The World Bank - World Development Indicators & Global Development Finance	Maximum 1980-2007

Financial Integration	(Total Assets + Total Liabilities)/GDP Total assets= FDI Assets+Portfolio Equity Assets+Debt Assets+Derivatives Assets+FX Reserves Total liabilities= FDI liabilities+portfolio equity liabilities+debt liabilities+derivatives liabilities From: Updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007)	Average 2005-2007

APPENDIX C

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : Arınsoy Memiş
Adı : Deniz
Bölümü : Ekonomi

TEZİN ADI (İngilizce) : The Determinants of Original Sin

TEZİN TÜRÜ : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: