GENERIC ECONOMIC STABILITY INDEX GENERATION FOR EMERGING MARKETS

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ABSTRACT

In this paper, I have designed a scalar composite leading indicator that aims to predict financial crisis in emerging markets by utilizing logistic regression models. Argentina, Russia, Brazil, Thailand and Turkey are selected to represent the main financial crisis in the emerging markets. It is also questioned whether a financial crisis in one country leads another crisis in the other country by checking the causality relations. I have also analyzed the relations among the credit default swap spreads for emerging markets which is a sign of the expectations about the economic stability of the associated country.

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1. INTRODUCTION

The purpose of this study is to generate a macroeconomic stability index for the selected countries which previously had financial crisis in their economy. The need for such an index arises from its performance to forecast macroeconomic crises. If we have a model which can tell us the probability of the crises to occur at a given time, then we can prevent it to happen by changing the necessary parameters that the model advices. In order to build such an index, one has to define the crises first.

Definition of the crisis is highly related to the dynamics and reasons of it. Literature mentions about three types of financial crisis. First one is the currency crises, which is the immediate depreciation of local currency; the second one is the banking crises, which is the decline of the banking system's capital; and lastly the debt crises, which is the case when the government, banks or firms do not meet their obligations to their debt holders.

Beginning from the 1980s until the 1990s, globalization took place not only in developed countries but also in emerging markets. They liberated the interest rates and decreased banking sector's required reserve ratios which are thought to increase economic growth. Increasing interest rates leads an increase in the savings and this causes a decrease in the liquidity needs of banks and investors. Theoretically the crucial point in here is that marginal efficiency of capital should not be exceeded by deposit rates in order to have a sustainable growth rate.

Many of the countries from Asia to Latin America had devastating macroeconomic problems as a result of those policies. Their macroeconomic problems originated not only from local reasons but also external dynamics. Both realized problems and uncertainties in one country have quickly spread to the other one via the traded goods and financial capital flows between those countries. As one country's macroeconomic conditions worsens, its risk premium increases and the foreign investors who does not want to bear that increased risk, take away their short termed capital from that country. As they take away their investments in a couple of days, risk premium of the country increases more and more which leads a re-decline in the liquidity of the markets of not only that country with worsened macroeconomic ratios but also the countries within the same class.

Variety of the products in the global capital markets has been increased dramatically during the last decade. Traders of global investment banks take leveraged positions on bonds, currencies, indices, stocks and even on future weather conditions in the emerging markets. Credit default swap[1] (CDS) can be given as an example one of those products in the derivative markets. In one of the following chapters, I will analyze CDS spreads and EMBI+[2] of the emerging sovereigns in more detail.

[1] Credit default swaps (CDS) are credit derivatives traded between two parties, whereby one makes periodic payments to the other and receives the promise of a payoff if a third party, which is generally a sovereign, defaults.
[2] Emerging Market Bond Index Plus, which was introduced in 1992 by J.P. Morgan Chase Bank.

2. FINANCIAL CRISES

In this chapter, I am going to discuss the dynamics and reasons for the emerging market crisis that are Argentina (2001), Brazil (1999), Russia (1998), Thailand (1997), Turkey (2001).

2.1 Thailand (1997)

After having a transition process in its production structure which was previously based on agriculture (specifically rice production) and starting industrialization in 1980s, Thailand's macroeconomic performance increased dramatically afterwards. Its average real growth rate was 7% during 1980-1989, inflation decreased from 22% to 6% and it had a budget surplus which was 3% of its GNP.

Likewise 1980s, Thailand's macroeconomic success continued during the first half of the next decade where real growth rate per year was 9% on average. During that period, the Thai government launched liberalization process by removing restrictions on foreign capital movements, privatizing energy sector and liberating banking sector. Those reforms on financial sector led a remarkable increase in foreign investment to Thailand. Foreign investment flows between 1990 and 1994 totaled over 50 billion dollars whereas more than half of it was made only in 1995. Macroeconomic growth which was previously financed domestically, started to be financed by foreign investors and this led external debt/GNP ratio to increase from 35% to 62% during 1989 and 1996. Main reason behind the increase in external debt was the high interest rates being paid to Thai Baht which was fixed to a basket of currencies in which US dollar's had 80% of weight.

Starting from second half of 1990, US Federal Reserve Bank rapidly decreased interest rates from 8.2% to 5.5% in 7 months and continued to decrease by 250 basis points until the end of 1993. This increase in the spread between US dollar rates and Thai Baht rates led many Thai firms to increase their currency risks by utilizing currency loans. Increase in purchasing power parity led an increase in the demand for new buildings, which also led the banking sector to increase the volume of their credit portfolio in favor of real estates. The boom in every sector of Thailand's economy brought a rapid increase in the current account deficit. In 1995 and 1996, current account deficit exceeded 8% of the GNP.

In summary, before the crisis, the situation in Thailand was two folded. Firstly, almost every sector had increased their debt which was dominated by US dollars. So, if Baht is to be depreciated against US dollar, most of these firms were going to default. Secondly, there were current account deficit with high interest rates. Central Bank of Thailand was unable to decrease interest rates but to increase, since its aim was to slow down the economic activity. Starting from 2nd quarter of 1995, although Thailand's economy started to slow down with the high interest rates, current account deficit continued to increase. Main reason behind the situation was the overvalued Baht against the countries' currencies to which Thai firms used to export. First reactions came from portfolio investors who thought current account deficit was high enough to increase demand for foreign currency. Since Baht was fixed to US dollars at 25 Baht/$ and Central Bank of Thailand thought its reserves were enough not to devaluate Baht, short term foreign investments were liquidated very fast. Following this policy, Central Bank of Thailand started to sell US dollars to meet the demand for foreign currency. Speculations on the probability of devaluation led Thai firms to start hedging their foreign currency risks which accelerated the increase of demand for US dollars. International reserves of Thailand were declining not only with spot operations but also with forward contracts of which counterparties were mainly hedge funds. Central Bank's decision on driving the interest rates over 20% to penalize the demand for foreign currency could not help international reserves to decrease by USD 32 billions. At last in July 2nd of 1997 Central Bank decided to abandon fixed exchange rate policy and officially asked for help from IMF which led USD/Baht parity to increase by 18% on the same day.

Thailand's GNP decreased by %1.5 and %10.5 in 1997 and in 1998 respectively. Many firms in real sector decreased their production capacity and employment. In order to rehabilitate the economy, overnight interest rates were decreased to 1.2% in spite of the 8% of inflation. Budget surplus which was 3% of GNP in 1980s declined to 1% of GNP as a deficit hand in hand with the policy of supporting the financial sector.

2.2 Russia (1998)

After Gorbachev's resignation in August 25th of 1991, Yeltsin and his associate Gaidar started a reformist period aiming privatization instead of central planning. With the support of IMF,

Russian government lifted the international trade barriers and restrictions over foreign exchange rates. This led imports to increase and local firms not to compete foreign goods in terms of both quality and quantity. Tax income of the government started to decline not only because of the complexity of taxation system and high tax rates, but also decrease of the incomes of the local firms because of the increased volume of imported goods. Government tried to handle the situation by increasing money supply but inflation went up to 2526% in 1992.

With financial liberalization after Yeltsin, government started to issue short term (with 3 months maturity) zero coupon bonds called Gosudarstvennie Kaznacheiskie Obligatsii[3] (GKO) and Obligatsii Federalnogo Zaima[4] (OFZ) bills with 2 year maturity paying coupons quarterly. In addition to GKOs and OFZs Russian Government started to issue Eurobonds in 1996. Increasing debt of the government was going far beyond financing government budget since 91% of the new debts were used to repay old debts in 1997. High interest rates led foreign capital movements towards Russia to increase. Foreign currency flow into Russia was 42 billions of US dollars in 1997 most of which was banking loans instead of long term direct investment.

Russian economy was (and still is) based on exports of energy products such as oil, lumber and natural gas. With the impact of Asian Crisis which brought a dramatic decrease in the demand for energy products caused those products' prices to decline from $24 to $11[5]. Immediate effects of the uncertainty started to be seen by the end of 1997 in financial markets where GKOs yields increased from 25% to 70% and USD/RUB parity were going up with decreasing international reserves. In May 1998, Moody's[6] stated that it has decreased Russia's credit rating from Ba3 to B1 and to B3 after 5 months.

In addition to the uncertainties in Russian financial and real sectors, in his column in Financial Times newspaper George Soros[7] stated that Russia needed at least %15-20 devaluation in rouble in order to be saved from financial trouble which is followed by another

[3] Treasury Bond of State. Since they had short term maturities with no coupon payment, they can be named as treasury bonds.
[4] Debt Obligation of State. From its maturity and coupon payment structure, we can simply call them as the treasury bills.
[5] Data source: Energy Information Administration. Europe Brent Spot Price per barrel.
[6] One of the most common international finance companies which serves consultancy about credit ratings and corporate finance to its customers. (http://www.moodys.com)
[7] A Hungarian-born American financial speculator, stock investor, philanthropist and political activist.

statement by Denis Kiselyov[8] who declared that a one-time devaluation of rouble wouldn't solve Russia's financial problems.

Assets of the Russian banks were composed mainly of treasury bills which were financed by short term foreign liabilities. If rouble were to be devaluated, they would have little chance to survive, since they had both currency and duration risks. On the other hand, Russian Central Bank had not much reserve to defend rouble against foreign currencies for a long time.
On 16th August of 1998 Russian Central Bank, by pleading Asian Financial Crisis and decreasing oil prices, decided to stop open market bond operations, announced moratorium for 90 days and also set a new USD/RUB parity band between 6.00 and 9.50.

While Central Bank of Russia tried to solve liquidity problems of Russian banks by decreasing reserve requirements, government tried to negotiate with foreign creditors in restructuring its debts. After the restructuring of the debt, USD/RUB parity went up to 25 which showed the amount of loss of the investors on Russian government bonds.

2.3 Brazil (1999)

Having many crisis during 1980s and beginning of 1990s which have different size of impacts over the economy, Brazilian governors set up a macroeconomic plan in 1994 which was called the "Real Plan". The targets of the plan had the following three steps. Budget discipline, which was ignored in the previous stability plans, strengthening expectations with the new currency and lastly inflation targeting were thought to be controlled via removing indexing.

Brazil's stability plan was successful until the Asian Crisis in 1997. Yet, economy has grown by 4% on average during 1993-1997 and the inflation decreased from 2500% to 4.3% by the end of 1997. All macroeconomic indicators were positive but the current account balance. Current account deficit has increased from +1.5% of GNP to -4.2% of GNP during 1993-1997. However, it was ignored despite Mexican Tequila crisis in 1994 which occurred just because of the same reason and which had been affected Brazilian currency policy on bands.

[8] Assistant president of Central Bank of Russia in 1998.

In the last quarter of 1997, Central Bank of Brazil started to fight with global speculative attacks by selling its reserves and increasing interest rates. First effects of the Asian Crisis have been overcome but Russian Crisis has occurred a second shock in 1998. International reserves of Central Bank of Brazil increased to 75 billion US dollars in April 1998 but high real interest rates which were about 15% had a negative effect on budget side of the Real Plan.

After moratorium decision of the Russian governors in August 1998, the Central Bank of Brazil tried to prevent Real to be devalued by selling its international reserves which have decreased from 67.3 billions to 45.8 billions during August. After having IMF and Worldbank's support for its reconstruction which amounted 41 billion dollars, Brazil had political uncertainties which led Real to devalue by over 40% in the beginning of 1999.

2.4 Argentina (2001)

Argentina suffered from inflation for many years before the "Convertibility Law" which was published on March 27th, 1991 and applied for the next ten years. According to this law, a ratio of ten thousand (10,000) australs per each United States dollar is fixed as selling price as of April 1st, 1991. Inflation targeting was the main purpose of the law and it was successfully implemented until Mexican Tequila crisis. Although Mexican crisis did not lead Argentina to give up the law, it has made governors of economy to realize the risks of the law since fixing local currency to a foreign currency to control inflation would eventually create not only current account deficit but also illiquidity. Because Central Bank of Argentina could increase money supply only when foreign currency flows into Argentina occurred, Central Bank's influence over monetary policy has disappeared which has created a problem of liquidity in the banking sector during the Mexican Tequila crisis and the Argentina crisis in 2001.
In addition to fixing Argentina's currency to US dollars, the law had other sections which have restricted price controls of state institutions which also brought space and need for later privatization of those institutions by which a surplus on budget was being created.
During Mexican Tequila crisis, Argentina suffered from decreasing monetary base with respect to decreasing international reserves. Overnight interest rates went up 50% where Central Bank had not the authority to fund banks because of the convertibility law.

Uncertainties about Brazil to devaluate its currency, real, existed also for Argentina since Brazil was the greatest trade partner of Argentina.

Argentina found the liquidity she needed by temporarily increasing value added tax from 18% to 21%, by decreasing public officers' salaries at 15% and issuing bonds which amounted 7 billions dollars in total. In addition to domestic finance, Argentina had the chance to find liquidity amounted $5 billions from IMF and Inter-American Development Bank.
Although the Tequila crisis did not hurt the economy in terms of currency and trade, lacking liquidity in the banking sector caused the banks suffer from increased interest rates. Argentina's growth was dependent on domestic demand and any appreciation in US dollars would also appreciate the peso, which would decrease demand for imports and eventually which would decrease domestic demand. On the other hand any depreciation in US dollars would increase domestic demand for imports which would increase current account deficit. This was the weak point of the convertibility law.

During Asian and Russian crisis, Argentina economy decreased by only 1% but the big shock was happened in 1999 when Brazilian real was devaluated by almost 100%. Since Argentina's main trading partner was Brazil, exports to Brazil was reduced and the economy was shrinked by 3.5% in Argentina. Decreasing economy also decreased the budget income which was financed by debts which amounted 46% of the GNP.

IMF, the main creditor of Argentina, was concerned mainly on the unrealistic budget targets with the over-valued peso. Devaluation of peso was inevitable for the IMF, so extra $10 billion of loan was not utilized for Argentina. Having no other alternative, Argentina devalued peso by 40% and foreign currency debts was converted to peso and dollar value of the debt decreased from $141 billions to $111 billions.

2.5 Turkey (2001)

Until 1980s, when financial liberalization policies are initiated, Turkish governments have chosen to increase debt stock instead of increasing money supply which prevented hyperinflation as it was in Latin American countries. But for many years this caused chronic inflation at around 50-60% per year. The New-Right stream, which has emerged after the

inflationary collapse of Keynesian policies, started to affect not only macroeconomic policy decisions but also the social and political life in Turkey. Turgut Özal was the Turkish representative of the New-Right stream. During his government a lot of reforms in the economy have been implemented such as removal of restrictions on financial markets, reforms on foreign exchange system and international trade. Value added taxation was also another reform which was adopted in order to simplify the tax system and prevent off the record earnings.

On the one hand Turkey was showing an accelerated economic performance with the reforms mentioned above, on the other hand because of indexed prices upon foreign exchange, inflation was going high at 67% on average during 1985-1989.

Turkish performance led foreign capital inflow during 1990 and 1993, most of which was coming through banking and private sector and which was also increasing the current account deficit in balance of payments. Although Turkish Lira was not appreciating much, demand for imported intermediate goods was increasing because of the increase in domestic demand. During the same period not only government debts but also cost of borrowing were soaring such that interest payments were almost 20% of the total budget. In order to decrease its cost of debt, government was trying to find external sources of finance and canceling its auctions in banking sector. However, because of the increased current account deficit and political uncertainties, liquidity originating from expiration of the previously issued bonds is used for buying foreign exchange which decreased Central Bank's international reserves. Foreign exchange reserves of the Central Bank which was $6.2 billions by the end of 1993, decreased to $3.3 billions by the end of March, 1994. On 5th of April, Turkish Lira was devaluated by 40%. Government, canceling treasury auctions at 70% of borrowing rates in 1993, was trying to finance its debts at 145% in 1994. Increased interest rates also increased inflation during that period from about 70% to 150%.

Benefiting from devaluated Turkish Lira, Turkey regained its growth performance from exports but there was no change in currency policy which was based on indexing prices to foreign exchange rates. That's why inflation was as high as it was before the crisis. Since there were no structural change in the economy, banks started to re-open their currency positions.

During 1997-1999, with the economic crisis in other emerging countries such as Thailand, Brazil and Russia, in addition to the Marmara Earthquake in August 1999, Turkish after-crisis macroeconomic performance slowed down. Especially Russian crisis had the most negative effect on foreign capital outflow because foreign investors believed in the resemblance of Turkey to Russia. With the same analogy they had in mind, demand for foreign exchange in Argentina increased during Mexican Tequila crisis. However, Central Bank's international reserves were around $26 billions before the Russian crisis and current account balance was positive during the period.

Although the effects of the financial crisis in Russia have been overcome since Central Bank has supported the market's liquidity, with the increased interest rates and uncertainty, foreign capital support to Turkish growth declined rapidly and Turkey, with IMF's support, started an economic stability program in the beginning of 2000. The program aimed to decrease the chronic inflation by controlling the depreciation rate of Turkish Lira against Euro and US dollar. Trade balance and especially current account balance was not the primary concern of the Central Bank but inflation was. According to the program, Central Bank could increase money supply if and only if it had bought foreign exchange from the market. The main reason behind this policy was the distrustfulness of IMF to the governments since the governments could easily provide liquidity by increasing money supply. This situation had occurred in Argentina in 1994 during the Mexican Tequila crisis. Central Bank of Argentina did not inject liquidity when needed and many banks in Argentina have defaulted. Although during Russian crisis has been overcome with Central Bank's support, now, it was Turkish government's turn to take the same risk to reduce inflation.

The program was not so powerful in decreasing inflation in the first two quarters of 2000 since annual change in the wholesale price index decreased from 66% to 56% but the current account deficit has increased to $9.9 billions. Macroeconomic underperformance, globally increasing interest rates, uncertainty in political atmosphere due to coalition government, fragile banking sector which has already showed itself with the Demirbank's default and most importantly narrowing liquidity led overnight interest rates to jump up to 873% just after Central Bank's decision on liquidity in 1st of December 2000.

Although IMF, seeing the weaknesses of the banking sector, advised to give up fixed exchange rate and to implement floating exchange rate system, which also meant to give up

the inflation targets, the government refused that proposal. Finally, on 19th of February during the National Security Council meeting, the President and the Prime Minister of Turkish Government had a quarrel which initiated a political crisis. After two days, floating exchange rate system was accepted and US dollars/Turkish Lira increased by 40% on 23th of February while overnight interest rates were above 1200%.

3. METHODOLOGY

In building a model for financial crisis for a given country with given macroeconomic ratios, we begin with defining crisis. We already know that crises do not occur in one single day but after a period of time which includes worsening macroeconomic conditions and increasing financial risk. However the impact is generally observed with an abnormal increase in interest rates and/or currency depreciation which occur in at most one week. When developing countries are concerned, this is much more visible because the crises come in sight just after a statement or decision of the governors which leads market players to react in extreme manners.

We are going to call the extreme market changes such as local currency depreciation and abnormal increases in interest rates as the crises event, at a point in time. After that we are going to try to define the period before and after the crisis event as near crisis days. Since most of macroeconomic data is disclosed in quarterly bases, we are going to be dealing with quarters instead of days or months.

When we come to build the model, we are going to use Fisher's Linear Discriminant Analysis which is a convenient method of statistics and machine learning to find the linear combination of features which best separate two or more classes of objects or events. The resulting combination may be used as a linear classifier, or, more commonly, for dimensionality reduction before later classification.

LDA is closely related to ANOVA (analysis of variance) and regression analysis, which also attempt to express one dependent variable as a linear combination of other features or measurements. In the other two methods however, the dependent variable is a numerical quantity, while for LDA it is a categorical variable (i.e. the class label).

LDA is also closely related to principal component analysis (PCA) and factor analysis in that both look for linear combinations of variables which best explain the data. LDA explicitly attempts to model the difference between the classes of data. PCA on the other hand does not take into account any difference in class, and factor analysis builds the feature combinations based on differences rather than similarities. Discriminant analysis is also different from factor analysis in that it is not an interdependence technique: a distinction between independent variables and dependent variables (also called criterion variables) must be made.

Suppose two classes of observations have means $\vec{\mu}_y = 0, \vec{\mu}_y = 1$ and covariances Σy = 0,Σy = 1. Then the linear combination of features $\vec{w} \cdot \vec{x}$ will have means $\vec{w} \cdot \vec{\mu}_{y=i}$ and variances $\vec{w}^T \sum_{y=i} \vec{w}$ for i = 0, 1. Fisher defined the separation between these two distributions to be the ratio of the variance between the classes to the variance within the classes:

$$S = \frac{\sigma^2_{between}}{\sigma^2_{within}} = \frac{(\vec{w} \cdot \vec{\mu}_{y=1} - \vec{w} \cdot \vec{\mu}_{y=0})^2}{\vec{w}^T \sum_{y=1} \vec{w} + \vec{w}^T \sum_{y=0} \vec{w}} = \frac{(\vec{w} \cdot (\vec{\mu}_{y=1} - \vec{\mu}_{y=0}))^2}{\vec{w}^T (\sum_{y=0} + \sum_{y=1}) \vec{w}}$$

This measure is, in some sense, a measure of the signal-to-noise ratio[9] for the class labelling. It can be shown that the maximum separation occurs when

$$\vec{w} = (\sum_{y=0} + \sum_{y=1})^{-1} (\vec{\mu}_{y=1} - \vec{\mu}_{y=0})$$

When the assumptions of LDA are satisfied, the above equation is equivalent to LDA.

After we are going to define and mark quarters which are near crisis quarters with "-1"s and safe quarters with "0"s, we are going to run Fisher's LDA which will help us in discriminating the crisis quarters from non-crisis quarters for given parameters of the country. We are going to use SPSS[10] tool v.16 for modeling the crisis with our parameter. The parameter which is going to be used for building the stability index will include the current account balance (CA), international reserves (IR), total external debt (TED) and short term external debt (STED) of the country. We have calculated a new variable which we'll call as the "raw variable" from these four figures as follows:

[9] Signal-to-noise ratio (often abbreviated SNR or S/N) is an electrical engineering concept, also used in other fields (such as scientific measurements, biological cell signaling), defined as the ratio of a signal power to the noise power corrupting the signal.
[10] Statistical Package for the Social Sciences is a computer program for statistical analysis.

$$RawVariable = \frac{CA + IR + TED - STED}{STED}$$

We already know that current account balance can be either positive or negative depending on the structure of the balance of payment of the country. Countries which had currency crisis also had a current account deficit before the crisis occurred. So the greater the current account balance we have in our balance of payments, the smaller the probability of a crisis to occur.

We also know from the history of the financial crisis mentioned in chapter 1 that international reserves play an important role for central banks to have price stability, i.e. to have a stable value of local currency against foreign currencies. International reserves of a country are some kind of a hedging tool for current account deficit. So when the amount of international reserves increases the local currency will be less affected by a speculative currency attack when its current account deficit is high enough for the country to be unable to finance.

External debt for emerging economies is almost inevitable in today's global economy. Most of the firms in developing countries try to finance their investments by increasing their external liabilities since generally the local interest rates are higher compared to the ones in foreign countries. Although this would increase currency risks of the debtor firms, they generally prefer not to pay higher interest rates in local currency. So long term external debt can be taken as a positive sign since if the country can find sources of long term finance, then market expectations of the country should be optimistic as well.

On the other hand, short term external debt has both currency risk and liquidity risk in it. Because of its shorter maturity, which is generally less than one year, any depreciation in local currency will increase the debtness of the country. In addition to that, debtor's assets may not be enough to cover its liabilities on the settlement day of the debt. So short term external debt is taken as an unfavorable figure for the country's economic stability.

We are going to work on three crises in the emerging markets. Two of those are Asian Crisis in 1997 and Brazilian Crisis which occurred in 1999. In addition to those the analysis can be extended by including the crises in Russia, Argentina, Mexico, Indonesia, Philippines, Chile and South Korea. But we will not go over them, since the crises that are taken into account here, have the greatest impact of their class. The fifth crisis will be Turkish crisis in 1994 and 2001.

4. INDEX GENERATION

4.1 Thai Economic Stability Index

Stability index equation for Thailand is as follows:

$$ThESI = -9.579 + 4.228 * RawVariable_{Thailand}$$

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.215	83.679	1	.000

Classification Results[b,c]

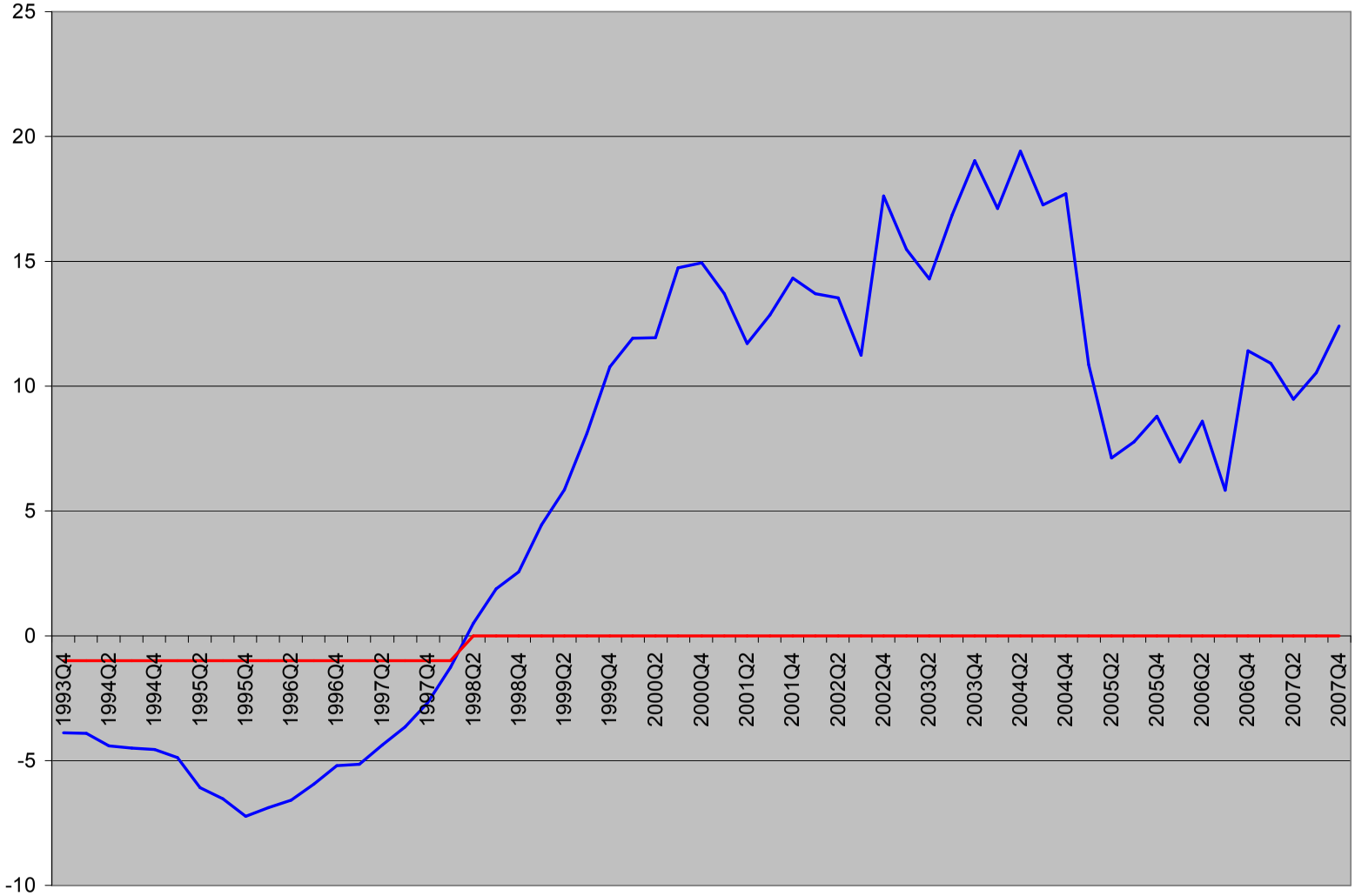
			Predicted Group Membership		
		tag	0	1	Total
Original	Count	0	36	3	39
		1	0	18	18
	%	0	92.3	7.7	100.0
		1	.0	100.0	100.0
Cross-validated[a]	Count	0	36	3	39
		1	0	18	18
	%	0	92.3	7.7	100.0
		1	.0	100.0	100.0

a. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b. 94.7% of original grouped cases correctly classified.

c. 94.7% of cross-validated grouped cases correctly classified.

Thai Economic Stability Index



4.2 Brazilian Economic Stability Index

Stability index equation for Brazil is as follows:

$$BESI = -3.981 + 0.349 * RawVariable_{Brazil}$$

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.719	29.894	1	.000

Classification Results[b,c]

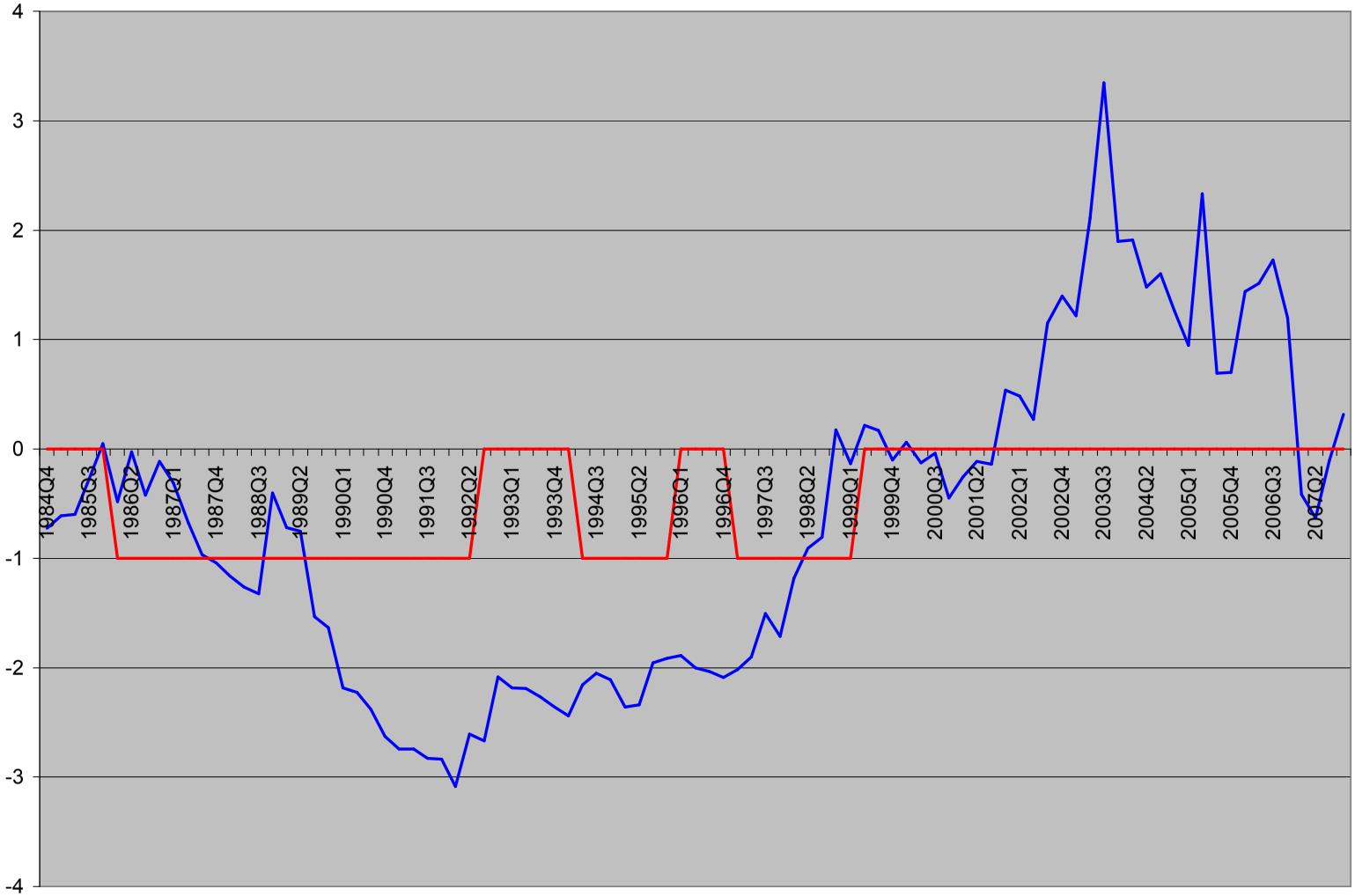
			Predicted Group Membership		
		tag	0	1	Total
Original	Count	0	40	11	51
		1	10	32	42
	%	0	78.4	21.6	100.0
		1	23.8	76.2	100.0
Cross-validated[a]	Count	0	40	11	51
		1	11	31	42
	%	0	78.4	21.6	100.0
		1	26.2	73.8	100.0

a. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b. 77.4% of original grouped cases correctly classified.

c. 76.3% of cross-validated grouped cases correctly classified.

Brazilian Economic Stability Index



4.3 Turkish Economic Stability Index

Stability index equation for Turkey is as follows:

$$TESI = -5.456 + 1.133 * RawVariable_{Turkey}$$

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.765	16.500	1	.000

Classification Results[b,c]

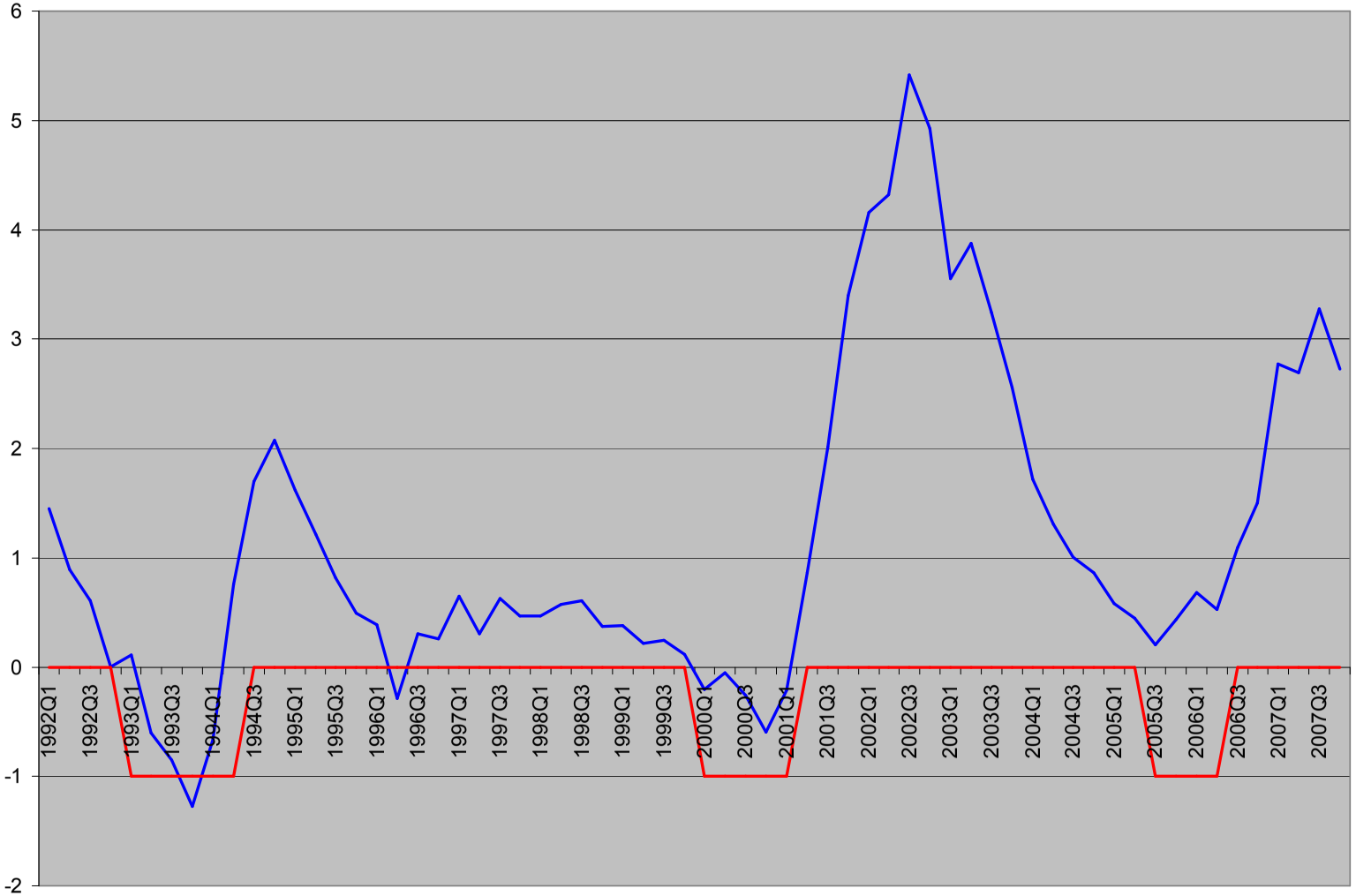
			Predicted Group Membership		
		tag	0	1	Total
Original	Count	0	28	21	49
		1	1	14	15
	%	0	57.1	42.9	100.0
		1	6.7	93.3	100.0
Cross-validated[a]	Count	0	28	21	49
		1	2	13	15
	%	0	57.1	42.9	100.0
		1	13.3	86.7	100.0

a. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b. 65.6% of original grouped cases correctly classified.

c. 64.1% of cross-validated grouped cases correctly classified.

Turkish Economic Stability Index



4.4 Other Emerging Economies

We have generated three stability indexes for Turkey, Brazil and Thailand but there are other emerging countries which had the same kind of crisis in their economies. Unfortunately, we were not able to get their data, especially external debt data, during the quarters in which they were having crisis. Since the available data did not cover the crisis period, Fisher's LDA would not work in their cases.

On the other hand, we still have the chance to calculate the raw variables for those starting from a common quarter of 2003Q3 as shown in the following table.

Date	Argentina	Russia	Mexico	Peru	Chile	Thailand	Brazil	Turkey
2003Q3	5.6310	5.9868	8.0288	13.8709	7.9115	6.2494	21.0030	7.6799
2003Q4	2.0448	6.5307	9.1165	14.1975	7.3983	6.7651	16.8441	7.0714
2004Q1	1.9015	7.9631	7.5728	14.3700	7.4955	6.3119	16.8794	6.3309
2004Q2	1.8593	8.3786	9.0531	13.3070	7.1401	6.8597	15.6438	5.9672
2004Q3	1.7864	9.1729	11.0451	12.8865	7.1401	6.3482	15.9888	5.7054
2004Q4	1.6877	8.8784	10.9108	14.9333	7.0696	6.4567	15.0287	5.5803
2005Q1	1.5699	8.8613	9.5096	14.4014	7.1647	4.8313	14.1288	5.3263
2005Q2	2.6544	9.4064	9.8879	14.2879	8.0471	3.9469	18.0916	5.2082
2005Q3	2.8111	9.1552	11.2630	14.0323	7.7366	4.1045	13.4001	4.9982
2005Q4	2.9371	9.5578	11.2945	12.4906	8.3347	4.3424	13.4140	5.1958
2006Q1	3.0486	8.5592	10.7989	12.7808	8.9792	3.9170	15.5265	5.4154
2006Q2	5.4595	9.7307	10.9046	13.0478	7.9897	4.2959	15.7406	5.2834
2006Q3	5.6576	9.2325	11.3023	14.9660	7.4144	3.6431	16.3576	5.7815
2006Q4	5.7598	10.1089	10.5016	14.2669	6.7142	4.9628	14.8406	6.1429
2007Q1	5.1866	9.5102	9.1654	14.2677	7.9401	4.8488	10.2056	7.2608
2007Q2	5.5483	8.4143	9.3408	11.2032	7.0382	4.5076	9.5978	7.1930
2007Q3	5.3243	7.6598	10.6799	10.6601	6.1168	4.7586	11.0946	7.7064
2007Q4	5.3896	8.0990	10.7813	9.5285	5.7389	5.2025	12.3058	7.2209

4.4.1 Correlation Table For The Raw Variables

	ARGENTINA	BRAZIL	CHILE	MEXICO	PERU	THAILAND	RUSSIA	TURKEY
ARGENTINA	100%	-26%	-21%	11%	-36%	-43%	2%	51%
BRAZIL	-26%	100%	36%	-28%	52%	32%	-33%	-21%
CHILE	-21%	36%	100%	-5%	46%	-30%	15%	-47%
MEXICO	11%	-28%	-5%	100%	-22%	-52%	58%	-48%
PERU	-36%	52%	46%	-22%	100%	12%	17%	-42%
THAILAND	-43%	32%	-30%	-52%	12%	100%	-54%	34%
RUSSIA	2%	-33%	15%	58%	17%	-54%	100%	-66%
TURKEY	51%	-21%	-47%	-48%	-42%	34%	-66%	100%

4.4.2 Granger Causality Findings For Economic Stability Index Variables

Although the data we have doesn't cover a wide range of a time period, we found the following causalities which are statistically significant at a 5% of confidence level.

Null Hypothesis:	Obs	F-Statistic	Probability
ARGENTINA does not Granger Cause MEXICO	16	16.7115	0.05%
ARGENTINA does not Granger Cause TURKEY	16	8.9618	0.49%
BRAZIL does not Granger Cause PERU	16	5.9364	1.78%
BRAZIL does not Granger Cause RUSSIA	16	10.7291	0.26%
TURKEY does not Granger Cause PERU	16	4.5466	3.64%
TURKEY does not Granger Cause RUSSIA	16	5.6131	2.09%
RUSSIA does not Granger Cause TURKEY	16	6.7896	1.20%

5. COINTEGRATING MARKETS

Although emerging economies have crisis in distinct times, which may be misleading for us to think that these crises are independent of each other, market players' expectations about those countries, thus the trend in those economies are highly correlated. Even if there is no direct macroeconomic relation between any of the two emerging markets, such as international trade, changing market expectations in one country affects the expectations in the other country. This section is planned to prove this fact with market data.

By market data I am going to be referring firstly to credit default swap spreads since credit default swap spreads are good indicators of market's expectations on the related country. Data source for the CDS spreads is the Bloomberg, the largest company in financial data and software services. Since CDS trading does not have a long history in the financial markets, time series data for CDS spreads is available only since Nov, 2002. The second indicator I am going to analyze is the J.P. Morgan's EMBI+ index of emerging markets. Although source for EMBI+ data is also Bloomberg, one can also access to the same data from other data sources such as Reuters or internet[11]. It is published for the most emerging countries just like the CDS data.

5.1 Cointegration

The term "cointegration" in econometrics is found by Eagle and Granger in 1987 with the concept of "spurious regression". They have randomly generated two independent variables and regressed one over the other.

$$y_t = \alpha + \beta x_t + \varepsilon_t$$

Since the variables were constructed randomly, any relation between them ought to be meaningless. However, according to the simulation results, more than 95% of the β coefficients were statistically significant; meaning that the independent variable x was a 'successful' explanatory variable for the dependent variable; which is actually not the fact.

[11] http://www.cbonds.info/all/eng/index/

Then they have run the same simulation not for the randomly generated variables, but for the first differences of them, which makes the new regression equation as follows:

$$y_t - y_{t-1} = \delta + \gamma(x_t - x_{t-1}) + \omega_t$$
$$\Rightarrow \Delta y_t = \delta + \gamma \Delta x_t + \omega_t$$

The second simulation showed that the first differences of the variables are not related to each other since only about 5% of the coefficients are estimated to be significant within 95% confidence interval which is what one should expect.

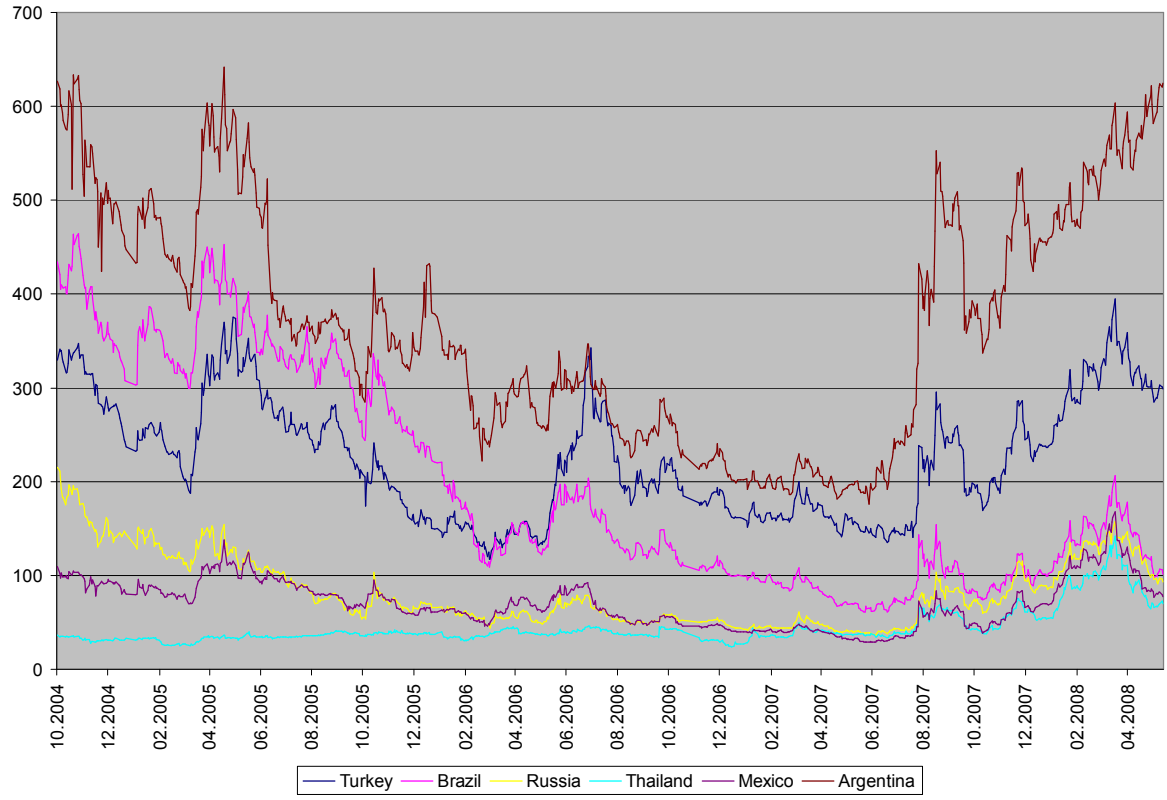
Time series in most macroeconomic and financial data are of the same kind as Eagle and Granger have used. This kind of series follows a so called 'random walk' process and they are non-stationary. At this point Eagle and Granger pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. Following this fact, I am going to test the data for stationarity and if they are non-stationary, then I am going to try to find a linear combination of those non-stationary series which is stationary in order to conclude that the series I have are cointegrated. I am going to use Augmented Dickey Fuller[12] (1984), Phillips Perron[13] (1988) and Kwaitkowski-Phillips-Schmidt-Shin[14] (1992) tests for stationarity and Johansen's Test for cointegration.

[12] In ADF test, $\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \ldots + \delta_p \Delta y_{t-p} + \varepsilon_t$ model is carried out and the significance of the coefficient γ is tested.

[13] $\tilde{t}_\alpha = t_\alpha \left(\frac{\gamma_0}{f_0} \right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2 f_0^{1/2} s}$ is the t value which is the modified version of it in ADF.

[14] In the KPSS test, the time series y_t is assumed to be stationary under the null hypothesis.

5.2 CDS Spreads



5.2.1 Correlation table & descriptive statistics for the CDS spreads

	TURKEY	THAILAND	RUSSIA	MEXICO	BRAZIL	ARGENTINA
TURKEY	100%	45%	84%	86%	57%	85%
THAILAND	45%	100%	30%	48%	-29%	44%
RUSSIA	84%	30%	100%	83%	69%	90%
MEXICO	86%	48%	83%	100%	63%	82%
BRAZIL	57%	-29%	69%	63%	100%	57%
ARGENTINA	85%	44%	90%	82%	57%	100%

	TURKEY	THAILAND	RUSSIA	MEXICO	BRAZIL	ARGENTINA
Mean	225.11	44.62	83.15	70.74	195.00	370.11
Median	220	38	71	68	144	358
Maximum	395	142	215	168	464	642
Minimum	117	24	37	29	61	176
Std. Dev.	63.44	19.10	37.09	25.68	113.16	126.72
Skewness	0.36	2.35	0.91	0.56	0.71	0.25
Kurtosis	2.03	8.49	3.01	2.98	2.05	1.86
Jarque-Bera	55.23	1977.27	124.65	47.02	111.30	59.07
Probability	0	0	0	0	0	0
Sum	204623	40558	75579	64307	177255	336430
Sum Sq. Dev.	3654351	331420.5	1249137	598730.8	11626450	14580601
Observations	909	909	909	909	909	909

5.2.2 Unit Root Test for the CDS Spreads

Following table shows the three different tests about the stationarity of the CDS spreads for the given emerging countries. As you can see, each series have a unit root, i.e. they are non-stationary, whereas when we apply the same tests to the first differences we observe that the series have no unit root.

	ADF*		Phillips-Perron*		KPSS**	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
Argentina	39.64%	0.00%	40.03%	0.00%	0.8472	0.4250
Brazil	30.54%	0.00%	30.57%	0.00%	3.0412	0.1514
Mexico	18.29%	0.00%	12.46%	0.00%	0.8081	0.0915
Russia	6.30%	0.00%	5.46%	0.01%	1.1269	0.5072
Thailand	32.01%	0.00%	41.15%	0.00%	1.8271	0.0539
Turkey	18.65%	0.00%	15.77%	0.01%	1.9415	0.1442

* p-values

** Kwiatkowski-Phillips-Schmidt-Shin test statistic

5.2.3 Johansen's Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.054974	134.3669	117.7082	0.0029
At most 1	0.028924	84.15666	88.8038	0.1033
At most 2	0.024215	58.0935	63.8761	0.1392
At most 3	0.022251	36.32612	42.91525	0.1946
At most 4	0.011861	16.34426	25.87211	0.4652
At most 5	0.006453	5.748419	12.51798	0.4929

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.054974	50.21022	44.4972	0.0108
At most 1	0.028924	26.06316	38.33101	0.5946
At most 2	0.024215	21.76738	32.11832	0.5115
At most 3	0.022251	19.98185	25.82321	0.2441
At most 4	0.011861	10.59585	19.38704	0.5554
At most 5	0.006453	5.748419	12.51798	0.4929

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Since both of the two tests indicate the number of cointegrating equations as one, I am going to generate the series accordingly.

5.2.4 Generation of Stationary Series

The cointegration test results recommend the following equation for the stationary series:

$$CS = Turkey - 0.08xBrazil - 1.30xRussia + 8.08xThailand - 6.15xMexico + 0.32xArgentina$$

where CS is the stationary series. However I want to be sure that the series is really stationary by applying unit root tests which I have applied for the original series in the previous section.

5.2.5 Unit Root Test for the New Series

	Level	**0.00%**
ADF*	**1st Difference**	0.00%
	Level	**0.00%**
Phillips-Perron*	**1st Difference**	0.01%
	Level	**0.0793**
KPSS**	**1st Difference**	0.0177

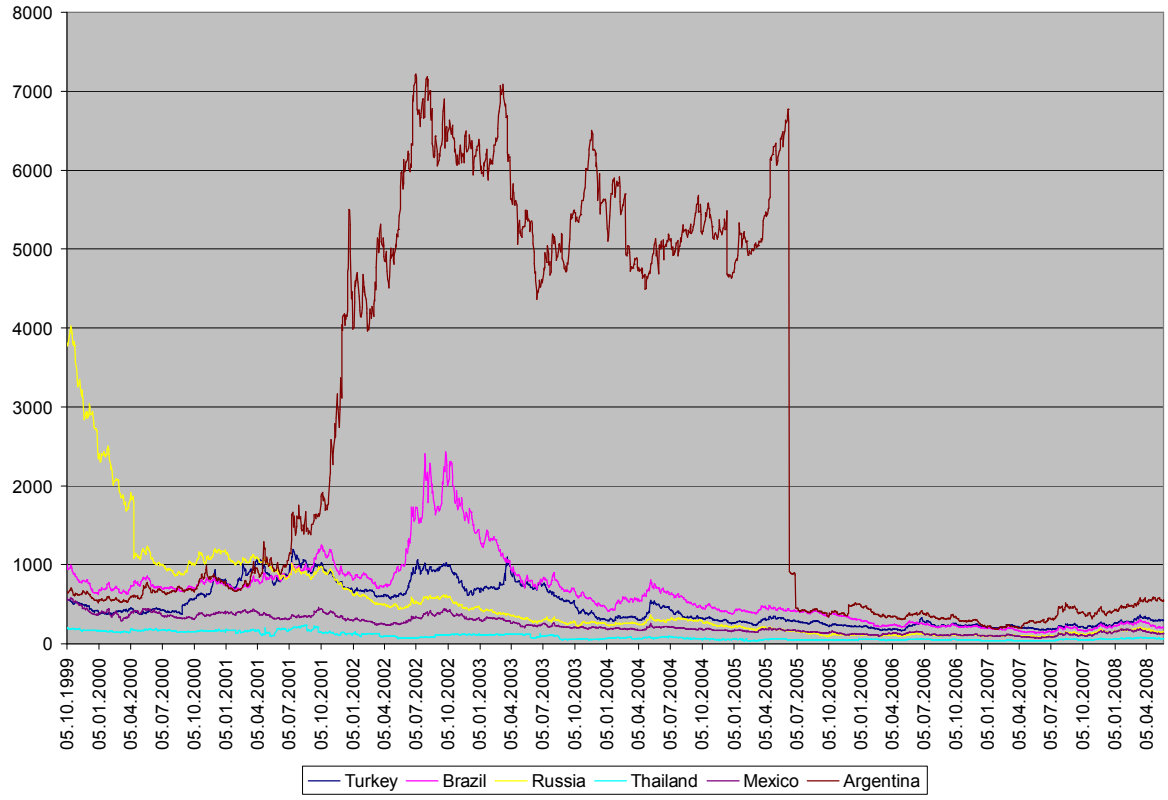
* p-values

** Kwiatkowski-Phillips-Schmidt-Shin test statistic

5.2.6 Granger Causality Findings For CDS Spreads

Null Hypothesis:	Obs	F-Statistic	Probability
TURKEY does not Granger Cause THAILAND	888	2.6701	0.01%
TURKEY does not Granger Cause RUSSIA	888	1.6769	2.91%
MEXICO does not Granger Cause TURKEY	888	1.9206	0.78%
TURKEY does not Granger Cause MEXICO	888	2.2881	0.09%
TURKEY does not Granger Cause BRAZIL	888	1.5759	4.82%
MEXICO does not Granger Cause THAILAND	888	2.6028	0.01%
BRAZIL does not Granger Cause THAILAND	888	1.9079	0.84%
ARGENTINA does not Granger Cause THAILAND	888	2.3612	0.06%
MEXICO does not Granger Cause RUSSIA	888	2.9505	0.00%
RUSSIA does not Granger Cause MEXICO	888	2.3897	0.05%
BRAZIL does not Granger Cause RUSSIA	888	2.8375	0.00%
ARGENTINA does not Granger Cause RUSSIA	888	3.3183	0.00%
BRAZIL does not Granger Cause MEXICO	888	3.2366	0.00%
ARGENTINA does not Granger Cause MEXICO	888	3.4366	0.00%
MEXICO does not Granger Cause ARGENTINA	888	1.6592	3.18%

5.3 EMBI+ Index



5.3.1 Correlation table & descriptive statistics for the EMBI+ indexes

	ARGENTINA	BRAZIL	MEXICO	RUSSIA	THAILAND	TURKEY
ARGENTINA	100%	56%	15%	-18%	-7%	37%
BRAZIL	56%	100%	75%	34%	53%	83%
MEXICO	15%	75%	100%	79%	89%	76%
RUSSIA	-18%	34%	79%	100%	75%	35%
THAILAND	-7%	53%	89%	75%	100%	68%
TURKEY	37%	83%	76%	35%	68%	100%

	ARGENTINA	BRAZIL	MEXICO	RUSSIA	THAILAND	TURKEY
Mean	2591.1	633.2	237.2	534.8	93.4	470.1
Median	852	606	204	279	72	379
Maximum	7220	2436	582	4023	238	1194
Minimum	185	138	71	84	31	164
Std. Dev.	2455.130	421.212	110.772	642.202	48.534	257.182
Skewness	0.440	1.447	0.494	2.728	0.769	0.765
Kurtosis	1.390	5.616	2.143	11.709	2.319	2.316
Jarque-Bera	302.69	1368.29	153.57	9491.12	254.09	252.63
Probability	0	0	0	0	0	0
Sum	5589064	1365889	511545.5	1153637	201471.7	1013945
Sum Sq. Dev.	1.30E+10	3.83E+08	26455182	8.89E+08	5078538	1.43E+08
Observations	2157	2157	2157	2157	2157	2157

5.3.2 Unit Root Test for the CDS Spreads

	ADF*		Phillips-Perron*		KPSS**	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
Argentina	59.64%	0.01%	57.81%	0.01%	1.4883	0.2054
Brazil	58.81%	0.00%	51.70%	0.00%	3.2657	0.0611
Mexico	5.75%	0.01%	3.71%	0.01%	5.5071	0.1717
Russia	0.00%	0.00%	0.00%	0.00%	0.7965	0.3693
Thailand	20.64%	0.00%	8.50%	0.01%	5.0109	0.0713
Turkey	60.72%	0.01%	58.76%	0.01%	3.6718	0.0828

* p-values

** Kwiatkowski-Phillips-Schmidt-Shin test statistic

Russian EMBI+ index already seems to be stationary which is the reason why I will remove it from the group and test the remaining countries for cointegration.

5.3.3 Johansen's Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.025356	91.77659	60.06141	0.0000
At most 1	0.007140	36.50601	40.17493	0.1116
At most 2	0.006117	21.08473	24.27596	0.1199
At most 3	0.002799	7.881575	12.32090	0.2460
At most 4	0.000860	1.850522	4.129906	0.2044

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.025356	55.27059	30.43961	0.0000
At most 1	0.007140	15.42128	24.15921	0.4713
At most 2	0.006117	13.20315	17.79730	0.2150
At most 3	0.002799	6.031053	11.22480	0.3462
At most 4	0.000860	1.850522	4.129906	0.2044

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Since both Trace and Maximum Eigenvalue tests indicate 2 cointegrating equations, I am going to build up two different series and test them for unit root.

5.3.4 Generation of Stationary Series

The cointegration test results recommend the following equation for the stationary series:

$$CS = Argentina + 4.03xBrazil - 10.85xMexico + 9.57xThailand - 2.19xTurkey$$

where CS is the stationary series. However I want to be sure that the series is really stationary by applying unit root tests which I have applied for the original series in the previous section.

5.3.5 Unit Root Test for the New Series

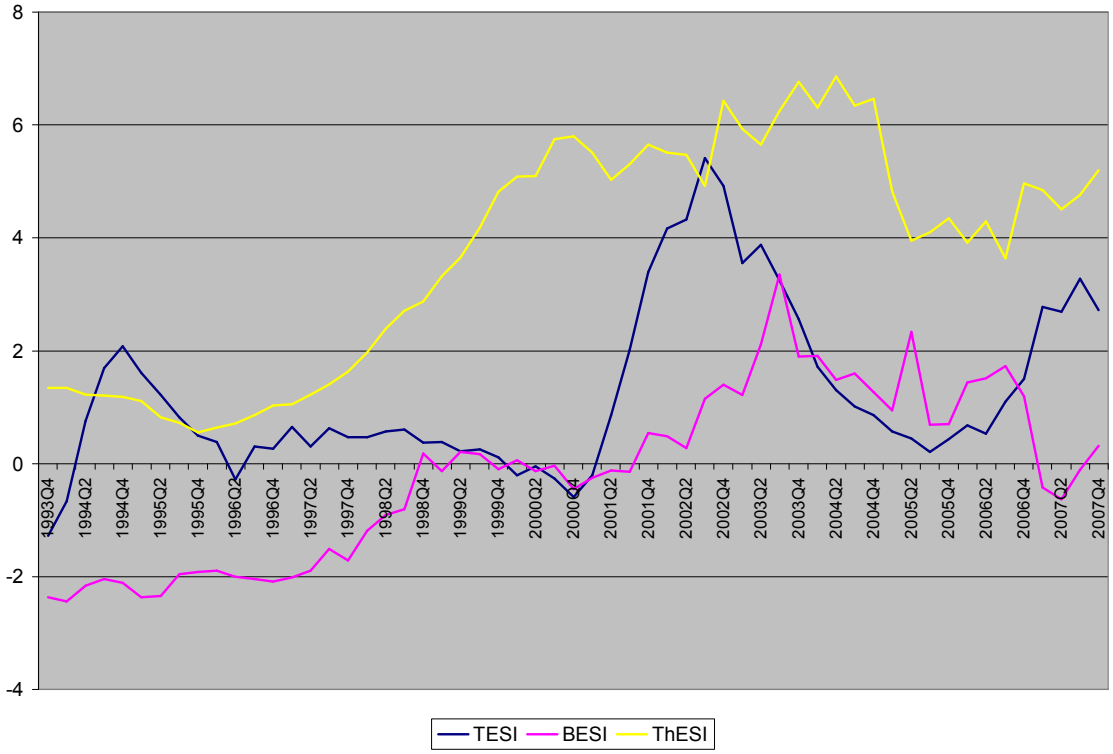
	Level	**0.00%**
ADF*	**1st Difference**	0.00%
	Level	**0.00%**
Phillips-Perron*	**1st Difference**	0.01%
	Level	**0.1461**
KPSS**	**1st Difference**	0.0417

* p-values
** Kwiatkowski-Phillips-Schmidt-Shin test statistic

5.3.6 Granger Causality Findings For EMBI+ Indexes

Null Hypothesis:	Obs	F-Statistic	Probability
MEXICO does not Granger Cause BRAZIL	2136	2.8486	0.00%
TURKEY does not Granger Cause BRAZIL	2136	2.0835	0.27%
BRAZIL does not Granger Cause TURKEY	2136	4.1849	0.00%
RUSSIA does not Granger Cause MEXICO	2136	2.6107	0.01%
MEXICO does not Granger Cause RUSSIA	2136	3.5691	0.00%
MEXICO does not Granger Cause THAILAND	2136	2.6981	0.00%
TURKEY does not Granger Cause MEXICO	2136	2.0882	0.26%
THAILAND does not Granger Cause RUSSIA	2136	2.0924	0.26%
TURKEY does not Granger Cause RUSSIA	2136	2.0981	0.25%
TURKEY does not Granger Cause THAILAND	2136	3.0341	0.00%

5.4 Cointegration on Economic Stability Indexes



Correlation table for the stability indexes

	BESI	TESI	THESI
BESI	100%	41%	85%
TESI	41%	100%	44%
THESI	85%	44%	100%

Descriptive statistics for the stability indexes

	BESI	TESI	THESI
Mean	-0.1776	1.2503	3.7445
Median	-0.1090	0.6518	4.2959
Maximum	3.3490	5.4180	6.8597
Minimum	-2.4418	-1.2717	0.5544
Std. Dev.	1.4958	1.4888	2.0362
Skewness	0.0838	1.0169	-0.2604
Kurtosis	2.0296	3.3008	1.5983
Jarque-Bera	2.3035	10.0386	5.3104
Probability	0.3161	0.0066	0.0703
Sum	-10.125	71.265	213.437
Sum Sq. Dev.	125.295	124.132	232.180
Observations	57	57	57

5.3.1 Unit Root Test for the Stability Indexes

	ADF*		Phillips-Perron*		KPSS**	
Index	**Level**	**1st Difference**	**Level**	**1st Difference**	**Level**	**1st Difference**
Thailand	69.40%	0.00%	69.91%	0.00%	0.6618	0.1649
Brazil	38.83%	0.00%	38.83%	0.00%	0.7667	0.1416
Turkey	5.66%	0.04%	13.88%	0.04%	0.2946	0.0605

* p-values

** Kwiatkowski-Phillips-Schmidt-Shin test statistic

According to the unit root tests' results, all stability indexes can be named as non-stationary but first differences of them are stationary. Now, we can check whether we can find a series which is a linear combination of the indexes and which is stationary.

5.3.2 Johansen's Cointegration Test

Trace Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.425596	46.68217	35.19275	0.0019
At most 1	0.252006	18.96106	20.26184	0.0747
At most 2	0.085027	4.443039	9.164546	0.3501

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Maximum-Eigenvalue Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.425596	27.72111	22.29962	0.0079
At most 1	0.252006	14.51802	15.8921	0.0811
At most 2	0.085027	4.443039	9.164546	0.3501

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Since both trace and maximum eigenvalue test fail to reject the null hypothesis of the Johansen's test we build up the series which is said to be stationary.

5.3.3 Generation of Stationary Series

The cointegration test results recommend the following equation for the stationary series:

$$CS = BESI + 0.15xTESI - 0.76xThESI$$

where CS is the stationary series, ThESI, TESI and BESI are the stability indexes of Thailand, Turkey and Brazil respectively. However I want to be sure that the series is really stationary by applying unit root tests which I have applied for the original series in the previous section.

5.2.4 Unit Root Test for the New Series

	Level	**2.14%**
ADF*	**1st Difference**	0.00%
	Level	**2.73%**
Phillips-Perron*	**1st Difference**	0.00%
	Level	**0.4898**
KPSS**	**1st Difference**	0.0807

* p-values

** Kwiatkowski-Phillips-Schmidt-Shin test statistic

Descriptive statistics for the new series

	CS
Mean	2.5818
Median	2.5001
Maximum	4.2139
Minimum	1.4436
Std. Dev.	0.5787
Skewness	0.8490
Kurtosis	3.7295
Jarque-Bera	8.1113
Probability	0.0173
Sum	147.163
Sum Sq. Dev.	18.756
Observations	57

6. CONCLUSION

We have devised TESI-like indicators for Thailand and Brazil, one from Asia one from Latin America. These indicators act just like TESI does. That is they go below the threshold value of 0 at least several months in advance even when including the lag in data reporting of the central banks, and then they go above 0 a few months after a crisis. The resulting indexes can be used to monitor sovereign risk premiums by the debtors in those countries as well as the creditors, the rating agencies. It can also supply a new perpective for banking sector in their bond portfolios both for the trading and the banking book.

Although data which belong to the crisis periods was not available for other emerging countries such as Russia, Argentina and Mexico, we have created the same risk variable which can be followed to measure the sensitivity and proximity of those countries to the crisis.

We have also found that the CDS spreads of the mentioned six countries are cointegrated which means market expectations for the risk premiums of the emerging countries move together. This result can be also utilized for CDS arbitrage trading, which can be tested by intraday CDS spreads as a future work. We have added that JP Morgan's EMBI+ indexes for those countries are not only correlated but also cointegrated.

7. APPENDICES

7.1 Crisis Definition for Thailand

Period	Return	Tag	Period	Return	Tag
1992Q1	-7%	1	2000Q1	26%	0
1992Q2	61%	1	2000Q2	22%	0
1992Q3	36%	1	2000Q3	11%	0
1992Q4	26%	1	2000Q4	2%	0
1993Q1	45%	1	2001Q1	17%	0
1993Q2	12%	1	2001Q2	29%	0
1993Q3	0%	1	2001Q3	18%	0
1993Q4	65%	1	2001Q4	-2%	0
1994Q1	42%	1	2002Q1	2%	0
1994Q2	41%	1	2002Q2	2%	0
1994Q3	23%	1	2002Q3	5%	0
1994Q4	17%	1	2002Q4	-3%	0
1995Q1	56%	1	2003Q1	10%	0
1995Q2	-9%	1	2003Q2	4%	0
1995Q3	31%	1	2003Q3	4%	0
1995Q4	29%	1	2003Q4	1%	0
1996Q1	16%	1	2004Q1	3%	0
1996Q2	25%	1	2004Q2	2%	0
1996Q3	18%	1	2004Q3	25%	0
1996Q4	12%	1	2004Q4	9%	0
1997Q1	34%	1	2005Q1	12%	0
1997Q2	33%	1	2005Q2	7%	0
1997Q3	44%	1	2005Q3	14%	0
1997Q4	8%	1	2005Q4	21%	0
1998Q1	4%	1	2006Q1	8%	0
1998Q2	12%	0	2006Q2	8%	0
1998Q3	-18%	0	2006Q3	1%	0
1998Q4	-29%	0	2006Q4	2%	0
1999Q1	12%	0	2007Q1	0%	0
1999Q2	-9%	0	2007Q2	-4%	0
1999Q3	23%	0	2007Q3	0%	0
1999Q4	-4%	0	2007Q4	2%	0

7.2 Data, Raw Variable and Stability Index for Thailand

Date	TAG	CA	IR	TED	STED	Raw	ThESI
1993Q4	-1	-1,820	25,439	29,473	22,634	1.3457	-3.8895
1994Q1	-1	-1,105	26,673	31,027	24,196	1.3390	-3.9176
1994Q2	-1	-2,680	28,341	32,581	26,222	1.2211	-4.4161
1994Q3	-1	-1,859	29,950	34,134	28,275	1.2007	-4.5023
1994Q4	-1	-2,157	30,279	35,688	29,179	1.1868	-4.5610
1995Q1	-1	-2,356	30,120	38,875	31,541	1.1127	-4.8743
1995Q2	-1	-3,908	34,958	42,061	40,082	0.8240	-6.0949
1995Q3	-1	-2,959	35,866	45,248	45,434	0.7202	-6.5341
1995Q4	-1	-4,011	37,027	48,434	52,398	0.5544	-7.2348
1996Q1	-1	-3,333	38,983	51,575	53,200	0.6396	-6.8749
1996Q2	-1	-4,802	39,830	54,717	52,486	0.7099	-6.5776
1996Q3	-1	-3,544	39,537	57,858	50,366	0.8634	-5.9287
1996Q4	-1	-2,671	38,725	60,999	47,743	1.0328	-5.2123
1997Q1	-1	-2,101	38,066	63,495	48,529	1.0495	-5.1418
1997Q2	-1	-3,134	32,353	65,991	42,701	1.2297	-4.3799
1997Q3	-1	-746	29,612	68,486	40,512	1.4030	-3.6469
1997Q4	-1	2,871	26,968	70,982	38,294	1.6328	-2.6755
1998Q1	-1	4,210	27,680	72,397	35,128	1.9688	-1.2550
1998Q2	0	2,811	26,572	73,812	30,482	2.3855	0.5067
1998Q3	0	3,410	27,291	75,226	28,562	2.7086	1.8730
1998Q4	0	3,860	29,536	76,641	28,421	2.8717	2.5624
1999Q1	0	3,972	29,936	76,590	25,608	3.3149	4.4365
1999Q2	0	2,218	31,434	75,810	23,546	3.6489	5.8484
1999Q3	0	3,026	32,360	75,916	21,473	4.1833	8.1080
1999Q4	0	3,250	34,781	75,512	19,539	4.8111	10.7622
2000Q1	0	3,302	32,284	73,602	17,955	5.0810	11.9037
2000Q2	0	1,677	32,142	70,111	17,070	5.0886	11.9357
2000Q3	0	2,165	32,250	68,467	15,241	5.7504	14.7335
2000Q4	0	2,184	32,661	65,021	14,694	5.7964	14.9282
2001Q1	0	1,101	32,295	61,261	14,547	5.5069	13.7041
2001Q2	0	740	31,612	59,140	15,161	5.0345	11.7069
2001Q3	0	1,368	32,635	58,158	14,615	5.3059	12.8545
2001Q4	0	1,905	33,048	54,120	13,389	5.6527	14.3207
2002Q1	0	1,281	33,615	51,282	13,239	5.5092	13.7140
2002Q2	0	156	36,791	51,801	13,723	5.4672	13.5363
2002Q3	0	1,141	37,652	47,139	14,504	4.9248	11.2429
2002Q4	0	2,107	38,924	47,540	11,919	6.4311	17.6115
2003Q1	0	1,646	37,632	44,444	12,085	5.9279	15.4842
2003Q2	0	472	39,327	43,301	12,497	5.6498	14.3082
2003Q3	0	1,022	40,264	41,286	11,390	6.2494	16.8436
2003Q4	0	1,644	42,148	40,879	10,904	6.7651	19.0239
2004Q1	0	1,123	43,036	39,956	11,504	6.3119	17.1075
2004Q2	0	-428	43,306	39,357	10,463	6.8597	19.4236
2004Q3	0	264	44,767	39,102	11,449	6.3482	17.2613
2004Q4	0	1,808	49,832	39,138	12,174	6.4567	17.7199
2005Q1	0	-2,361	48,681	36,466	14,197	4.8313	10.8477
2005Q2	0	-5,431	48,357	35,301	15,813	3.9469	7.1086
2005Q3	0	189	49,795	35,887	16,823	4.1045	7.7748
2005Q4	0	-39	52,066	35,631	16,408	4.3424	8.7806
2006Q1	0	718	55,266	38,078	19,130	3.9170	6.9822
2006Q2	0	-2,308	58,057	39,177	17,924	4.2959	8.5840

2006Q3	0	1,205	61,593	38,256	21,764	3.6431	5.8241
2006Q4	0	2,560	66,985	41,089	18,554	4.9628	11.4036
2007Q1	0	4,683	70,863	40,065	19,767	4.8488	10.9218
2007Q2	0	1,166	73,000	38,550	20,465	4.5076	9.4793
2007Q3	0	3,238	80,687	39,519	21,436	4.7586	10.5402
2007Q4	0	6,679	87,455	40,098	21,642	5.2025	12.4171

7.3 Crisis Definition for Brazil

Period	Return	Tag	Period	Return	Tag
1986Q2	4%	1	1997Q1	12%	1
1986Q3	16%	1	1997Q2	4%	1
1986Q4	35%	1	1997Q3	9%	1
1987Q1	33%	1	1997Q4	61%	1
1987Q2	29%	1	1998Q1	4%	1
1987Q3	5%	1	1998Q2	1%	1
1987Q4	16%	1	1998Q3	40%	1
1988Q1	12%	1	1998Q4	1%	1
1988Q2	19%	1	1999Q1	12%	1
1988Q3	14%	1	1999Q2	0%	0
1988Q4	23%	1	1999Q3	1%	0
1989Q1	6%	1	1999Q4	1%	0
1989Q2	14%	1	2000Q1	0%	0
1989Q3	9%	1	2000Q2	1%	0
1989Q4	7%	1	2000Q3	1%	0
1990Q1	5%	1	2000Q4	0%	0
1990Q2	36%	1	2001Q1	3%	0
1990Q3	29%	1	2001Q2	7%	0
1990Q4	47%	1	2001Q3	3%	0
1991Q1	32%	1	2001Q4	0%	0
1991Q2	3%	1	2002Q1	0%	0
1991Q3	9%	1	2002Q2	6%	0
1991Q4	22%	1	2002Q3	0%	0
1992Q1	3%	1	2002Q4	14%	0
1992Q2	1%	1	2003Q1	3%	0
1992Q3	4%	0	2003Q2	0%	0
1992Q4	3%	0	2003Q3	0%	0
1993Q1	7%	0	2003Q4	0%	0
1993Q2	7%	0	2004Q1	0%	0
1993Q3	1%	0	2004Q2	0%	0
1993Q4	3%	0	2004Q3	1%	0
1994Q1	11%	0	2004Q4	3%	0
1994Q2	4%	1	2005Q1	3%	0
1994Q3	4%	1	2005Q2	1%	0
1994Q4	6%	1	2005Q3	0%	0
1995Q1	37%	1	2005Q4	0%	0
1995Q2	20%	1	2006Q1	0%	0
1995Q3	2%	1	2006Q2	0%	0
1995Q4	3%	1	2006Q3	0%	0
1996Q1	5%	0	2006Q4	0%	0
1996Q2	4%	0	2007Q1	0%	0
1996Q3	4%	0	2007Q2	0%	0
1996Q4	5%	0	2007Q3	0%	0
			2007Q4	0%	0

7.4 Data, Raw Variable and Stability Index for Brazil

Date	TAG	CA	IR	TED	STED	Raw	BESI
1984Q4	0	-150	11,995	102,127	11,036	9.3273	-0.7258
1985Q1	0	-1,401	11,454	101,444	10,460	9.6593	-0.6099
1985Q2	0	420	11,647	101,312	10,602	9.6941	-0.5977
1985Q3	0	625	11,860	103,283	9,970	10.6116	-0.2776
1985Q4	0	108	11,608	105,171	9,314	11.5496	0.0498
1986Q1	-1	-719	1,072	107,942	9,822	10.0257	-0.4820
1986Q2	-1	279	10,391	109,354	9,732	11.3329	-0.0258
1986Q3	-1	-1,027	925	110,783	9,887	10.1946	-0.4231
1986Q4	-1	-3,856	6,760	111,203	9,444	11.0825	-0.1132
1987Q1	-1	-2,523	4,859	114,516	10,139	10.5250	-0.3078
1987Q2	-1	-428	5,630	115,492	11,518	9.4787	-0.6729
1987Q3	-1	1,434	7,386	117,039	13,069	8.6303	-0.9690
1987Q4	-1	80	7,458	121,188	13,674	8.4139	-1.0445
1988Q1	-1	-529	6,847	119,314	13,835	8.0807	-1.1608
1988Q2	-1	1,995	7,435	115,969	14,270	7.7876	-1.2631
1988Q3	-1	2,165	9,334	114,157	14,599	7.6072	-1.3261
1988Q4	-1	549	9,140	113,511	10,956	10.2450	-0.4055
1989Q1	-1	815	10,520	114,010	12,109	9.3514	-0.7174
1989Q2	-1	417	8,564	114,509	12,040	9.2566	-0.7504
1989Q3	-1	-345	9,890	115,007	15,556	7.0067	-1.5357
1989Q4	-1	145	9,679	115,506	16,221	6.7264	-1.6335
1990Q1	-1	-2,715	7,385	117,596	19,909	5.1412	-2.1867
1990Q2	-1	1,720	10,173	118,305	21,604	5.0266	-2.2267
1990Q3	-1	-450	10,171	121,132	23,401	4.5918	-2.3784
1990Q4	-1	-2,339	9,973	123,439	26,893	3.8739	-2.6290
1991Q1	-1	35	8,663	120,520	28,458	3.5406	-2.7453
1991Q2	-1	984	10,401	118,374	28,481	3.5560	-2.7400
1991Q3	-1	-1,479	7,956	120,098	29,393	3.3064	-2.8271
1991Q4	-1	-948	9,406	123,910	30,914	3.2818	-2.8356
1992Q1	-1	1,252	1,763	132,260	37,932	2.5662	-3.0854
1992Q2	-1	2,438	21,703	133,489	31,954	3.9331	-2.6084
1992Q3	0	452	21,964	134,719	33,030	3.7574	-2.6697
1992Q4	0	1,967	23,754	135,949	25,114	5.4375	-2.0833
1993Q1	0	-170	22,309	138,393	26,095	5.1518	-2.1830
1993Q2	0	102	24,476	140,837	27,039	5.1176	-2.1950
1993Q3	0	-138	26,948	143,282	28,713	4.9240	-2.2625
1993Q4	0	-470	32,211	145,726	31,456	4.6418	-2.3610
1994Q1	0	332	38,282	148,011	34,494	4.4104	-2.4418
1994Q2	-1	990	42,881	150,296	31,187	5.2260	-2.1571
1994Q3	-1	1,976	43,455	149,295	29,781	5.5386	-2.0480
1994Q4	-1	-5,110	38,806	148,295	28,627	5.3573	-2.1113
1995Q1	-1	-5,631	33,742	152,719	32,037	4.6445	-2.3601
1995Q2	-1	-6,563	33,512	157,143	32,266	4.7055	-2.3388
1995Q3	-1	-2,344	48,713	158,199	30,069	5.8033	-1.9556
1995Q4	-1	-3,846	51,840	159,256	29,943	5.9214	-1.9144
1996Q1	0	-3,439	55,753	162,999	30,823	5.9854	-1.8921
1996Q2	0	-4,215	59,997	166,741	33,359	5.6706	-2.0019
1996Q3	0	-5,782	58,775	173,338	34,488	5.5627	-2.0396
1996Q4	0	-10,067	60,110	179,934	35,842	5.4163	-2.0907
1997Q1	-1	-4,655	58,980	184,950	36,068	5.6340	-2.0147
1997Q2	-1	-7,771	57,615	189,966	34,433	5.9645	-1.8994

1997Q3	-1	-7,202	61,931	194,982	30,873	7.0882	-1.5072
1997Q4	-1	-10,824	52,173	199,998	32,237	6.4866	-1.7172
1998Q1	-1	-6,108	68,594	210,409	30,283	8.0115	-1.1850
1998Q2	-1	-7,345	70,898	220,821	29,015	8.8010	-0.9095
1998Q3	-1	-8,655	45,811	231,232	26,587	9.0946	-0.8070
1998Q4	-1	-11,307	44,556	241,644	21,294	11.9093	0.1754
1999Q1	-1	-5,487	33,848	241,600	22,450	11.0250	-0.1333
1999Q2	0	-7,113	41,346	241,556	21,177	12.0230	0.2150
1999Q3	0	-4,930	42,562	241,513	21,667	11.8836	0.1664
1999Q4	0	-7,805	36,342	241,469	22,272	11.1232	-0.0990
2000Q1	0	-3,986	39,200	242,537	22,066	11.5870	0.0629
2000Q2	0	-6,993	28,265	232,288	21,054	11.0436	-0.1268
2000Q3	0	-4,364	31,431	232,388	21,102	11.2956	-0.0389
2000Q4	0	-8,882	3,311	236,157	20,742	10.1168	-0.4502
2001Q1	0	-6,668	34,407	204,095	19,847	10.6809	-0.2534
2001Q2	0	-6,673	37,318	207,741	19,743	11.0745	-0.1160
2001Q3	0	-4,093	4,054	216,524	18,046	10.9963	-0.1433
2001Q4	0	-5,781	35,866	209,934	17,214	12.9433	0.5362
2002Q1	0	-3,248	36,721	210,777	17,707	12.7938	0.4840
2002Q2	0	-5,146	41,999	219,038	19,415	12.1798	0.2697
2002Q3	0	997	38,381	212,873	16,067	14.7001	1.1493
2002Q4	0	-240	37,823	210,711	15,124	15.4171	1.3996
2003Q1	0	163	42,335	215,294	16,227	14.8868	1.2145
2003Q2	0	435	47,956	218,853	14,488	17.4465	2.1078
2003Q3	0	3,315	52,675	219,724	12,531	21.0030	3.3490
2003Q4	0	265	49,296	214,930	14,822	16.8441	1.8976
2004Q1	0	1,638	51,612	213,463	14,917	16.8794	1.9099
2004Q2	0	2,741	49,805	205,558	15,507	15.6438	1.4787
2004Q3	0	5,292	49,496	202,187	15,126	15.9888	1.5991
2004Q4	0	2,008	52,935	201,374	15,991	15.0287	1.2640
2005Q1	0	2,657	61,960	201,922	17,618	14.1288	0.9500
2005Q2	0	2,592	59,885	191,309	13,293	18.0916	2.3330
2005Q3	0	5,670	578	183,151	13,153	13.4001	0.6956
2005Q4	0	3,066	53,799	169,450	15,701	13.4140	0.7005
2006Q1	0	1,625	59,824	166,652	13,802	15.5265	1.4378
2006Q2	0	1,149	62,670	156,661	13,170	15.7406	1.5125
2006Q3	0	7,502	73,393	159,560	13,853	16.3576	1.7278
2006Q4	0	3,368	85,839	172,589	16,527	14.8406	1.1984
2007Q1	0	232	109,531	182,082	26,045	10.2056	-0.4193
2007Q2	0	2,182	147,101	191,358	32,143	9.5978	-0.6314
2007Q3	0	1,203	162,962	195,331	29,724	11.0946	-0.1090
2007Q4	0	-1,904	180,334	193,563	27,957	12.3058	0.3137

7.5 Crisis Definition for Turkey

Period	Return	Tag	Period	Return	Tag
1992Q1	3%	0	2000Q1	31%	1
1992Q2	8%	0	2000Q2	3%	1
1992Q3	2%	0	2000Q3	12%	1
1992Q4	48%	0	2000Q4	288%	1
1993Q1	-37%	1	2001Q1	116%	1
1993Q2	13%	1	2001Q2	-431%	1
1993Q3	-6%	1	2001Q3	-22%	0
1993Q4	220%	1	2001Q4	-8%	0
1994Q1	25%	1	2002Q1	0%	0
1994Q2	-36%	1	2002Q2	2%	0
1994Q3	-73%	0	2002Q3	-23%	0
1994Q4	13%	0	2002Q4	9%	0
1995Q1	-34%	0	2003Q1	-4%	0
1995Q2	-22%	0	2003Q2	15%	0
1995Q3	-23%	0	2003Q3	15%	0
1995Q4	79%	0	2003Q4	-27%	0
1996Q1	-48%	0	2004Q1	11%	0
1996Q2	-36%	0	2004Q2	17%	0
1996Q3	13%	0	2004Q3	0%	0
1996Q4	0%	0	2004Q4	-10%	0
1997Q1	-3%	0	2005Q1	11%	0
1997Q2	-8%	0	2005Q2	15%	0
1997Q3	5%	0	2005Q3	-8%	1
1997Q4	5%	0	2005Q4	0%	1
1998Q1	6%	0	2006Q1	-5%	1
1998Q2	-4%	0	2006Q2	25%	1
1998Q3	-4%	0	2006Q3	1%	0
1998Q4	0%	0	2006Q4	0%	0
1999Q1	0%	0	2007Q1	0%	0
1999Q2	-3%	0	2007Q2	0%	0
1999Q3	0%	0	2007Q3	0%	0
1999Q4	-10%	0	2007Q4	1%	0

7.6 Data, Raw Variable and Stability Index for Turkey

Date	TAG	CA	IR	TED	STED	Raw	TESI
1992Q1	0	-160	11,152	51,584	8,819	6.0956	1.4503
1992Q2	0	-592	12,345	55,581	10,203	5.5995	0.8882
1992Q3	0	-47	14,661	59,746	11,701	5.3550	0.6112
1992Q4	0	-175	15,252	58,595	12,660	4.8193	0.0043
1993Q1	-1	-932	14,796	60,512	12,581	4.9117	0.1090
1993Q2	-1	-2,344	15,182	63,577	14,455	4.2864	-0.5995
1993Q3	-1	-1,580	16,508	68,644	16,497	4.0659	-0.8494
1993Q4	-1	-1,577	17,761	70,512	18,473	3.6931	-1.2717
1994Q1	-1	-1,133	12,996	70,836	15,815	4.2291	-0.6644
1994Q2	-1	1,408	13,837	69,845	13,129	5.4811	0.7540
1994Q3	0	2,014	16,623	69,475	12,046	6.3146	1.6985
1994Q4	0	342	16,514	68,705	11,187	6.6483	2.0765
1995Q1	0	428	19,413	74,443	13,023	6.2398	1.6137
1995Q2	0	-443	21,215	76,095	14,064	5.8876	1.2146
1995Q3	0	25	24,901	75,726	15,404	5.5342	0.8142
1995Q4	0	-2,349	23,317	75,948	15,500	5.2526	0.4952
1996Q1	0	-429	22,864	76,125	16,016	5.1538	0.3833
1996Q2	0	-1,430	24,696	78,666	18,323	4.5631	-0.2860
1996Q3	0	470	25,998	79,021	17,341	5.0832	0.3033
1996Q4	0	-1,048	24,966	79,299	17,072	5.0460	0.2611
1997Q1	0	-1,248	23,617	76,382	15,452	5.3908	0.6518
1997Q2	0	-1,032	23,597	79,634	16,789	5.0873	0.3079
1997Q3	0	948	28,129	81,957	17,437	5.3677	0.6256
1997Q4	0	-1,306	27,138	84,356	17,691	5.2285	0.4679
1998Q1	0	-1,034	28,463	85,751	18,170	5.2290	0.4684
1998Q2	0	-259	34,260	90,390	19,676	5.3220	0.5738
1998Q3	0	1,514	35,303	95,709	20,855	5.3547	0.6108
1998Q4	0	1,779	29,499	96,351	20,774	5.1437	0.3718
1999Q1	0	1,365	30,795	94,915	20,668	5.1484	0.3772
1999Q2	0	-1,290	30,585	93,619	20,462	5.0069	0.2168
1999Q3	0	254	32,750	97,384	21,608	5.0343	0.2478
1999Q4	0	-1,254	33,751	103,123	22,921	4.9169	0.1148
2000Q1	-1	-2,301	33,727	104,752	24,175	4.6330	-0.2068
2000Q2	-1	-3,271	34,803	109,477	24,436	4.7705	-0.0510
2000Q3	-1	-1,334	35,925	110,712	25,994	4.5899	-0.2557
2000Q4	-1	-3,014	34,159	118,602	28,301	4.2912	-0.5940
2001Q1	-1	-571	30,183	116,946	26,029	4.6306	-0.2096
2001Q2	0	1,422	29,741	114,376	22,132	5.5759	0.8615
2001Q3	0	2,092	30,841	119,775	20,108	6.5944	2.0155
2001Q4	0	817	30,192	113,592	16,403	7.8155	3.3990
2002Q1	0	-461	29,698	113,969	15,096	8.4864	4.1591
2002Q2	0	-618	31,975	123,377	16,070	8.6287	4.3204
2002Q3	0	1,244	35,247	124,941	15,233	9.5975	5.4180
2002Q4	0	-791	38,051	129,598	16,424	9.1594	4.9216
2003Q1	0	-2,953	33,841	130,952	18,078	7.9523	3.5540
2003Q2	0	-2,456	36,865	135,025	18,347	8.2349	3.8742
2003Q3	0	1,248	42,904	138,707	21,067	7.6799	3.2453
2003Q4	0	-3,354	44,957	144,145	23,013	7.0714	2.5559

2004Q1	0	-5,284	43,169	144,816	24,922	6.3309	1.7169
2004Q2	0	-4,251	45,447	147,294	27,054	5.9672	1.3048
2004Q3	0	-243	49,758	153,001	30,202	5.7054	1.0082
2004Q4	0	-4,653	53,785	160,646	31,880	5.5803	0.8664
2005Q1	0	-5,877	52,386	159,171	32,512	5.3263	0.5787
2005Q2	0	-6,647	56,911	160,876	34,010	5.2082	0.4449
2005Q3	-1	-2,277	62,337	164,464	37,432	4.9982	0.2070
2005Q4	-1	-7,336	68,744	168,474	37,103	5.1958	0.4308
2006Q1	-1	-8,586	75,864	182,557	38,943	5.4154	0.6796
2006Q2	-1	-10,681	77,988	189,833	40,924	5.2834	0.5300
2006Q3	0	-4,785	82,714	195,303	40,291	5.7815	1.0944
2006Q4	0	-7,841	90,821	205,265	40,354	6.1429	1.5039
2007Q1	0	-9,262	97,652	212,569	36,432	7.2608	2.7705
2007Q2	0	-10,011	104,764	223,202	38,808	7.1930	2.6937
2007Q3	0	-6,795	105,437	234,474	38,261	7.7064	3.2754
2007Q4	0	-11,629	108,251	247,094	41,810	7.2209	2.7253

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