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Bradley Rotter

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University of Richmond – Robins School of Business

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Abstract

This paper looks at the relationship between trade openness and an exchange rate volatility index called exchange market pressure. The theory behind the paper is that increasing trade flows between nations should reduce economic volatility, as it allows for the correct allocation of goods and services across borders. The results show a negative relationship between an increase in trade openness and volatility as measured by exchange market pressures. The empirical estimate is based on 20 OECD nations from 1992 to 2007. Although, trade shows some impact on volatility, most instability arises from systematic risks that are felt globally.

I. Introduction

The World Trade Organization (2012) recognizes 511 regional trade agreements by 157 nations, evidence of the growing importance of trade in maximizing global output and mitigating economic volatility. By increasing trade across borders, nations will raise welfare and reduce volatility. At least, that is the goal of international trade organizations such as the WTO and the reason for the promotion of trade agreements. However, according to a study by Aart Kraay at the World Bank, there were a total of 30 speculative attacks on currencies, in the 1990's alone.[1] The prevalence of volatility, even with more integrated financial economies, lends itself to important questions surrounding what, in fact, will reduce instability and create manageable business cycles. Victims of instability in the past two decades include developing countries accessing world markets for the first time such as South Korea in 1997, as well as highly developed and globalized nations like Great Britain, as recently as 1992. Nevertheless, countries continue to enter trade agreements and move towards currency unions to improve access to capital markets and promote the correct allocation of goods and services across borders. This paper attempts to isolate whether the increasing attention placed on trade agreements aids in reducing a nation's volatility.

Trade theory suggests that greater integration dilutes abrupt changes in a nation's business cycle, rooted in the notion that moving away from autarkic protection improves a nation's trade basket, and creates a larger pie for all parties involved. The goal of integration is not only to increase growth, but also to reduce volatility of business cycles by creating more stable inflation rates, unemployment rates, government debt levels, tariff rates and price parity by allowing for

[1] Speculative attacks are the massive selling of a currency on a foreign exchange market, which leads to a currency's rapid depreciation. The mechanics of such attacks are explained in the literature review.

the correct allocation of factors of production between borders. By globalizing, nations have access to more and cheaper liquidity and hedging opportunities to dampen cycles.

To understand the relationship between trade and volatility, this paper looks at instability in terms of balance of payment (BOP) and currency crises, which are both forms of exchange rate volatility, and attempts to identify the effect of trade transformation on the two crises. Currency crises are the immediate change in a currency valuation that alters the supply and demand of an individual country's output. Balance of payment crises are a nation's inability to reconcile trade debts leading to the devaluation of its currency. Nations experiencing either type of crises observe a sizeable increase in its nominal exchange rate. The traditional literature on exchange rate volatility focuses on capital flows in creating the majority of currency crises.[2] This paper analyzes trade openness, as one of many factors that influence currency and balance of payment crises, in addition to other variables which aid in creating asymmetric shocks between similar countries.[3] This includes national debt, inflation, gross domestic product per capita and unemployment. Asymmetric shocks occur when markets experience varying supply and demand equlibria from one region to another. By bridging the gap between asymmetries, countries will be able to adjust quicker towards equilibrium, and prevent future imbalances as economies will embody harmonized policy measures.[4]

[2]The first major increases in currency crises occurred in 1960's and were caused by investors moving their portfolio positions to attractive investments in developing countries. This put some nations into consecutive fiscal deficits, creating increased currency susceptibility to crises. Nations saw depreciations due to changes in the valuation of their currency. The literature review will delve further into topics that cause crises in addition to excessive capital flows to developing countries.

[3] Trade openness is measured by the summation of exports and imports as a ratio of GDP. Trade openness can be changed by growth in goods and services within a nation as well as influenced by trade partners. Therefore, it has the capacity to impact a nation's ability to correctly allocate goods and services.

[4] In the Euro Zone, harmonized policies have taken the form of a single central bank that sets monetary policy for all nations, identical trade policies in partners, tariff levels and rules of origin rates, and the agreement of the Maastricht Convergence Criteria which forced participating countries to match an inflation rate, deficit rate and debt to GDP level. By harmonizing such policies, the Euro Zone hopes to achieve monetary gains through integrative efficiencies.

Understanding the relationship between trade and exchange rate volatility provides decision tools for nations focusing on greater trade liberalization. This generates policy implications for whether a nation enters into free and regional trade agreements, as well as joins currency unions, such as the Euro Zone. The success of the Euro Zone could lead to South American countries participating in Mercosur to create a common currency.[5] It also explains the uncertainties of nations to join trade agreements, as is the case with Japan and its hesitation to join the Trans-Pacific Partnership. If trade is effective in reducing volatility in financial markets, then more nations will engage in the globalization trend.

Nations referencing recent trade agreements will find it difficult to fully understand the impact of integration on stability. Volatility and its causes remain prevalent as portrayed by the presence of speculative attacks on currencies even with increased trade liberalization, as well as varying inflationary and debt levels between similar countries. Haddad et al (2010) argues that openness may have a positive or negative effect on economic growth volatility depending on trade baskets. The recent entrance of a handful of developing nations into large trade agreements reinvigorated the need to look at this relationship. The nations of the European Union actively participate in well over 30 regional trade agreements, while emerging economies have expanded their trade partners rapidly in the past decade. However, agreements in the recent past show both positive and negative outcomes. Shortly after Mexico signed the North American Free Trade Agreement (NAFTA) in 1994, it suffered a currency crisis in 1995. Although the results of

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However, not all nations within the currency union have been able to synthesize policies creating problems for the Euro Zone and its ability to provide cohesive stability. For example, Greece, Italy and Spain have been unable to harmonize their debt to GDP ratios, leading to larger shocks in those nations than other Euro Zone nations. This makes a single monetary policy for all Euro Zone nations ineffective in curtailing excessive shocks in troubled nations, without negatively impacting more stable countries.

[5] Mercosur is made-up of Argentina, Brazil, Paraguay, Uruguay and Venezuela. The nations have already reduced trade tariffs and harmonized many trade partners, much like the Euro Zone nations did on the way to their currency union. The nations of Mercosur have been plagued by a myriad of currency and balance of payment crises in recent decades.

NAFTA in changing tariffs and causing adjustments to capital flows took years to realize, sentiment over stability can change immediately. Garber and Flood (1984) introduced second generation crises which argue that volatility can be caused by sentiment changes.[6] Trade agreements represent the momentum to provide such sentiment changes if investors believe trade will lead to depreciation in order to increase competitiveness. Another example of a liberalization crisis is the East Asian Tigers, who opened their economies in the 1990's and experienced a crisis in 1997. Mexico's situation is unique but is growing in importance as they engaged in devaluation to increase competitiveness. Other developing countries may follow suit. The different examples include currency crises and balance of payment crises, but both see immediate changes in nominal exchange rates. Economists continue to argue over whether Mexico should have agreed to engage in a free trade agreement with the United States. Some are not convinced that the integration provided Mexico with additional stability.

Past research uses varying methods to analyze a country's exchange rate volatility. This paper assesses a nation's volatility based on a variable developed by Eichengreen et al (1994, 1995) that incorporates exchange rate movements, interest rate spreads and international reserves called exchange market pressure (EMP). Studies focusing on volatility often only look at movements in a nation's exchange rate. EMP takes into account exchange rate movements, but also interest rate and international reserve changes which are commonly associated with volatility. The model in this paper concentrates on causes of exchange market pressures as a result of economic variables studied in past research including national debt, inflation, GDP per

[6] Sentiment crises involve an investor's expectation that currency devaluation may occur in the future because of economic weaknesses. This may include high levels of inflation and debt levels, both of which will be tested in this model. Under this presumption, investors will engage in capital flight, or the selling of domestic currency, leading to devaluation. Mexico engaged in devaluation to create export competitiveness, which investors took note of and created a crisis that the Mexican government could not control with policy measures. Trade has the ability to trigger a sentiment change if investors question a nation's trade balance or that of a trade partner.

capita and unemployment rates (all factors that can lead to instability), but also expands into trade parameters that affect pressures. Using exchange market pressures allows for an analysis of all types of movements including devaluations, sentiment changes and speculative attacks, because each type of volatility is amassed in the exchange rate, interest rate and international reserves variables.

This paper first introduces the literature relevant to currency crises, trade openness and their interaction. Next, the model uses panel data to show the effect of macroeconomic events, in particular trade events, on Eichengreen et al's (1994, 1995) exchange market pressure. The results will assist policy makers on how trade can be adjusted to provide financial stabilization, and whether entering trade agreements and currency unions rightly assists in the mitigation of asymmetric shocks and validates the mission of the World Trade Organization.

II. Literature Review

Volatility is often identified through the analysis of currency and balance of payment crises. Therefore, it is necessary to explore the history of exchange rate crises and investigate how recent research looks at some of the factors that may influence this instability.

After the fall of the Bretton Woods exchange rate system in 1973, nations moved from a fixed exchange rate on gold to floating rates. This increased the attention of monetary policy on volatility of economies in response to shocks. Monetary policy was used as preemption to capital flights that created risks of currency devaluations. Large variations in exchange rate volatility reinvigorated Robert Mundell's (1961) thesis on optimum currency areas. He argues that trade zones act as a stabilizer for exchange rate fluctuations, signifying a need for greater regional integration, with the formation of single currency areas as an extreme, in order to reduce

business cycles.[7] Mundell was one of the first proponents for creating a single currency in the European region. This currency area he labels as an optimum currency area, or an integrated region that reaps the benefits of a single monetary unit by harmonizing business cycles and allowing for the free movement of factors of production. He argues that integration alleviates exchange rate crises, while also reducing asymmetric shocks and aiding in consistent growth because labor and other factors of production can correctly move to where they are most efficient. Lane (2000) argues that asymmetric shocks are the main cause of exchange rate movements. Mundell shows that harmonized regions would see these economic variables move together allowing for rule based policy to alleviate abrupt cycles. Rules include inflation rate rules to keep rates at low, consistent amounts, tariff regulations, and fiscal policy mandates. As described before, the Euro Zone created the Maastricht Criteria to ensure these main factors that lead to asymmetric shocks were held at synchronized rates.[8]

The argument for capital and trade mobility to create a harmonized economy subsided until the breakdown of the Bretton Woods System. Nations began experiencing varying exchange rate pressures, became more susceptible to balance of payment crises and ultimately turned to monetary policy to provide stability. Volatility did arise in the late 1960's and early 70's under

[7] Exchange rates are often the mechanism that adjusts when there are asymmetries between economies. For example, disequilibrium between nations in inflation rates, debt levels and trade balances are put into parity through exchange rates, allowing their movements to be used as a measure of economic crisis.

[8] According to the Maastricht Convergence Criteria as outlined by the European Commission, European members that wish to join the Euro Zone must consent to the following four criteria:

1. "An average rate of inflation that does not exceed by more than 1.5 percentage points that of the three best-performing Member States in terms of price stability for a period of one year before the examination.
2. Government deficit to gross domestic product should be no more than 3%, and their ratio of (general) government debt to GDP should be no more than 60%.
3. Respect the normal fluctuation margins of the exchange rate mechanism without severe tensions for at least the two years before the examination.
4. Had an average nominal long-term interest rate over a period of one year before the examination that does not exceed by more than 2 percentage points that of the three best-performing Member States in terms of price stability."

Despite such constraints, many nations within the Euro Zone fail to meet the guidelines, which explains part of the determination of asymmetric shocks.

the Bretton Woods System as speculators began to increase investments in developing nations which created large capital flow movements. This put countries into consecutive fiscal deficits and called for sterilization policies, which drained foreign reserves. Sterilization policies are open market operations used to offset changes in foreign asset accounts. As foreign reserves fall, central governments increase domestic currency supplies to prevent currency depreciations. Such policies began the possibilities of balance of payment crises according to Krugman et al (2008). This is because investors know a government will need to sell their foreign reserves, which will depreciate the currency, so to prevent a suboptimal position, investors sell all domestic assets immediately.

Rudiger Dornbusch (1976) amended the Mundell-Fleming Model to show that nominal exchange rates over depreciate in the short run and then appreciate to a still depreciated level in the long run.[9] This model proved useful in providing the initial explanation for exchange rate volatility in the adjustment to floating rates. It demonstrated that financial markets adjust rapidly, while the goods market incurred sticky prices. Calderon (2004) noting the work of Dornbusch, shows how the impact of monetary stability on exchange rates provides an initial explanation of currency movements, but still lacks a full understanding of the volatility.

Krugman (1979) provides an initial theoretical framework to explain currency crises. He posits that at a pegged exchange rate, a government's international reserves (also known as foreign exchange reserves) will begin to fall, and at a point well before the exhaustion of reserves, there is a sudden speculative attack that causes full depletion. The psychology behind a first generation crisis hinges on the expectation that a central government will defend its

[9] The Mundell-Fleming Model assumes prices to be sticky in the short run. Dornbusch relaxes this assumption and finds that financial markets react immediately to exogenous shocks.

currency at the current rate by undergoing an expansionary monetary policy. This signals to investors the potential for depreciation of the currency and in turn their current position in the market. Krugman's model correctly incorporates international reserves in explaining depreciations, and provides a starting point to define a crisis, especially those in the 1970's after the fall of the Bretton Woods System. Crises at this time centered more on initial financial speculation and the movement of capital between countries where investors looked to maximize their positions on investments in developing countries.

Garber and Flood (1984) explored the intuition behind second-generation currency crisis models which focus on how expectations of a crisis can lead to the defense of the currency by the central government. In this model, multiple equilibria force a central government to decide whether to attempt a defense which would entail increasing the money supply, or abandoning the peg to allow for a free floating exchange rate at the shadow rate. The shadow exchange rate is the rate that would prevail if the government used a floating exchange rate and allowed for no foreign exchange market intervention. Thus, when the peg is abandoned, a country moves to its shadow rate. A government must weigh the costs and benefits of defense or peg abandonment, where defense may temporarily work, but fail during the next attack. Eichengreen et al (1994) suggest this model set the stage for identifying different factors that may be the reason for the attack or not. This model caused future research to focus on whether other factors such as contagion, terms of trade changes, trade as percentage of output, leadership switches and other events affect the government's decision to try to defend the currency or allow for a speculative attack.[10] In the case of trade liberalization, some nations allow for the controlled depreciations

[10] See footnote 6 for a detailed explanation of how exogenous factors affect sentiment with regards to a nation's currency.

(in lieu of an attack) to promote growth. Thus, the model suggests focusing on factors such as national debt or trade parameters to help explain the cause of a self-fulfilling currency crisis.[11]

Recent literature identifies a chasm between researchers who believe output, growth, money supply, contagion, employment, fiscal policy and many other factors are effective in providing more information about crises and those who argue the variables are too endogenous to make robust claims. Obstfeld (1994) analyzes the appropriateness of attributing said factors to the causes of currency crises. He contends that it is difficult to bridge comparisons between different currency crises due to varying market expectations. Furthermore, the endogenous attributes of the variables that cause crises make it difficult to ascribe the cause to specific events or expectations. Feridun (2007) argues that crisis predictions and early warning systems may be unattainable because of multiple equilibria based on market sentiments.[12] He asserts that faulty models try to identify specific factors instead of inherent weaknesses. Furthermore, much research looks into whether a government entertains a controlled devaluation, as in the case of Mexico in 1995, as preemption to a self-fulfilling crisis. Devaluation increases a nation's trade balance and potentially restores confidence in the currency rate.

Other researchers believe monetary, fiscal and trade policies may affect a country's decision to defend or abandon a peg. Eichengreen et al (1994) go as far as to say that speculative attacks may occur even in the absence of certain imbalances in policy to stabilize an economy during an asymmetric shock. Due to the often endogenous nature of currency crises and planned

[11] Self-fulfilling currency crises are crises caused by investor's sentiment changes. These crises are caused by poor policies in place by governments that make its currencies susceptible to capital flight by investors. Governments often have the capability to abandon or defend a currency by manipulating policy, but this only delays a crisis based on sentiment.

[12] Early warning systems in currency crises include trying to isolate variable changes that will help economists predict an impending crisis. This study is not trying to isolate trade variables to predict a crisis, but rather show if trade is effective in the mitigation of asymmetric shocks.

devaluations, using a method to explain exchange rate pressures provides a better understanding of the variations in exchange rates caused by specific variables. As a policy measure, this supplies central governments with the factors that lead to volatility, not a recipe for deciding whether to defend their currency or not, which is based heavily on sentiment and not strictly the variables of the model.

Rose (1994) argues that volatility is hard to identify from the laundry list of monetary, fiscal and trade factors, but finds that volatility of pegged exchanged rates varies quite a bit. This study provides a new way to investigate currency regimes as a cause of volatility instead of picking economic indicators such as interest rates, inflation, etc. as a way to show volatility. Shortly after the publication of Rose's paper, other studies began to look into causes that change sentiment. Eichengreen et al (1995) look at the relationship between volatility and political regimes, including party turnover. Further into their studies, Eichengreen et al (1996) focus on how integrated trade partners experience contagion in exchange rate volatility.[13] They note the important policy implications in relation to providing relief for troubled nations to curtail contagion, as well as the implication of regional currency areas that maintain pegs.

With research refocusing on variables other than monetary policy and capital flows that may affect volatility, this paper tries to illustrate how trade openness may affect exchange rate movements. The relationship between the two is nothing new, as expressed by Mundell (1961), Hau (1999), Auboin and Ruta (2011) and others. Hau (1999) finds statistical evidence that exchange rate volatility is determined by the ratio of imports to GDP. Hau (2002) furthers his initial paper to find that trade openness is significant in reducing real exchange rate volatility. He

[13] This paper by Eichengreen et. al. bears significant relevance to this research as it shows how common trade partners absorb crises from one another. Where economic and trade factors are not completely mobile, countries may experience a crisis because one of its trade partners entered into poor fiscal or monetary policies.

addresses the reverse causality problem of trade openness and volatility using land size as an instrument. However, Hau's papers recognize that volatility may feed back through monetary variables such as money supply and interest rates as well as fiscal variables including output and unemployment, and because the macroeconomic variables used to explain this topic are endogenous, it is difficult to attribute results to specific policy measures. By using two-stage least squares, reverse causality may be mitigated to show the effects of trade on volatility. Hau (1999) controls for reverse causality to explain how non-tradable goods and their pass-through effect can show how integrated trade reduces exchange rate volatility. He and Romer (1993) use land size as an instrumental variable (IV) to control for the reverse causality.[14] Using an IV is consistent with the literature which is starting to revert back to the belief that trade affects currency changes. Broda and Romalis (2003) challenge the endogeneity critique using a large panel data set, and find that trade leads to lower volatility, and further identify that the effect of exchange rate volatility on trade is small. With a doubling of real exchange rate volatility, Broda and Romalis observe a decrease in trade of only 2%. Thus, the impact of trade on exchange rate volatility is high, but not volatility on trade. Auboin and Ruta (2011) show the relationship between trade and volatility may change over time due to the increased hedging capabilities of a nation. Their study for the WTO provides an analysis of recent papers on the relationship between trade and volatility in which they find positive and negative relationships, as well as, significant and insignificant results.

This paper uses trade parameters focusing on the summation of imports and exports as a percent of GDP to attempt to isolate a causal relationship between trade and exchange market

[14] Land is an exogenous variable that Romer believes affects trade, but not volatility. The purpose of an instrumental variable (IV) is to find a factor that affects an independent variable, but not the dependent variable in order to control for an endogeniety problem.

pressures. Finding a relationship between exchange market pressure and trade may provide a policy guideline to moderate the volatility of markets.

III. The Model

This paper defines a currency crisis using the Eichengreen et al (1994, 1995) exchange market pressure (EMP) model, which shows volatility in exchange rates as a function of changes in nominal exchange rates, interest rates and international reserves. The model is a weighted index that standardizes the influence of each variable on the EMP by dividing each variable by its standard deviation. This alleviates a bias effect of one variable overwhelming the other two. It assigns a weight to each variable to ensure the lowest standard deviation of the EMP variable. Eichengreen et al created this equation as a way to compare exchange rate pressures across countries engaging in devaluations, revaluations or undergoing an attack. The equation for EMP is as follows:

$$\text{EMP}_{\text{j,t}} = \alpha\%\Delta e_{j,t} + \beta\Delta\left(i_{j,t} - i_{j^*,t}\right) - \left(\gamma\left(\%\Delta r_{j,t} - \%\Delta r_{j^*,t}\right)\right)$$

In this equation, $e_{j,t}$ represents the nominal exchange rate, $i_{j,t}$ is the interest rate in the sample country, $i_{j^*,t}$ is the interest rate of the control country (in this study, the United States), $r_{j,t}$ represents the ratio of international reserves to domestic money (M1) of the sample country and $r_{j^*,t}$ is the ratio of international reserves to M1 of the United States.[15] The parameters α, β and γ are the weights that allocate the different variables to the EMP. Each weight is the inverse standard deviation of the variable it modifies. This equation is effective in showing exchange rate pressures as it includes the primary endogenous variables that affect crises, not just reserves,

[15] Domestic money (M1) is the total amount of currency and overnight deposits held by households and firms. M1 is often used for currency crisis models as this is the domestic currency that is liquid and allows investors to change their positions immediately in response to government monetary and fiscal policies, as well as sentiment changes.

as is the case in Krugman's (1979) initial currency crisis model which focuses on capital flight. The EMP serves as the dependent variable throughout this model; however, one can also isolate specific crises that were witnessed in past economies. Using exchange market pressures allows for the model to include any crisis that causes a change in currency levels such as currency crises and balance of payment crises. Below is the threshold value created by Eichengreen et al that provides a dichotomous variable that signals if a nation is in a crisis:

$$Threshold_j = \mu_{EMPj} + 1.5(\sigma_{EMPj})$$

When the EMP is above this threshold, the sample economy is experiencing a crisis (Figure 1).

With the EMP equation above, the framework is now in place to introduce the regressors to the model to help explain exchange market pressure variation. Many of the regressors represent the monetary and fiscal variables such as national debt, inflation, gross domestic product per capita and unemployment that impact currency pressures, but additional variables focus on specific trade factors such as trade openness and trade agreements. However, all regressors are factors that nations wish to harmonize when entering trade agreements and currency unions to reduce asymmetric shocks.

The EMP equation is widely used as a measure of exchange rate crises; however, it is necessary to point out the limitations of the formula. Given that it is determined solely by exchange rates, interest rates and international reserves, any variables regressed against the EMP includes an endogeneity problem. It is difficult to disentangle whether regressors focusing on the state of the economy and trade cause volatility in EMP, or is caused by EMP volatility. This paper uses two-stage least squares to address endogeniety. Regional trade agreements is the instrumental variable that predicts trade openness, but not EMP.

The models of this paper analyze the explanatory power of different macroeconomic variables on exchange market pressures. The models are as follows:

Specification 1: Ordinary Least Squares, Fixed Effects

$$EMP_{j,t} = \beta_0 + \beta_1 Inflation_{j,t} + \frac{\beta_2 Debt}{GDP}_{j,t} + \frac{\beta_3 GDP}{Capita}_{j,t} + \beta_4 Unemployment\ Rate_{j,t} + \beta_5 Trade\ Openness\ Index_{j,t} + \beta_6 Year\ 1993 + \cdots + \beta_{19} Year\ 2007 + \beta_{20} Australia + \cdots + \beta_{38} UK + \varepsilon_{j,t}$$

Specification 2: Two-Stage Least Squares

$$EMP_{j,t} = \beta_0 + \beta_1 Inflation_{j,t} + \frac{\beta_2 Debt}{GDP}_{j,t} + \frac{\beta_3 GDP}{Capita}_{j,t} + \beta_4 Unemployment\ Rate_{j,t} + \beta_5 Trade\ Openness\ Index - hat_{j,t} + \beta_6 Year\ 1993 + \cdots + \beta_{19} Year\ 2007 + \beta_{20} Australia + \cdots + \beta_{38} UK + \varepsilon_{j,t}$$

Specification 3: First Differences

$$EMP\ Difference_{j,t} = \beta_0 + \beta_1 Inflation\ Difference_{j,t} + \frac{\beta_2 Debt}{GDP}\ Difference_{j,t} + \frac{\beta_3 GDP}{Capita}\ Difference_{j,t} + \beta_4 Unemployment\ Rate\ Difference_{j,t} + \beta_5 Trade\ Openness\ Index\ Difference_{j,t} + \beta_6 Year\ 1994 + \cdots + \beta_{18} Year\ 2007 + \beta_{19} Australia + \cdots + \beta_{37} UK + \varepsilon_{j,t}$$

Variable	Definition	Expected Sign
Inflation	The increase in general prices of goods and services over time	(+) Signifies expansionary monetary policy
Debt/GDP	The ratio of government debt to gross domestic product	(+) Increased debt suggests that countries have outbound cash flows
GDP/Capita	Gross domestic product per person	(-) Growth of GDP/capita is consistent with economic stability
Unemployment Rate	Ratio of the number unemployed to the total labor force	(+) High unemployment is consistent with poor economic stability
Trade Openness Index	Ratio of the sum of imports and exports to GDP	(-) Increased integration mitigates volatility

The model argues that common factors as well as trade determine exchange market pressures. In previous literature, there is a chasm between empiricists who believe exchange rate volatility causes trade movements and the reverse argument. This paper argues trade affects currency volatility, thus two-stage least squares uses an instrument to resolve the causality problem. Possible instruments include the number of years a country has been in the WTO, its number of trade agreements and the land size of the country as used in Romer (1993) and Hau (1999). All three instrumental variables influence trade, but not exchange market pressures. The need for a remedial measure such as an instrument is derived from omitted variable bias, such that the error term is correlated with the one or more of the regressors. Using instruments provides an unbiased estimator that is not correlated with the error term. Additionally, there is a break in the data due to the unification of the Euro Zone. All year 1999 data for the sample has been removed to accommodate the change in exchange rates from national to Euro for the countries involved.

IV. Data

The dependent variable (EMP) uses nominal exchange rates relative to USD for the years 1992 to 2007. OECD data are used for nominal exchange rates as well as 3-month short interest rates. International reserves are available only on an annual basis and were obtained from the International Monetary Fund (IMF) database of International Financial Statistics (IFS). International reserves create an additional data bias because they are reported from the central banks of respective nations. For the purpose of this paper, stated reserves are taken at their true value, despite possible central bank manipulations to show stronger positions than reality. Less transparent governments are more notorious for providing unreliable international reserve data in order to maintain sentiment on current currency rates. M1 data are also taken from the IFS as well as the Federal Reserve Economic Data (FRED), when unavailable in the IFS database.

This paper uses panel data to show the exchange market pressures of 20 OECD nations over a 15 year period (1992-2007, less 1999). 1999 is omitted for all countries due to the formation of the Euro Zone which restructured exchange rates for participating nations. All OECD nations inducted into the organization before 1996 are used in the research with the exception of the United States (the reference nation for exchange rates, interest rates and international reserves). Finland, Greece, Ireland and Luxembourg are not included due to missing money values in the IFS database.

Panel data are used to better control for fixed and time effects inherent in the dynamic growth of the selected countries during the 15 year period. Furthermore, panel data adds degrees of freedom and variability to mitigate auto correlation. International reserves, an integral variable in

determining crises, is available on a yearly basis only, thus all data collected for this paper is shown annually.

The majority of the data for the regressors are derived from the OECD database. Debt to gross domestic product is primarily found on the OECD database, with missing data received from the Reinhart and Rogoff debt/GDP database. Inflation is the consumer price annual percentage change, also from the OECD database. GDP per capita from the OECD is in constant prices and constant PPPs in US dollars. Harmonized unemployment percentage is provided by the OECD, with missing data found on the World Bank's Database. Regional trade agreements (RTA) are aggregated totals from the WTO's RTA database. The trade openness index is from the United Nation's UNCTADstat Database, and here is defined as the sum of imports and exports (roughly the size of international trade) as a percent of GDP. All data points for the 20 nations over the 15 year period are complete and consistent.

V. Empirical Estimation

This paper estimates the effect of inflation, debt to gross domestic product, gross domestic product per capita, unemployment rate and trade openness on economic volatility. The motivation of the paper is to demonstrate how the growth in trade in the past quarter century impacts the ability of countries to lessen volatility as measured by the exchange market pressure technique. Due to the presence of multicollinearity and reverse causality, this paper uses three different techniques to identify the effect of trade on volatility. The first model uses ordinary least squares with fixed effects to determine an initial relationship. Second, two-stage least squares is used to acquire an instrument to control for reverse causality between trade openness and volatility. This paper posits that trade influences volatility, but because the sample is

stretched over 15 years, volatility could affect trade as well. Last, 1st differences are used to remove mulitcollinearity between regressors.

Table 1 illustrates the descriptive statistics for the exchange market pressures of each nation. The exchange market pressure is the measure of economic volatility derived from changes in nominal exchange rates, interest rates and international reserves. A positive EMP signifies a more volatile economy on average over the time frame analyzed. A higher standard deviation shows a greater dispersion of volatility over the time series. The mean EMP for the OECD nations analyzed is slightly negative, which is expected as the central tendency of volatility over the time frame exhibits periods of both economic prosperity and deficiency. Mexico, Portugal and Spain experienced the highest EMP average over the time series. Mexico also encountered the largest EMP value of any year during its 1995 crisis of .58 compared to a mean of .056 over the 15 year period. The threshold crisis value is measured by taking the mean EMP for a specific country and adding 1.5 times its standard deviation. Once a nation crosses this threshold due to a high EMP for an individual year, it is said to be in a crisis. Figure 1 provides an example using Mexico to determine when a nation is considered in crisis. The data correctly corroborates crises with results actually seen during the time period analyzed, such as Mexico in 1995, the Asian Tigers in 1997 and other nations in 2001. In total, the time series produced 18 crises.

The descriptive statistics in table 2 evaluate the aggregate levels for the regressors of OECD nations over the 15 year time period. Inflation levels are stable at just below 3%, with the extreme inflation level represented by Mexico during its 1995 crisis at about 35%. Debt levels averaged 48.9% of GDP for the sample nations, with Australia exhibiting the lowest at around 5% in 2007 and Japan the highest at 165% in 2007. The unemployment rate averaged 6.6% over the time period, with the highest spell at 21.3% for Spain in 1994. The trade openness index,

measured by the ratio of the sum of imports and exports to GDP, is 34.5% with the lowest openness for Japan in 1993, who also engaged in zero trade agreements at the time, and Belgium in 2000 with the highest. All nations display a positive trend in trade openness over the span of the data, signifying an increase in trade interactions in the past 15 years, with some nations such as Japan engaging in regional trade agreements for the first time.

Table 3 first looks at how the regressors impact exchange market pressures using ordinary least squares, with fixed effects. The initial year, 1992, is the omitted year out of convenience, while Canada is the omitted nation because it possesses a near mean zero exchange market pressure and the smallest EMP standard deviation in the dataset. 1999 is omitted for all specifications due to the formation of the Euro Zone which restructured exchange rates for participating nations. All regressors use data on an annual basis. Table 3 shows that inflation is significant in explaining volatility. This coincides with economic intuition, as parity suggests that increased inflation would translate into higher interest rates and exchange rates, which are both inputs of the exchange market pressure variable. This mechanism is best explained by the Fisher Effect, developed by Irving Fisher (1930), which argues that to maintain parity, a rise in expected inflation, causes a rise in expected interest rates. Interest rates are a key input in the EMP, so it is predictable that the two variables move together. The results show a 1% increase in inflation will raise the EMP by .013 units which may seem insignificant, but during a time of global volatility, it has the potential to push a nation towards or across its crisis threshold level. As noted before, Mexico saw inflation levels of about 35% in 1995. Eichengreen et al (1995) found a similar strong relationship between higher inflation and ensuing crises. Controlling for other regressors, gross domestic product per capita is significant and negative in impacting volatility. This makes intuitive sense, as a more prosperous nation would ideally exhibit better

financial hedging capabilities and access to financial markets to lessen peaks and troughs in business cycles.

Using OLS shows that the years 1997, 2000, 2001, 2002 and 2007 are significantly positive in affecting EMP. The results mirror other studies that show 1997 and 2001 as volatile years. Furthermore, an investigation of each nation's EMP against a crisis threshold value ascribed to individual nations based on the standard deviation of their EMP shows that 4 nations experienced a crisis in 2001 and 8 in 1997. The magnitude of the coefficients are .201 and .179 respectively. The crisis in 1997 was largely felt by Asian Tigers and the resulting contagion, while 2001crises resulted from a stock market recession and 9/11. This shows that exchange market pressures are largely influenced by systematic risks felt on a global level. Much like a well diversified financial portfolio, it is possible to reduce idiosyncratic risks, but volatility is still largely determined by the variance of the global economy. Although, poor monetary policies have the potential to produce idiosyncratic risks that can move one nation into crises despite stable conditions elsewhere. This is part of the theory behind why trade is expected to reduce volatility. Increasing trade partners and the movement of goods and services should in practice diversify a nation's assets, reducing idiosyncratic risks. Much like Mundell's (1961) theory, if factors of production are allocated correctly, individual crises are removed from the economy in place of symmetrical shocks.

Country effects display results that prove counter intuitive to expectations, such as a negative coefficient for Mexico and Korea. These two nations exhibit a higher mean EMP than the majority of nations, as well as experienced crises. However, conditional on all other regressors that are likely to impact volatility, country effects may not play a significant part in determining the lessening or intensification of business cycle volatility.

Another specification within the first table is a logit approach to determine whether the characteristics of the regressors impact a country to cross the crisis threshold as defined by the model. Many of the regressors cause the EMP to move subtly, but the purpose of the logit is to see whether a regressor is explanatory in causing major changes in the EMP, such that a country is in crisis. The results illustrate that inflation is significant in causing a country to go from not in crisis to crisis, conditional on other factors. Furthermore, the unemployment rate is positive and almost significant in prompting a similar result. The regressors that aid in preventing a crisis are trade openness, GDP per capita and surprisingly debt to GDP, which may be because OECD nations with larger debts may be incurring it at a lower interest rate because they are fiscally strong nations. The logit results use the dichotomous threshold variable to show not was causes minor fluctuations in EMP, but large changes in EMP that can move a country towards crisis.

OLS provides a cursory overview of the impact of the regressors on volatility. The main motivator for this paper is the impact of trade on volatility, which is not a strong indicator of EMP according to the OLS technique.

The next regression uses two-stage least squares, which is used to find an instrumental variable to correct for reverse causality. Research on trade and its impact on volatility recognize the chance that a regression technique may pick up on the impact of volatility on trade over a time series and not the other way around. Therefore, this paper uses a nation's total regional trade agreements as an instrument that will predict trade openness but not exchange market pressures. Past research such as Hau (1999) and Romer (1993) used land size as an instrument, but the time series nature of this research requires an instrument that is dynamic such as trade agreements. Table 4 provides the first and second stage regressions of a fixed effect, two-stage least squares technique. The first equation exhibits an R square of .97, which is quite high for an

instrument. However, the availability to find a macroeconomic instrument that is correlated with trade openness, but not volatility at a more reasonable correlation is difficult. Thus, trade agreements are used despite its high correlation. Once corrected with a trade openness estimator, the results change slightly from the first specification of OLS.

Inflation is again significant and positive in predicting volatility. Just a one percent increase in inflation increases EMP by .011. Therefore, a country like Mexico who has an average EMP around .05 with a standard deviation of about .17 will likely flirt with a crisis during a period of poor monetary policies. Thus, a crisis may be self-fulfilling in that one poor policy leads to implications that permeate other variables, ultimately worsening volatility. GDP per capita is once again negative and significant, meaning that controlling for all other regressors, an increase in a nation's wealth will reduce volatility. This technique provides a positive significance in the year 1997, consistent with the OLS method as well as volatility observed during that time periods. The coefficient is .116 for 1997. By controlling for year effects, this paper shows that volatility is largely systematic. Thus, some policy measures may alleviate pressures, but ultimately, a crisis may be attributable to global market conditions.

The purpose of using two-stage least squares is to correct for reverse causality between trade openness and exchange market pressures. The instrument of trade agreements provides a weak correction, yet demonstrates an interesting change in results. Trade openness is now nearly significant and positive. This is contrary to the hypothesis of the paper, and may be attributable to a weak instrument. However, part of the motivation for this paper lay in the peculiar increase in volatility in nations such as Mexico, South Korea and Japan after they increased trade openness. A positive and nearly significant result is consistent with some papers in the past

decade according to Auboin and Ruta (2011). The main difficulty in this line of research is identifying a proper instrument to provide more stable results.

The third table shows a specification that tries to correct for the endogeniety and collinearity problems alike through first differences. In doing so, the year 1993 is dropped as a dummy variable as well as Canada as the omitted country. Furthermore, time and country effects are included to pick up on any other explanatory inputs that could affect EMP. The results show similar findings in inflation, both positive and significant, which is expected for price level and interest rate parity to hold. The main difference is seen in trade openness, where the regressor is now negative and significant at the 5% level, confirming the paper's hypothesis. The results illustrate that a one unit increase in trade openness, or the ratio of imports and exports to GDP, results in a .004 decline in EMP. This is a robust result, given that many nations saw large increases in trade openness and a subsequent fall in EMP year-over-year. Large increases in openness are seen by European Union participants who entered into trade agreements en masse. Furthermore, as nations continue to liberalize, their openness index rapidly increases. The rest of the results for the final specification demonstrates significance in year effects, consistent with the idea that systematic risks plays a large role in volatility. Fixed effects for year 1997, display a positive and significant result with an increase in EMP conditional on other regressors of .198. This alone is above the crisis threshold for many nations, which is consistent with 8 of the 20 nations sampled experiencing a crisis according to the EMP threshold during that year.

Adding countries in fixed effects may appear redundant when performing first differences, but the purpose remains to illustrate how specific country policies can influence EMP depending on their effectiveness. Thus, table 5 also shows first differences without country effects. The signs of the regressors stay the same with the exception of GDP per capita and debt to GDP,

which are so close to zero that it is inconsequential. Inflation remains significant and positive, but without country effects, trade openness is no longer significant. However, the coefficient remains nearly the same at a -.003 decrease in EMP for a one unit increase in trade openness. This suggests that first differences with country effects are satisfactory in explaining changes in EMP, while allowing analysis of how idiosyncratic policies of a country affect its volatility.

VI. Conclusion

The analysis suggests that exchange market pressures witnessed by OECD nations in the 15 year time frame are largely influenced by inflation rates. This intuitively makes sense due to parities between interest rates, an input of the EMP equation, and inflation as explained by the Fisher Effect. The findings also corroborate true events that occurred in 1997 and 2001 that illustrate volatility. Year effect's significant impact on EMP suggests that volatility is rooted in systematic risk in the global economy, and not necessarily based on idiosyncratic monetary policies by the countries who encounter crises. With that said, certain nations exhibit higher mean EMP's, which may be attributable to poor decisions in terms of fighting off potential currency crises. Eichengreen et al (1995) note the relevance of high inflation in predicting crises, but are quick to acknowledge unpredictable, unavoidable factors also assist in volatility.

The final regression illustrates that trade causes a negative and significant impact in determining EMP. This is an important finding as it suggests that the World Trade Organization correctly promotes countries to globalize as a way to mitigate volatility. Many instances throughout the dataset illustrate significant increases in trade openness, accompanied by declines in year-over-year exchange market pressures. Such results suggest that countries that increase their trade portfolio may decrease volatility.

The findings match the main premise behind the work of Mundell (1961), where he suggests integration via trade or an optimum currency area (such as the Euro Zone) will reduce volatility by correctly allocating goods and services to specific countries based on need. Each country in the sample continues to see an upward trend in trade openness which may also assist in the reduction of volatility as it opens up financial markets and hedging capabilities. Access to trade provides a way for countries to perform consumption smoothing to lessen business cycles. Furthermore, it better aligns monetary policies between nations, which should further reduce idiosyncratic risks. However, consistent monetary policies remove the ability of a nation to carry out individual monetary policies in times of volatility. Thus, for unification to be successful, integrated countries must assure factors of production can move freely and as needed between nations.

Despite a time frame of increasing trade openness, the nations included in the dataset experiences a total of 18 crises. Even if measures are taken to reduce volatility, such as increased trade relationships, there will still be a recurrence of crises, even among prosperous nations such as those included in the OECD. Thus, past models showing second generation crises based on sentiment changes may still provide the best insight into why crises occur. A country may experience poor monetary policies at a time where systematic risks in the global economy persist, causing an ultimate loss in confidence in a nation with just slightly poorer economic models. At this point, investors will move their position and the country's currency will devalue. As the threshold values show, some years illustrated higher EMP's for all nations. If this is coupled with even a slight mismanagement of inflation or debt, a nation could quickly fall into a crisis.

This papers reinforces the policy implications established between countries in the past quarter century. Increasing trade partners may aid in reducing volatility, by correctly allocating

goods and services, as well as providing a wider reach of financial markets. Nations looking to strengthen their economies can also engage in currency unions as evident by the Euro Zone in order to take advantage of increased trade and creating policy symmetries to curtail cycles. Nations should continue to take part in Trade Round Tables to better bridge the operations and policies between each other to reduce idiosyncratic risks that may lead to economic volatility. If done correctly, countries may only be subject to the systematic risks that are felt globally.

Summary Statistics

Table 1: Exchange Market Pressures

Country	Mean	Minimum	Maximum	Standard Deviation	Crisis Threshold
OECD Sample	-0.00649	-0.33522	0.57739	0.02626	0.17378
Australia	0.01477	-0.16882	0.29794	0.12007	0.19488
Austria	-0.00349	-0.24450	0.18424	0.11685	0.17179
Belgium	-0.01665	-0.25606	0.20077	0.11348	0.15357
Canada	-0.01014	-0.15322	0.09986	0.07707	0.10546
Denmark	-0.04019	-0.27912	0.15924	0.11110	0.12647
France	-0.03660	-0.16412	0.11240	0.10111	0.11507
Germany	-0.00262	-0.22915	0.17115	0.11373	0.16798
Iceland	0.01912	-0.17183	0.21880	0.11830	0.19658
Italy	-0.00882	-0.24962	0.15809	0.10197	0.14415
Japan	-0.06143	-0.28612	0.11639	0.11713	0.11427
Korea	-0.02268	-0.33522	0.22316	0.15544	0.21048
Mexico	0.05629	-0.09559	0.57739	0.17539	0.31937
Netherlands	-0.02812	-0.25551	0.15286	0.13181	0.16960
New Zealand	-0.00528	-0.19591	0.42728	0.16415	0.24094
Norway	-0.00504	-0.13851	0.29327	0.11563	0.16841
Portugal	0.02350	-0.25365	0.17074	0.10045	0.17417
Spain	0.01617	-0.30789	0.36683	0.16776	0.26781
Sweden	0.00674	-0.16996	0.10172	0.08988	0.14156
Switzerland	-0.00465	-0.19258	0.16939	0.10506	0.15294
United Kingdom	-0.02061	-0.27907	0.14932	0.10711	0.14005

Table 2: Regressors

	Mean	Minimum	Maximum	Standard Deviation
Inflation	2.81	-0.90	34.99	3.41
Debt/GDP	48.95	5.18	164.55	30.13
GDP/Capita	27884	9913	49208	6988
Unemployment Rate %	6.56	2.06	21.33	3.17
Regional Trade Agreements	14.9	0	32	9.8
Trade Openness Index	34.46	8.22	89.92	14.20

Table 3: Ordinary least squares, with fixed effects

	Coefficient	Significance	Logit	Significance
Constant	.437	**	-52.012	
	(.206)		(5166.244)	
Inflation	.013	***	1.093	**
	(.003)		(.440)	
Debt / GDP	-.001		-.396	*
	(.001)		(.203)	
GDP / Capita	-.0000168	*	-.002	*
	(.000)		(.001)	
Unemployment	.003		1.443	
Rate	(.005)		(.901)	
Trade Openness	-.00049		-.355	
	(.002)		(.301)	
Year 2007	.141	**	No Crises	
	(.071)			
Year 2006	.109		23.688	
	(.067)		(10635.48)	
Year 2005	.012		21.882	
	(.062)		(11018.99)	
Year 2004	.086		20.821	
	(.058)		(11233.33)	
Year 2003	.071		No Crises	
	(.053)			
Year 2002	.161	***	40.260	
	(.053)		(5165.98)	
Year 2001	.201	***	42.857	
	(.053)		(5165.98)	
Year 2000	.143	***	No Crises	
	(.053)			
Year 1998	.066		10.114	
	(.043)		(10332.87)	
Year 1997	.179	***	37.326	
	(.040)		(5165.98)	
Year 1996	-.010		No Crises	
	(.037)			
Year 1995	-.040		27.617	
	(.035)		(5165.98)	
Year 1994	.036		23.995	
	(.035)		(5165.98)	
Year 1993	-.015		No Crises	
	(.034)			
Australia	-.006		-19.436	*
	(.058)		(10.298)	
Austria	.017		10.608	*
	(.051)		(6.205)	
Belgium	.026		33.553	*
	(.101)		(17.850)	

Denmark	-.012		No Crises	
	(.045)			
France	-.092	*	No Crises	
	(.052)			
Germany	-.033		-14.308	
	(.043)		(9.128)	
Iceland	-.014		-3.658	
	(.044)		(4.551)	
Italy	-.047		No Crises	
	(.059)			
Japan	.029		11.840	
	(.077)		(10.058)	
Korea	-.319	***	-41.367	*
	(.103)		(23.145)	
Mexico	-.404	***	-75.456	**
	(.153)		(35.327)	
Netherlands	.027		No Crises	
	(.070)			
New Zealand	-.154	**	-26.567	*
	(.074)		(15.544)	
Norway	.203	***	24.052	
	(.077)		(15.130)	
Portugal	-.162	*	No Crises	
	(.087)			
Spain	-.146	**	No Crises	
	(.070)			
Sweden	-.027		-.975	
	(.044)		(4.022)	
Switzerland	.097	*	10.850	*
	(.052)		(6.485)	
United Kingdom	-.044		-8.252	
	(.047)		(6.017)	
R-Square	.368		McFadden: .692	

Notes: *** (**,*) indicates statistically different from zero at the 1% (5%, 10%) level.

Table 4: Two stage least squares to correct for causality problem

	1st Stage	Significance	2nd Stage	Significance
Constant	27.104	***	.136	***
	(5.071)		(.272)	
Inflation	.245	***	.011	***
	(.068)		(.003)	
Debt / GDP	-.001		-.001	
	(.015)		(.001)	
GDP / Capita	-.0000359		-.00001553	**
	(.000)		(.000)	
Unemployment Rate	.558	***	-.004	
	(.128)		(.007)	
Trade Openness - Estimator			.010	
			(.006)	
Trade Agreements	.408	***		
	(.065)			
Year 2007	7.466	***	-.013	
	(1.973)		(.113)	
Year 2006	6.858	***	-.034	
	(.1.855)		(.106)	
Year 2005	5.102	***	-.107	
	(1.748)		(.093)	
Year 2004	4.087	**	-.018	
	(1.649)		(.084)	
Year 2003	2.815	*	-.016	
	(1.547)		(.074)	
Year 2002	4.404	***	.060	
	(1.491)		(.079)	
Year 2001	6.832	***	.082	
	(1.395)		(.086)	
Year 2000	8.145	***	.019	
	(1.301)		(.088)	
Year 1998	4.274	***	-.009	
	(1.132)		(.062)	
Year 1997	3.243	***	.116	**
	(1.069)		(.055)	
Year 1996	1.789	*	-.048	
	(.972)		(.044)	
Year 1995	1.602	*	-.071	*
	(.921)		(.041)	
Year 1994	.862		.022	
	(.894)		(.037)	
Year 1993	-.481		-.011	
	(.870)		(.035)	
Australia	-17.277	***	-.183	
	(1.092)		(.121)	
Austria	2.850	*	-.094	
	(1.680)		(.082)	
Belgium	29.737	***	-.395	
	(1.970)		(.256)	

Denmark	-2.678		-.075	
	(1.747)		(.058)	
France	-20.167	***	.042	
	(1.685)		(.093)	
Germany	-13.314	***	.029	
	(1.602)		(.056)	
Iceland	-2.140	*	-.027	
	(1.263)		(.047)	
Italy	-20.561	***	.077	
	(1.998)		(.092)	
Japan	-21.248	***	.248	*
	(1.632)		(.146)	
Korea	-.983		-.302	***
	(2.664)		(.108)	
Mexico	-14.296	***	-.268	
	(3.884)		(.176)	
Netherlands	16.502	***	-.244	
	(1.758)		(.167)	
New Zealand	-6.094	***	-.081	
	(1.876)		(.087)	
Norway	-1.267		.169	**
	(2.113)		(.083)	
Portugal	-10.953	***	-.118	
	(2.482)		(.094)	
Spain	-21.290	***	.017	
	(1.865)		(.116)	
Sweden	-4.385	***	-055	
	(1.578)		(.048)	
Switzerland	7.074	***	-.016	
	(1.312)		(.083)	
United Kingdom	-15.960	***	.042	
	(1.639)		(.069)	
R-Square	.968		.352	

Notes: *** (**,*) indicates statistically different from zero at the 1% (5%, 10%) level.

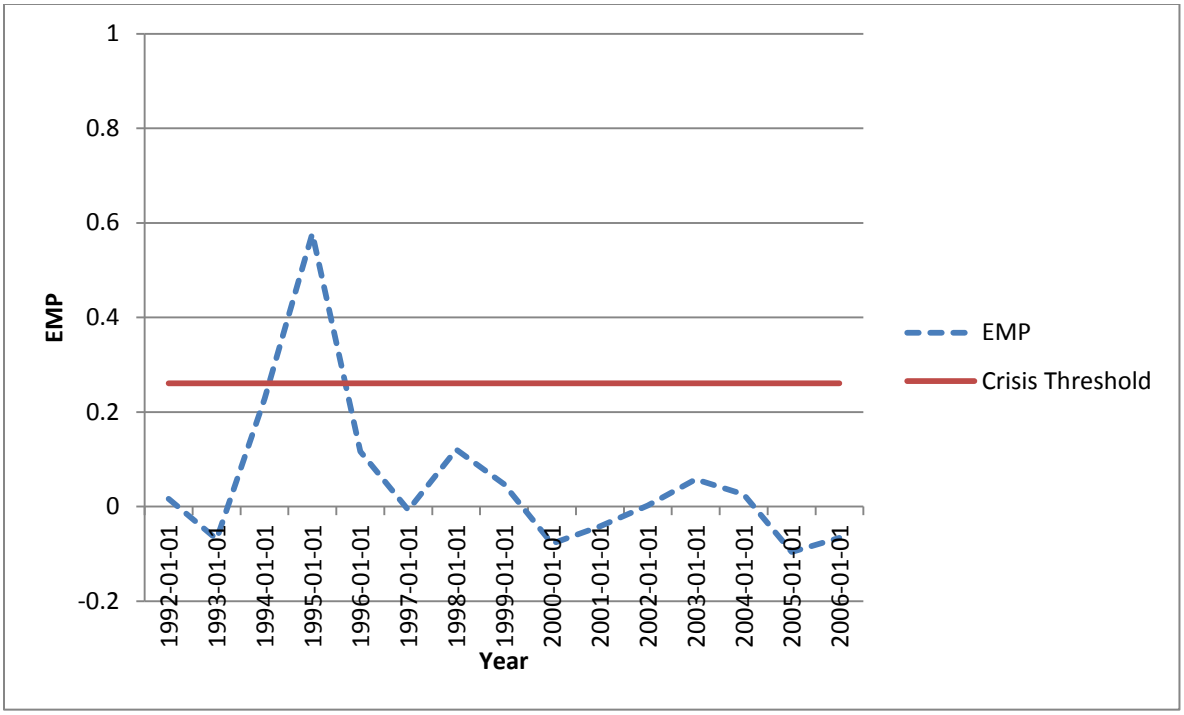
Table 5: First differences specification

	Coefficient	Significance	Without Country Effects	Significance
Constant	-.026		-.020	
	(.043)		(.033)	
Inflation Difference	.021	***	.016	***
	(.004)		(.004)	
Debt / GDP Difference	-.000104		.001	
	(.001)		(.002)	
GDP / Capita Difference	.00000428		-.00001211	
	(.000)		(.000)	
Unemployment Rate Difference	-.004		-.003	
	(.008)		(.012)	
Trade Openness Difference	-.004	**	-.003	
	(.002)		(.004)	
Year 2007	.030		.052	
	(.040)		(.044)	
Year 2006	.096	**	.118	***
	(.040)		(.045)	
Year 2005	-.071	*	-.053	
	(.040)		(.043)	
Year 2004	.019		.036	
	(.040)		(.043)	
Year 2003	-.082	**	-.070	*
	(.039)		(.042)	
Year 2002	-.032		-.022	
	(.039)		(.042)	
Year 2001	.059		.075	*
	(.040)		(.043)	
Year 2000	.056		.095	*
	(.043)		(.054)	
Year 1998	-.111	***	-.093	
	(.040)		(.044)	
Year 1997	.198	***	.214	***
	(.040)		(.045)	
Year 1996	.037		.051	
	(.040)		(.042)	
Year 1995	-.085	**	-.064	
	(.041)		(.044)	
Year 1994	.059		.070	
	(.040)		(.043)	
Australia	.010			
	(.050)			
Austria	.007			
	(.050)			
Belgium	.026			
	(.050)			
Denmark	.029			
	(.050)			
France	.005			

	(.049)	
Germany	.018	
	(.050)	
Iceland	.011	
	(.049)	
Italy	.016	
	(.050)	
Japan	.015	
	(.050)	
Korea	-.043	
	(.050)	
Mexico	.073	
	(.049)	
Netherlands	.025	
	(.050)	
New Zealand	-.003	
	(.049)	
Norway	.029	
	(.049)	
Portugal	.018	
	(.050)	
Spain	.004	
	(.049)	
Sweden	.016	
	(.050)	
Switzerland	.015	
	(.049)	
United Kingdom	.001	
	(.049)	
R-Square	.336	.313

Notes: *** (**, *) indicates statistically different from zero at the 1% (5%, 10%) level.

Figure 1: Mexico's EMP



The figure above shows the movement in exchange market pressures over time for Mexico. The crisis threshold uses the referred to equation by Eichengreen et al (1994). When EMP crosses the crisis threshold, that particular country is said to be undergoing a currency crisis. In this case, it was devaluation in 1995.

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