DISCIPLINE EFFECTS AND ALTERNATIVE EXCHANGE RATE REGIMES

BY

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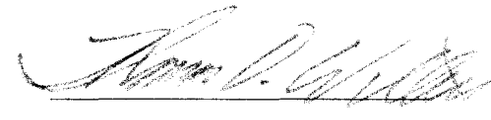

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Abstract of the Dissertation

Discipline Effects and Alternative Exchange Rate Regimes

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Claremont Graduate University: 2007

There is a long held view that fixed exchange rates can provide an important source of discipline for monetary and fiscal policies. This study shows, however, that such discipline effects are often much weaker than advocates assume. Discipline effects are a result of incentive and constraint effects. Most of the discipline literature addresses only the constraint aspect. Since the two effects often work in opposite directions, pegged exchange rates may not always be an effective source of discipline. While several studies treat hard fixes and soft pegs as being one and the same, the two regime types are very different in their incentive and constraint structures. One should expect hard fixed-rate regimes to be a much stronger source of discipline.

The empirical results in the current literature tend to be mixed due to differences in methodology. This study addresses these problems by separately analyzing fiscal and monetary discipline and accounts for potential differences in the effects exerted by hard fixes and soft pegs. The study also looks at effects for developing and emerging market countries, since the two groups differ not only in their institutions, but also in their degrees of capital mobility. The results confirm that hard fixes are the most effective source of monetary discipline of all the different exchange rate regime types for both developing and emerging market countries. Soft pegs are clearly less effective than hard

fixes in delivering monetary discipline. The results for fiscal discipline show more variability, but none of the estimates support the view that fixed or pegged exchange rates have a strong positive effect on fiscal discipline. The results also show that effects of particular types of exchange rate regimes often have opposing signs for emerging and developing economies, and thus these two types of economies should be analyzed separately.

In addition to distinguishing between hard and soft fixes, this study also improves on the previous literature by investigating the role that politically unstable and divided governments may play in affecting the discipline effects, but also allows for the possibility of interaction effects between these political variables and exchange rate regimes.

Dedication

This dissertation is dedicated to my parents, Kumthorn Dechsakulthorn and Nuttaporn Supasiratanont, for their endless encouragement and patience, and also to my aunt, Rungnapa Supasiratanont, and my brother, Supadech Dechsakulthorn, who made it all possible.

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Discipline Effects and Alternative Exchange Rate Regimes

Chapter 1. Introduction

In the 1980s and 1990s many countries, especially in Latin America, adopted various forms of pegged exchange rates in the hope of solving high or even hyperinflation problems. The adoption of pegged exchange-rate regimes as a "nominal anchor" for the economy as a means of reducing inflation is known as Exchange-Rate Based Stabilization (ERBS).

ERBS became very popular in the 80s and 90s due in part to the success of a number of Western European nations in using ERBS during the 80s. The ERBS policy was advocated by many academics and International Monetary Fund officials mainly because of its ability to generate a rapid deceleration of inflation. For example, Michael Bruno states, "In almost all historical hyperinflations as well as in recent attempts at stabilization from high inflation, fixing exchange was a key element of rapid stabilization" (Bruno, 1991, p. 21).

This statement, however, overstates the effectiveness of ERBS. The study of ERBS by Martin, Westbrook, and Willett (1999) for Latin American countries showed that the track record of ERBS is not as impressive as the advocates of ERBS usually argue. One of the factors believed to affect the chance of success of an ERBS program is the country's domestic macroeconomic policies. This is because inflation and macroeconomic policies are closely related. For example, if a country's fiscal policy is driven by a large fiscal deficit, the result will be significant debt accumulation. This in

turn pressures a government to print more money to finance this debt, leading a country's inflation rate to accelerate. Most ERBS advocates argue that fixed exchange rate regimes have been successful not only in bringing down high inflation, but also in preventing a country from pursuing excessive spending. While this may be true in some cases, it is worthwhile to determine the extent and the manner exchange rate regimes can influence a country's fiscal and monetary policy, which is referred to in the literature as "discipline effects".

There is a long held view that fixed exchange rates can provide an important source of discipline for monetary and fiscal policies. This study shows, however, that such discipline effects are often much weaker than advocates assume. Discipline effects are a result of incentive and constraint effects. Most of the discipline literature, however, addresses only the constraint aspect. An exchange rate is said to constrain economic policies if a government have no choice but to do otherwise. For example, countries with hard pegs cannot follow excessive monetary policies because it has no control over the monetary policies. However, incentive mechanisms work differently from the constraint mechanism in that they do not actually limit governments' actions, but instead only threaten serious consequences as a result of the poor government policies. Governments opt not to follow excessive expansionary policies in fear of future currency crises when the exchange rate regime collapses due to excessive expansionary policies. In reality, this incentive mechanism rarely happens because government officials are generally short sighted. Rather, the effects often go other way; pegging an exchange rate allows a country to borrow at low cost, and hence tempting the government to overspend. Since

the constraint and incentive effects often work in opposite directions, pegged exchange rates may not always be an effective source of discipline.

This study argues that discipline effects over monetary and fiscal policy can be quite different, as are the effects of "hard" fixes versus "soft" adjustable pegs. Hard fixes consist of dollarizations, currency boards, or currency unions, whereas soft pegs are adjustable pegs. While there have been a number of empirical studies of discipline effects, none of them has systematically investigated these distinctions. While several studies treat hard fixes and soft pegs as being one and the same, the two regime types are very different in their incentive and constraint structures; the constraints implied by soft pegs would presumably be much less firm than those associated with hard fixes. Soft pegs may also create greater incentives to follow expansionary domestic policies that result in short-run benefits at greater medium- or longer-term costs. Therefore, one should expect hard fixed-rate regimes to be a much stronger source of discipline. Furthermore, the discipline effects of hard fixes on monetary policy may be quite different from those on fiscal policy; for example, high capital mobility can make a fixed-rate regime an effective constraint over monetary policy, but it can also make it easier to finance fiscal deficits. Argentina presents a powerful example of this possibility. In the 1990s, the Argentine government convinced the markets that the fix was credible, making it much easier for them to borrow, which in turn allowed them to pursue unsustainable expansionary fiscal policies.

The empirical literature generally finds that hard fixes such as dollarization do provide strong monetary discipline. Beyond this finding, the results tend to be mixed due to differences in methodology, measures of exchange rate regimes, and country and time

coverage. This study addresses these problems by separately analyzing fiscal and monetary discipline and accounts for potential differences in the effects exerted by hard fixes and soft pegs by drawing on the new measures of *de facto* exchange rate regimes developed at the IMF. The study also looks at effects for developing and emerging market countries, since the two groups differ not only in their institutions, but also in their degrees of capital mobility. Arellano and Bond's Generalized Method of Moments (GMM) estimator for dynamic panel data models is used due to its effectiveness in dealing with problems of reverse causality and inertia behavior in the dependent variables, which in this case are fiscal and monetary performance.

The results confirm that hard fixes are the most effective source of monetary discipline of all the different exchange rate regime types for both developing and emerging market countries. Soft pegs are clearly less effective than hard fixes in delivering monetary discipline. The results for fiscal discipline show more variability, but none of the estimates support the view that either hard fixes or soft pegs have a strong positive effect on fiscal discipline. The results also show that effects of particular types of exchange rate regimes often have opposing signs for emerging and developing economies, and thus these two types of economies should be analyzed separately. For example, floating regimes are found to be the least effective source for monetary discipline for developing countries, but not for emerging-market economies.

In addition to distinguishing between hard fixes and soft pegs, this study also improves on the previous literature by investigating the role that politically unstable and divided governments may play in affecting the discipline effects, but also allows for the

possibility of interaction effects between these political variables and exchange rate regimes.

Moreover, exchange rate regimes may influence not only a country's macroeconomic policies, but also the behavior of its real exchange rate. The experiences of Chile, Argentina, and Brazil during the 80s and the 90s show that if an exchange rate regime is not consistent with a country's other economic policies, overvaluation can often occur, resulting in a currency crisis. Therefore, it is important to examine the relationship between exchange rate regimes and real exchange rates.

The dissertation proceeds as follows. The next chapter discusses the theoretical background on discipline effects and exchange rate regimes literature, discussing the constraint and incentive components of the discipline effects. Further, since the incentive components of monetary discipline are a function of the output-inflation tradeoffs, Chapter 2 examines this literature, and argues that exchange rate regime choices are critical to the analysis. Chapter 3 reviews the empirical literature of discipline effects. Chapter 4 describes both the data and the methodology used our study, and summarizes the major findings. Chapter 5 examines the relationship of exchange rate regimes and real exchange rates. Chapter 6 concludes.

Chapter 2. Constraint versus Incentive Effects: A Review of Literature

Much of the literature on the discipline effects of exchange rate regimes does not focus carefully on the mechanisms through which discipline is assumed to be imposed. Frequently, it is just asserted that fixed rates will act as a constraint over profligate domestic macroeconomic policies. But this view is much too simple. As Willett (2001) quotes Bates et al. (1998), "Institutions do not impose constraints; the order they provide emerges endogenously. Institutions rest upon credible promises, of either reward or punishment. They therefore can and should be analyzed as the equilibria of extensive form games" (p.5).

To begin with, it is important to understand the definitions of "constraint" and "incentive" of discipline effects in the international money and finance setting. An exchange rate regime is said to constrain a country's policies if government officials have no choice but to do otherwise. For example, if a country adopts a hard fix, its hands are tied and it basically gives up its monetary policy. On the other hand, an exchange rate regime choice is said to affect a country's discipline via an incentive effect if government officials restrain from pursuing excessive domestic policies that might lead to a collapse of the exchange rate regimes and therefore incur high costs for the country. Unfortunately, most governments have short-time horizon and are unlikely to restrain themselves from lavish spending, especially when pegging the exchange rate allows them to borrow at lower cost, showing that the incentive effects of a pegged exchange rate can be perverse. Most studies in the literature only focus on the constraint component, while neglecting the perverse incentive part, and hence leading to misleading conclusion.

Willett (2001) argues that, in contrast to the popular idea in macroeconomic level political economy analysis, exchange rate pegs rarely work as the credible constraints on governments' actions, and therefore should rather be viewed as influencing incentive structures. He also adds that from this perspective, pegging cannot be a substitute for "domestic discipline enhancing measures," but a complement.

The following discussions illustrate this example further.

A. *Monetary Discipline*

Pegged rates can theoretically produce monetary discipline because, in order to maintain the pegged rates, governments must refrain from pursuing rapid monetary expansions that have high future costs in terms of balance of payments disequilibrium and very likely an economic crisis.[1] In addition to these incentives, hard fixed rates, in contrast to soft pegged rates, may serve as a constraint on monetary policy. When a country adopts a hard fixed rate, such as a full currency board, its money supply is allowed to change only when its central bank's holdings of the foreign reserve changes. This is especially true when capital mobility is high. The Mundell-Fleming model best illustrates this.

When a government follows an expansionary monetary policy, it purchases bonds from the public. This drives up the bond price, expands money supply, and leads to a fall in domestic interest rates. A lower domestic interest rate, in turn, contributes to a balance of payment deficits through two channels. First, the lower interest rate stimulates

[1] Expansionary monetary policies not only lead to an increase in output, and hence an increase in imports, but also a lower interest rate, and hence capital outflows. This creates balance of payment deficits, and pressure for a currency to depreciate. See Chapter 4's Appendix 3 for different crisis models.

investment, leading to higher output. An increase in income generally leads to higher imports, thus negatively affecting the current account balance. Second, the lower interest rate would lead to capital outflow. With balance of payment deficits, there is pressure for the currency to depreciate. In order for the government to maintain its fixed exchange rates, it needs to sell its foreign reserves, thus reducing its money supply. This offsets the original increase in money supply due to the initial expansionary monetary policy. When the degree of capital mobility is low, the government can engage in sterilized intervention, by which it further increases the purchase of domestic bonds to ensure that the changes in reserves do not affect the aimed monetary base. However, under high capital mobility, this is impracticable because the government would quickly run out of international reserves. This Mundel-Fleming analysis shows that under high capital mobility, hard fixes can act as a constraint on monetary policies.

As with the fiscal discipline literature, there are hardly any studies that examine the monetary discipline effects of exchange rate regimes while taking into account the role of politics. However, there are a number of studies that analyze the political causes of excessive money growth and inflation, focusing mostly on the seigniorage mechanism. For example, Cukierman, Edwards, and Tabellini (1992) show in their theoretical model that political instability and polarization lead to higher seigniorage revenue. Acemoglu et al. (2002) argue that weak institutions can give rise to bad macroeconomic policies, including excessive money growth. Aisa and Veiga (2005) find evidence supporting political instability as a main cause of high inflation.

The basic idea behind the relationship between political instability and high inflation is that frequent cabinet changes and government crises shorten the horizon of

the government, since there is high uncertainty whether the members will be able to maintain their posts for the entire term. If there is a high probability of the government being replaced, the government will be more likely to focus on the short-term objectives, and therefore it is rather difficult to maintain low inflation. Also, it has been argued that weak governments often unable to resist excessive public expenditures, which are usually financed by the inflation tax.

B. *Fiscal Discipline*

Likewise, the standard view argues that pegged rates can induce fiscal discipline, since under a pegged exchange rate regime excessive expansionary fiscal policies often result in a collapse of the exchange rate regime, incurring considerable political and economic costs.[2] Forward-looking governments therefore restrain themselves from pursuing lax fiscal policies to avoid such economic crises. However, since there are no actual binding constraints against pursuing such lax policies, pegged rates are better viewed as reflecting incentive effects rather than constraint effects. In fact, this type of exchange rate regime may actually increase the short-term incentives to pursue inadvisable policies, as it allows governments to borrow at lower costs from foreign countries, and commensurately increases the temptation to spend more. If the governments are short-sighted, which is often the case, pegged exchange rates may then lead to a lower fiscal discipline, reflecting the perverse incentive effects of the regime.

Tornell and Velasco (1998; 2000) show theoretically that how much politicians discount the future influences the effectiveness of exchange rate regimes as a source of fiscal discipline. They argue that if politicians are impatient, flexible exchange rate

[2] Chapter 4's Appendix 3 gives a brief discussion on different crisis models.

regimes induce greater fiscal discipline by forcing the costs of unsound policies to be paid up front. However, if the authorities have a relatively low discount rate, fixed exchange rate regimes would provide more discipline because the more significant tax burden is pushed to the future when the exchange rate is abandoned. This illustrates that, along with exchange rate regime choices, political factors matter in studies of discipline analysis.

Although there are a number of studies on the political economy determinants of fiscal deficits, they do not take into account a role of exchange rate regimes in explaining deficits. Roubini and Sachs (1989) show that difficulties of political management in a coalition are a cause of slow adjustments in reducing budget deficits. Alesina, Hausmann, Hommes, and Stein (1999) argue that the differences in fiscal positions among countries are due to different procedures, including legislative constraints, that lead to the formulation, approval and implementation of the budget. Clark and Hallerberg (2000) study how capital mobility, degree of central bank independence and timing of elections affect a country's fiscal and monetary policy.

There are only a number of studies, including Heinemann (1999), that focus on the relationship between exchange rate regimes and fiscal deficits, and take into account the importance of political institutions in affecting fiscal discipline. In his study, Heinemann focuses on the observed countries' type of government and its durability. While the former distinguishes the importance of having a coalition or multiparty government, the latter involves an election or cabinet reshuffle and a significant change in government ideology or major political change. He concludes that the higher the

political instability (measured by the number of elections and cabinet shuffles), the higher the primary deficits.

Another important consideration is the type of governments that may pursue lax fiscal policies. Willett (2001) distinguishes between opportunistic and unified versus well-meaning but weak governments, and explains how exchange rate regimes and other factors could weaken a country's discipline under these different types of government. Opportunistic unitary governments refer to those that seek short-run benefits by following bad economic policies at significant long-run costs. This type of government is typically examined in studies of political business cycle theory. However, Willett (2001) argues that consideration should be given to well-meaning but weak governments as well. This type of government has good intentions and wants to follow disciplined policies, but, however, lacks political capabilities to do so. For example, while adjustable pegs are unlikely to be able to restrain opportunistic governments from lavish spending, they may hold more promise for well meaning governments who are seeking to rally political support for their policies.

The above discussion illustrates how the discipline effects are the result of both incentive and constraint components. When examining the incentive components of monetary discipline, it is useful to look at the short-run output-inflation tradeoffs literature. The following shows that exchange rate regimes play a role in the output-inflation tradeoffs. Pegging an exchange rate increases an incentive to inflate and hence affects the tradeoff.

2.1 Output-Inflation Tradeoffs in an Open Economy Framework

The literature on the output-inflation tradeoff in an open economy, though extensive, is far from complete. Many studies on the subject neglect the role of exchange rate regimes, which clearly can affect the output-inflation tradeoff, i.e., the slope of the Phillips curve. Why is it critical to include exchange rate regimes while analyzing the output-inflation tradeoff? What impact would this inclusion have to the overall results of output-inflation tradeoff? These two questions are addressed in this section.

Recent studies on the output-inflation tradeoffs in open economies often cite Romer's (1993) model that explains why inflation should be lower in relatively more open economy. Yet there are a number of discrepancies among these studies. In the original Romer model, openness affects the tradeoffs through term of trade effects, given that a country must be large enough to influence the international price of goods. Lane (1997) argues that this explanation is limited; he contends that the openness affects the tradeoffs through imperfect competition in the nontraded sector, rather than through the terms of trade effects, and thus the relationship holds in both small and large economies. On the other hand, Ghironi and Giavazzi (1998) claim that the "identical in size" assumption, though it yields an analytically simple model, is not useful. They argue that constraints facing a country and its incentives are affected by the relative size of the country.

Moreover, some studies, such as Alfaro (2005), emphasize that the time horizon of the relationship between openness and output-inflation tradeoffs matters. Alfaro argues that openness only affects the tradeoffs in the long run. This in turn leads to a further debate on the definition of short run versus long run. In addition, Temple (2002) argues

that the contradictory predictions of these standard open economic models are due to Romer's explanation of time inconsistency, which Temple does not consider to be satisfactory. In particular, Temple claims that the explanation for low inflation in open economies is compatible with the time inconsistency hypothesis but does not rely on it.

There are still debates over the actual forces driving the openness-inflation relationship. From the fiscal view, many studies find that a fiscal imbalance would affect a country's inflation rate. Nonetheless, the main studies on the subject including Romer's and Lane's, do not control for the fiscal deficits. Some also argue that the relationship is driven by a group of severely indebted countries. Opponents of this view claim that the relationship holds before and after the debt crises. The debates over the openness and output-inflation tradeoffs go on and on.

Despite the discrepancies mentioned, what these studies have in common is the assumption of flexible exchange rate regimes, which is the key factor driving the theoretical prediction of their analyses. In these studies, including the Romer original, it is often argued that exchange rate regimes do not matter to the relationship between openness and output-inflation tradeoffs. However, this is not the case. Under fixed exchange rates, monetary expansions would lead to real exchange rate appreciation due to an increase in domestic prices, or inflation. Under flexible rates, however, the expansions can lead to large real exchange rate depreciation in the short-run due to price rigidity; for example, in a Dornbusch model. In other words, under fixed exchange rates, the output-inflation tradeoff curve is expected to be flatter, reflecting greater difference between the short-run and the long-run tradeoffs. Thus, under fixed exchange rates there is more scope for a government to exploit the situation by increasing inflation to boost

output. On the other hand, under flexible exchange rates, the costs of pursuing such a policy show up far faster in exchange rate changes. Therefore, under flexible exchange rates, there would be less of a time asymmetry to exploit. This shows that not only the direction of changes, but also the questions of how much and how long are of importance and needs to be examined.

Because in reality there is a wide range of exchange rate regimes, the assumption of flexible exchange rates therefore may not be a useful one. It is also important to note that not all Phillips curve models are affected by an inclusion of exchange rate regimes to their analyses. For example, the exchange rate regime does not directly affect the Phillips curve in either the Lucas supply curve formulation or the Barro-Gordon version with surprise inflation.

The first subsection gives a brief background on the Phillips curve concept. The second section, focusing on the exclusion of exchange rate regimes from the concept, evaluates the Romer (1993) study, as well as the other main studies of the Phillips curve concept in an open economy framework. The last section discusses a future plan to incorporate exchange rate regimes into the output-inflation tradeoff analysis under relevant models.

2.1.1. A Brief Background on the Phillips Curve Concept

The Phillips curve concept is often viewed not only as old and outdated, but also as incorrect. Still, many economists find it still to be a useful concept once it was reformulated to explicitly include expectations. In its initial formulation the charges against its theoretical basis were clearly correct. The Phillips curve was named after A.W. Phillips (1958), who used the UK data to show a negative relationship between

unemployment rates and the wage inflation. Supported by various economists, including Paul Samuelson and Robert Solow, the Phillips curve concept soon became one of the first concepts learned by a student in Macroeconomics 101. Below are some of the main criticisms summarized by Clement (2001). I conclude with Mankiw (2001) arguments that the concept is still important and useful for research.

The original Phillips curve was criticized by Milton Friedman, Robert Lucas and others for being theoretically incorrect. A stable relationship between inflation and unemployment, depicted in the original Phillips curve, is improbable. This is because, the theorists argue, people' expectations about inflation change depending on economic conditions. The criticisms are supported by the failure of the Phillips curve to match with the stagflation of the '70s. From here, the expectations-augmented Phillips curve was developed. An expectations-augmented Phillips curve simply states that the tradeoff between "unanticipated" inflation and "cyclical" unemployment exists only in the short run. "Unanticipated" inflation is the difference between actual and expected inflation, and "cyclical" unemployment is the difference between actual and natural rate of unemployment. At the natural rate of unemployment, inflation is believed to be constant. If people form their inflation expectations rationally, this tradeoff may not even exist in the short run. There is also a NAIRU Phillips curve, where the term NAIRU stands for Non-Accelerating Inflation Rate of Unemployment. In this version, the focus is on the unemployment rate and a *change* in inflation rates.

According to Yuen (2002), there are at least four central concepts of the Phillips curve: (1) New Classical flexible price, monetary misperceptions theories; (2) New Keynesian sticky price theories; (3) "Non-Accelerating-Inflation Rate of Unemployment"

(NAIRU) theories; and (4) The "reverse causation" result of real business cycle theories, which maintain that there is no such relation as a Phillips curve. Moreover, there are a good number of variations of the Phillips curve. Among these variations are inflation-persistence Phillips curve, the Phillip curve with sticky information, the Phillips curve with productivity growth, a nonlinear Phillips curve, and a sunspot Phillips curve.[3] Thus, it all depends on what the objective of a study is – some work perfectly, some don't.

On the subject of Phillips curves' failures to find empirical support during the past decades, Mankiw (2001) simply says, "Regardless of our judgment on the empirical Phillips curve, we cannot easily escape the conclusion that monetary policymakers face a short-run tradeoff between inflation and unemployment. The only alternative to acknowledging such a tradeoff is to deny monetary policy's ability to influence one of these two variables, and that is a tough position to defend" (p.5). This short-run tradeoff is easily explained by price stickiness, Mankiw concludes. Unlike Clement, Makiw stresses the need to find a better explanation for the tradeoff between inflation and unemployment: "The economics profession is not likely to ever reject the short-run tradeoff between inflation and unemployment, so it had better get on with the task of explaining it" (p.24).

The above models are in the closed economy setting. While these models are still useful, it is worth examining the concept in an open economy framework.

2.1.2 The Phillips Curve Concept in an Open Economy Framework

Romer's (1993) prediction that inflation should be lower in relatively more open economy is widely accepted; it is also mentioned in a textbook by Obstfeld and Rogoff

[3] For references of each version of these Phillips curve, see Appendix 2 in Yuen (2002).

(1996): "the output-inflation Phillips curve tradeoff is worse in an open economy than in a closed economy" (pp. 653-54). Therefore, in order to understand where the recent literature of the output-inflation tradeoff stands, it is important to be familiar with Romer's model.

Romer (1993) argues that, "Because unanticipated monetary expansion leads to real exchange rate depreciation, and because the harms of real depreciation are greater in more open economies, the benefits of unanticipated expansion are decreasing in the degree of openness" (p.1). He also argues that the openness-inflation relationship should be weaker in countries that are more politically stable and have more independent central banks. Romer bases his model on a standard closed-economy model of the dynamic inconsistency of monetary policy with citations that include the well-known work by Barro and Gordon (1983). The key equation is:

$$y = y^n + \beta \cdot \left(\pi - \pi^e\right) \tag{1}$$

where y is actual output,
y^n the natural rate of output (or equilibrium output under flexible prices)
π inflation
π^e expected inflation

The model assumes that policymakers view higher output as desirable and higher inflation as undesirable, leading to a following objective function:

$$W = -\left(\frac{1}{2}\right) \cdot \pi^2 + \gamma \cdot y \tag{2}$$

Romer (1993) then suggests that an increase in degree of openness (measured in terms of a fraction of goods that are purchased from abroad) reduces the benefits of increase in output being above its natural rate. This is, he argues, because domestic expansion increases domestic output relative to output abroad, leading to a lower relative

price of domestic goods. Moreover, openness increases the costs of real depreciation, which in turn leads to a higher inflation associated with a given output, and thus lowers overall benefits of unanticipated monetary expansion. He then concludes that the incentives to expand (and thus inflate) are lower in more open economies, and as a result equilibrium inflation under discretionary policy is smaller. In Romer's model, openness affects inflation through:

$$x = a(e + p*) + (1 - a)p \tag{3}$$

where x is the rate of consumer price inflation (or the change in the log CPI)
a a imports fraction of consumer goods (or degree of openness)
e the change from the preceding period in the log exchange rate
p^* the change in the log price index for foreign goods in foreign currency
p the change in the log price index for domestically produced goods in domestic currency

The first effect of openness is that an expansion of domestic output, which is imperfect substitutes for goods from abroad, drives down the relative price of domestically produced goods, shown in

$$e + p^* - p = \alpha \cdot (y - y^*) \tag{4}$$

where y is the change in log domestic output
y^* the change in log foreign output
α the inverse of elasticity of substitution between two goods, < 1.

Romer (1993) follows a standard practice in the literature and assumes a direct cost to inflation. He then calculates the effects of a monetary expansion on domestic output, domestic inflation, CPI inflation, and the real exchange rate. Romer concludes that the effect of a monetary expansion on output is smaller in a more open economy, but the effect on both domestic and CPI inflation are larger. Thus, the output-inflation tradeoff is less favorable in more open economy. Whether this is correct will depend both

on the types of exchange rate regimes and definition of real exchange rate. Lastly, Romer suggests the effect of monetary expansion on that real exchange rate is independent of the degree of openness. Yet he notes that the welfare cost of a given real exchange rate is larger the more open the economy, therefore, real depreciation provides a greater disincentive to expansionary monetary policy.

Romer (1993) makes a bold statement regarding a role of exchange rate regimes: "There is no priori reason to expect the predictions of the theory to apply only to certain types of countries. In particular, the theory should apply to countries with fixed as well as flexible exchange rates" (p.874). However, he fails to provide any support for his statement and this conclusion is questionable.[4] For example, Willett and Mullen (1982), using a more traditional formulation of inflation-unemployment tradeoff, argue that pegged rates will have substantially different effects than flexible ones on the short-run tradeoff.

In order to test his theory, Romer (1993) uses the average annual change in the log of GDP or GNP deflator as a measure for inflation, and the average share of imports in GDP or GNP over the years for openness. His measure for inflation is somewhat questionable. The choice to use GDP or GNP deflator is probably a result of his model shown previously which differentiates between domestic inflation and CPI inflation, though he concludes that "the choices of whether it is CPI inflation or domestic inflation that is relevant for firms' price-setting decisions, for money demand, and for the costs of inflation are not important to the model's conclusion" (p.896). Inflation is more

[4] Bowdler (2003) empirically tests this assumption. In contrast to other studies including Temple (2002) that do not find empirical support for theoretical prediction of the Romer model, Bowdler's study shows that Romer's prediction holds as long as an exchange rate regime is controlled for. This finding shows that Romer's claim that exchange rate regime choice does not matter is not valid.

commonly measured by a change in consumer price indices. The benchmark specification is a regression of the log of average inflation on a constant and the degree of openness. For a robustness check, he adds other factors to the benchmark model, including real income capita as a measure for a degree of development, a set of dummy variables for OECD membership and for various regions, and dummy variables for the use of CPI rather than the GDP deflator to measure inflation and for the alternative measure of openness.[5]

Interestingly, Romer (1993) argues that, "...exclusion of any factor that could potentially affect the average inflation biases the coefficient on openness only if the omitted factor is correlated with openness" (p.876). One clear example that meets both requirements – potentially affecting the average inflation and correlating with openness – is exchange rate regimes. Yet Romer does not pay any attention to exchange rate regimes. This is probably due to his presumption that his model's prediction should apply to all countries, regardless of their exchange rate regimes.

Romer (1993) also contends that inflation will be low in highly open economy countries even in the absence of precommitment, leading to his prediction that the relationship between openness and inflation will be weaker in more stable countries and countries with a higher degree of central bank interdependence. Moreover, Romer finds that for highly developed countries, their average inflation rates are lower and are unaffected to policymakers' incentives to attempt surprise expansion, claiming that these countries have largely solved the problem of dynamic inconsistency of optimal monetary

[5] This latter set of dummies is included to capture the differences in the average levels of alternative inflation and openness measures.

policy. He claims that this can be seen in the differences in political instability and central bank independence between developed and less developed countries in his sample.

Romer (1993) also considers the possibility of the degree of openness being endogenous to a country's domestic policy, which in turn affects a country's inflation. Using land area and population as instrumental variables, Romer tests the hypothesis and rejects it.

Lane (1997) argues that the mechanism linking the welfare effects of monetary surprises, and hence the incentives to inflate, to openness does not rely on a large-country terms of trade effect, a conventional explanation including Romer's (1993), but rather is due to imperfect competition and nominal price rigidity in the non-traded sector. The main contribution from Lane's (1997) work is the introduction of the non-traded sector into the analysis of the output-inflation tradeoffs in an open economy framework. In other words, Lane extends Romer's (1993) model to include a role of non-tradable sectors in attempt to find a better linkage between openness and output-inflation tradeoff.

Lane (1997) assumes that the non-traded sector is monopolistic in market structure and faces a nominal rigidity in changing prices. Although the assumption made regarding the non-traded sector is fairly strong and is essential to his model's prediction, Lane does not explain further why it should be so. Moreover, he treats the traded sector output as a constant endowment of a homogenous good, which is a perfect substitute for foreign output.

The central idea of Lane's (1997) theoretical argument is that "an unanticipated permanent increase in the money stock generates a short-run expansion in non-traded output, owing to nominal price rigidity in the non-traded sector. The current account does

not change.[6] Both real[7] and nominal depreciation occurs in the short-run. After one period, non-tradables prices adjust and the only permanent effect of the monetary shock is a proportionate increase in the price level and the nominal exchange rate" (p.335). This leads to his conclusion that the larger the non-tradable sector (the closer the economy), the higher the actual inflation. Lane further argues that his results with respect to openness would hold as long as there is price stickiness in the non-traded sector and the non-traded sector is relatively more distorted than the traded sector. Note that the traded good sector is likely to be more flexible under flexible exchange rates rather than pegged rates.

Lane (1997) uses cross-section data from 1973 until 1988 for 114 countries. He averages the inflation rate over the sample period so that his regression does not pick up the cyclical behavior of inflation. However, Lane does not specify his inflation variable, whether it is based on price indices or GDP deflator, though I assume that he, following Romer (1993), uses the GDP or GNP deflator. Like Romer, Lane uses the share of imports in GDP as a measure of openness. In addition, he includes total GDP as a measure of a country's size as one of the explanatory variables. His control variables include GDP per capita as a measure of how poor a country is, a measure of central bank independence, and a measure of political instability.

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[6] This is due to the model's assumptions: agents desire a certain amount of traded goods consumption; an endowment of traded goods is constant; initial net foreign asset is zero; and price of traded goods is exogenously determined on world market. These assumptions also imply that the traded balance is zero.

[7] Romer defines real exchange rate as the following:

$$q \equiv \frac{E \cdot P_T^*}{P_N}$$

where q is real exchange rate, E is nominal exchange rate, P_T^* is exogenously determined world price of traded goods, and P_N is a price of nontraded goods. However, Lane (1997) does not include the real exchange rate aspect in the empirical test of his model.

Lane's (1997) justification for including size as one of the explanatory variables is that, "Because openness and size are correlated variables in the data, omitting size from the regression would introduce a bias into the estimation of the effect of openness on size, in the direction of understating the true contribution of openness in reducing inflation" (p.339). His rationale appears somewhat weak in that if one includes two explanatory variables that are correlated in an ordinary least square regression, it would result in a collinearity problem and thus a biased result. Despite a possibility of a biased result, Lane concludes that "the openness effect is strengthened when country size is included as a control variable, which suggests that openness is not just working through a terms of trade effects" (p.345).

As a robustness check, Lane (1997) uses an alternative measure of a degree of openness: "natural openness," which is constructed as a fitted value from the policy-free variables, including area, distance from major world market, tariff rate, and black market premium. Lane argues that this variable should help reject the alternative hypothesis that openness and inflation are linked because countries with high inflation have a high probability of adopting protectionist trade policies. Using the "natural openness" measure, Lane finds general support for the relationship between openness and inflation, thus rejecting an "endogenous openness" hypothesis.

To summarize, Lane (1997) adds to Romer's (1993) work by concluding that Romer's prediction should hold even if a country is small and cannot affect a terms of trade. Lane also briefly refers to his unpublished work, which finds that, "...more open economies are more likely to have pegged exchange rates, which offers further support for the openness-inflation relationship, given that the ability to commit to an exchange

rate peg is a decreasing function of the gains to surprise inflation" (p.345). Yet Lane fails to include an analysis of the role of exchange rate regimes in his analysis of openness-inflation relationship.

Both Romer and Lane's studies only focus on monetary policy and fail to acknowledge a country's ability to use fiscal policy to surprise inflation. This is crucial since monetary policy is not the only tool a government can use to generate a surprise inflation. However, this is understandable because both studies are based on Barro-Gordon model, which assumes that policymakers directly control inflation and then the unemployment rate is affected through a modified version of Phillips curve. The Barro-Gordon model is shown below.

Barro-Gordon Model:

In Barro and Gordon (1983), policymakers directly control inflation by controlling money growth. The policymakers choose inflation; if it is unexpected, it affects the level of the economy's output and thus unemployment. The key equation is:

$$u = u^n - \alpha \cdot (\pi - \pi^e) \qquad (5)$$

where u is unemployment rate, u^n is the natural rate of unemployment, π is the inflation rate, π^e is the expected inflation rate. In the Barro-Gordon model, the direction of causation is clear: unexpected inflation causes changes in unemployment and hence output. The equation is a modified version of expectations-augmented Phillips curve:

$$\pi - \pi^e = -\gamma \cdot \left(u - u^n\right) \qquad (6)$$

where $\gamma = (1/\alpha) > 0$, being a slope of Phillips curve.

However, in the expectations-augmented Phillips curve, the direction of causation is not as clear. On one hand, some scholars, including Friedman, would interpret it in the way Barro-Gordon do, in which a surprise inflation causes an increase in output and thus a lower unemployment rate. On the other hand, Keynesians often interpret the augmented Phillips curve as low unemployment causes inflation to be unexpectedly high because low unemployment leads to tight labor market, greater bargaining power for workers, and upward pressure on wages and prices.

In a closed economy framework, the slope of Phillips curve in the Lucas supply curve formulation depends on the relative sizes of the variance of general inflation or/and the variance of inflation for a particular producer. For example, when the variance of general inflation is large relative to the variance of inflation for a particular producer, producers react less to a given increase in prices because they think the price increase is driven by an increase in general inflation. This results in a steeper Lucas supply curve. Moreover, a degree of flexibility of nominal wages can also affect the slope of the Phillips curve.[8] However, it ignores the roles of openness and exchange rate regimes. In international economics, on other hand, it is often argued that openness affects the slope of Phillips curve, γ.

While none of the models discussed above explicitly shows how the openness should affect the slope of the Phillips curve, Temple (2002) attempts to theoretically show how the openness mechanism works. Temple (2002) aims to tackle the puzzle of

[8] Daniels and Van Hoose (2004) illustrate in their textbook that under fixed nominal wages, the aggregate supply curve will be upward-sloping, while under flexible nominal wages the aggregate supply curve will be vertical. In reality, the degree of nominal wage flexibility lies somewhere in between these two extremes – thus it is probable to assume that the aggregate supply curve is upward-sloping in the short-run where the wage adjustment is limited, and becomes vertical in the long run where a full wage adjustment to price changes can be achieved.

openness and the Phillips curve. He argues that the direct evidence for a correlation between openness and the Phillips curve is not strong and therefore there is a need for alternative explanations for the Romer (1993) evidence of the linkage. Temple sets out to test the hypothesis that Phillips curves are steeper in more open economies. This hypothesis, Temple argues, follows from Romer (1993)'s finding that inflation is lower in more open economies.

Temple (2002) assumes that the movements along the Phillips curve are mostly driven by monetary shocks - a justified assumption, according to Temple. He argues that for his empirical work, with the sample period extending from the mid-1960s to the late 1980s, "...we could probably assume that models based on floating exchange rates and perfect capital mobility are quite good approximations, at least for developed countries" (p.452), which mean the fiscal policy would not have affect on output because any policy change will be offset by the change in exchange rate. Even though the logic of his argument is theoretically correct, his supposition of floating exchange rates and perfect capital mobility being good approximations are highly questionable. Although there is a substantial increase of a degree of capital mobility over the past decades, it is still far from being perfect. Therefore, Temple's sample period cannot be characterized by the perfect capital mobility. In addition, according to Reinhart and Rogoff's (2002) *de facto* classification of exchange rates, Temple's presumption regarding flexible rates is clearly not the case.[9]

[9] Bretton Woods system was in place until 1974, which means most, if not all, developed countries did not have flexible exchange rate regimes, not until after 1974. Even after 1974, there are only a number of developed countries that follow pure float. For example, United Kingdom and Italy have never adopted flexible exchange rate regimes. Source: Reinhart and Rogoff (2002).

Moreover, Temple (2002) cites Romer (1993) and Obstfeld and Rogoff (1996) for why he does not include exchange rate regimes in the analysis. He notes that Obstfeld and Rogoff (1996) state that the flexible exchange rate assumption is not essential to the openness-inflation argument. However, Obstfeld and Rogoff (1996) do not specify why the flexible exchange rate assumption is not necessary. After stating that the assumption of flexible exchange rate is not necessary, Obstfeld and Rogoff (1996) go straight to discuss why the output-inflation tradeoff is worse in an open economy. This discussion mentions real depreciation as a medium linking the openness and the output-inflation tradeoff. From this it can be implied that the Obstfeld and Rogoff assume that exchange rate regimes do not matter since it is real depreciation that drives the results. However, there are many studies that find that exchange rate regimes do affect real exchange rates in the short run.[10]

In his paper, Temple (2002) uses an expectations-augmented Phillips curve (eq. 6) and policymaker's loss function:

$$L(\pi,u)=\frac{1}{2}\left[(\pi-\pi^*)^2-\lambda(u-u^*)^2\right] \qquad (7)$$

where "*" denotes central bank's desired target, and $u^* < u_n$. Temple (2002) then gives a solution of an equilibrium inflation rate under discretion, π^D:

$$\pi^D=\pi^*+\frac{\lambda}{\gamma}\left(u_n-u^*\right) \qquad (8)$$

Due to the assumption that u^* is less than the natural unemployment rate, u_n, an equilibrium inflation rate is lower when the cost of inflation is relatively higher (lower λ),

[10] For more discussion on the relationship of overvaluation and exchange rate regimes, see Chapter 5 Real Appreciation and Exchange Rate Regimes.

when the Phillips curve is steeper (higher γ), and when the unemployment target is higher relative to the natural rate.

Again Temple (2002) does not theoretically show how the slope of the Phillips curve should depend on the degree of openness. He refers to Romer (1993) model of why openness might affect the incentive to inflate, and suggests that according to Romer's discussion the parameters λ and γ may depend on the extent of openness. Temple, referring to Lane (1997), concludes that "for a given monetary expansion, the depreciation will be reflected in a higher inflation cost and a reduced output gain, and these effects will be greater in more open economies. As a result, the slope of the Phillips curve will be steeper" (p.454). Temple then argues that, according to the standard time inconsistency theory, the steeper Phillips curve will result in a lower equilibrium inflation rate.

He then starts testing the prediction by first noting that, "if the slope of the Phillips curve is genuinely steeper in more open economies, then in particular one would expect to see greater openness associated with a lower 'sacrifice ratio'" (p.455). The sacrifice ratio is defined as the ratio between total output losses and the change in trend inflation over the course of a disinflation. However, Temple (2002) notes that the ratio could have measurement errors, in which, along with small sample size, generally leads to high standard errors. Thus, not only are the effects Temple finds small, but the results are also subject to a high degree of uncertainty. Temple concludes, "the sample correlation between openness and the slope of the Phillips curve is not at all strong"

(p.460), and argues that the time inconsistency model no longer provides a good explanation to the openness-inflation correlation.[11]

At the end of his paper, Temple (2002) provides a short discussion of a plausible role of exchange rate regimes, working through real exchange rate variability, in affecting the relationship between openness and the slope of the Phillips curve. Temple starts the discussion by noting Lane's (1997) finding that open economies are more likely to peg their exchange rate. As a result of pegging, the variability of the real exchange rate is lowered, and this should lead to an increase in the perceived costs of inflation. Temple wraps up his discussion on exchange rate regimes stating: "the argument advanced here is that the costs of high and variable inflation are potentially greater in open economies, and perhaps especially in those countries that seek to fix their exchange rate. This could explain why inflation is kept relatively low [and thus, implying a steeper Phillips curve] in more open economies" (p.465). He notes the difficulty in testing the roles of exchange rate systems; one being the endogeneity of exchange rate regimes, and he argues: "It is also possible that inflation is more costly in more open economies, regardless of the exchange rate regimes" (p.465). Temple does not give support for why it could possibly be the case; and more interestingly, this statement is contradict to his previous statement

[11] However, Bowdler (2003) opposes Temple's finding. Bowdler's study is based on new measures of the Phillips curve, rather than the conventional Ball-Mankiw-Romer measure. He also allows for the interaction term between a degree of openness and a country's exchange rate regime. Bowdler finds some supports for the standard theoretical prediction that openness should have a positive effect on the slope of the Phillips curve, but the supports found are confined to those countries that have maintained floating exchange rate regimes. His finding is aligned with the theoretical model since the theory assumes that countries have pure floats. Nevertheless, I have some doubt toward his method of identifying if a country has a fixed or flexible exchange rate regimes; Bowdler only uses a volatility of exchange rate to determine whether a country's exchange rate regime is fixed or flexible. Bowdler forgets the other two instruments a country can use to maintain fixed exchange rates: interest rates and foreign exchange reserves. Thus future research can improve upon his study by using a better exchange rate classification.

that says the costs of inflation are likely to be higher in countries with fixed exchange rates.

A recent study by Alfaro (2005) empirically tests Romer's (1993) prediction taking exchange rate regimes explicitly into consideration and concludes that in the short-run fixed exchange rate regimes play a significant role in restricting inflation while openness does not.

Alfaro (2005) briefly reviews the literature, and suggests that Romer's (1993) argument that the choice of exchange rate regime is not an important determinant of inflation only applies in long-term horizon. Alfaro cites various studies[12] to support her argument that fixing exchange rates can affect the inflation rate, at least in the short-run. This is because a pegged exchange rate is transparent, thus it provides an observable commitment to monetary policy.

She then uses panel analysis to test her hypothesis that exchange rate regimes, rather than openness, matter in determining inflation rate in the short-run. In contrast to previous studies, Alfaro (2005) does not include central bank independence and political instability measures in her analysis, arguing that these variables are of little use in a panel analysis due to lack of data availability. She argues that time and country dummies, rather than using the actual measures, should be able to capture the differences in central bank independence and political instability among countries. Alfaro finds that the negative relationship between openness and inflation disappears after she controls for time- and country-fixed effects, and argues that the correlation found in previous studies could be driven by time-invariant omitted variables, such as those measuring differences in institutions. Note that Alfaro uses Reinhart and Rogoff's exchange rate classification.

[12] Including Calvo and Végh (1999), Frankel (1999), and Ghosh et al. (1997).

Alfaro regroups Reinhart and Rogoff's 5-way classification into 3-way classification in order to compare with the IMF's *de jure* classification of exchange rate regimes.[13]

Alfaro's (2005) main conclusion is that "at short-term horizons, the exchange-rate regime betters openness in restraining inflation" (p. 246). She argues that this is because exchange rate regimes have "greater observability, accountability, and transparency" (p.246) than the degree of openness. She then stresses that openness, however, still serves better in the longer time horizon in determining the inflation rate. Alfaro's analysis can be interpreted along the Willett (2001) discussion of the role of external factors, both exchange rate regimes and openness, played in serving as incentives versus constraints for a country's discipline over domestic policies, and in turn over the country's inflation rate.

Using the Mundell-Fleming framework, Yuen (2002) *theoretically* shows how the exchange rate regime choice should affect the slope of the Phillips curve in a small open economy setting. He mentions a number of studies that give importance to the role the exchange rate regimes play in affecting the output-inflation tradeoffs. Yuen concludes that in general the Phillips curve would be flatter under a fixed exchange rate regime.

Yuen (2002) assumes that agents are forward-looking, and therefore equilibrium is based on expectations about future shocks and future short-run equilibria. Note that this model is an expectations-augmented Mundell-Fleming model, and is different from the basic Mundell-Fleming model where agents are assumed to have static expectations. The expectations-augmented version seems to be more relevant in this case since we are

[13] Alfaro (2005) groups Reinhart and Rogoff's managed floating, free floating, and free falling into one class of "floating regimes". She then renames Reinhart and Rogoff's crawling pegs and bands as "intermediate regimes". Lastly, she maintains Reinhart and Rogoff's fixed regimes as "fixed regimes".

dealing with the output-inflation tradeoff that involves expectations of future output and future inflation rate.

According to Yuen (2002), the key to the difference in the slopes of the Phillips curve under flexible and fixed exchange rate regimes is due to the elasticities of aggregate demand with respect to real interest rates and real exchange rates. These elasticities determine how sensitive aggregate demand is to changes in prices. If these elasticities are sufficiently small, aggregate demand would not be sensitive to price changes regardless of exchange rate regimes, thus adopting floating exchange rate regimes will not lead to a steeper Phillips curve. Specifically, the Phillips curve would be steeper under the floating exchange rate regimes if and only if the sum of the two elasticities is greater than one, which is generally the case, Yuen argues. In his model, these elasticities are exogenously determined. Nevertheless, there is a possibility that the choice of exchange rate regimes can affect the elasticities, and in turn may affect the conclusion of his analysis.

Even though the point made above is not mentioned in his study, Yuen (2002) is aware that the choice of exchange rate regimes may affect inflation expectations, shifting the Phillips curve around under the floating rate regime. Yuen stresses that this is not the case under fixed exchange rate regimes.

He then uses data from Hong Kong to search for empirical support for his theoretical prediction. Similar to Romer (1993) and Lane (1997), Yuen (2002) uses the rate of change of the GDP deflator as a measure of inflation. He subsequently concludes that, "the evidence is not clear enough for us to draw a definite conclusion" (p.11). This

may very well due to his specification that sets inflation expectations to be constant over time.

Yuen's (2002) paper provides a good starting point for future study since it directly and theoretically deals with the changing slopes of Phillips curve and the choice of exchange rate regimes. There is room for improvement on Yuen's work. For example, one can study how a degree of openness would affect the relation between exchange rate regimes and slopes of Phillips curve. Degree of openness can be defined either in terms of trade volume or capital mobility. These factors, trade and capital mobility, affect not only the inflation level but also the exchange rate regime choice. Thus, neglecting them could result in biased results. In relation to the degree of openness, terms of trade should also be taken into account by introducing tradable and non-tradable sectors into the analysis.

There is one highly relevant paper by Ghironi and Giavazzi (1998). This paper, using game theory analysis, shows that the output-inflation tradeoff facing a central bank depends on the size of the economy for which it sets monetary policy, as well as the exchange rate regimes. Ghironi and Giavazzi differentiate between flexible and managed exchange rate regimes. In a managed regime, there are "core" and "peripheral" countries. While "core" country sets the money supply for itself as well as for the peripheral countries, "peripheral" countries set the value of the bilateral exchange rate. Contrary to conventional idea that "peripheral" countries prefer pegged exchange rate because it allows them to transfer costs of adjusting to external disturbances to other countries and therefore facing a more favorable output-inflation tradeoff, Ghironi and Giavazzi find that exchange rate regime choice does not matter for "peripheral" countries. However, the

smaller the "peripheral" countries, the steeper their output-inflation tradeoff should be. On the other hand, the "core" country under managed exchange rate always faces worse tradeoff than if it were under flexible rate. Exchange rate regime choice matters to the "core" country unless the size of "peripheral" countries is relatively small that they cannot create any impact on the "core" country. However, the core country's size does not matter for its output-inflation tradeoff.

Although their finding is interesting, the model is a bit complicated. It will be very useful to address the subject in a way that is easier to understand, perhaps using basic macroeconomic models rather than game theory, which may appeal more to policymakers.

Yuen (2002) summarizes his paper by stressing one of the most important issues – the policy implications. As a guide for future research, he asks, "What are the implications of the changing slopes of the Phillips curve for the optimal design of monetary and fiscal policy in stabilizing inflation and output in the open economy?" (p.13). This question is very crucial, and thus future plans include improving the theoretical study on the relationship between the exchange rate regime choices and output-inflation tradeoff, and coming up with useful policy implications. The next section discusses how to come about achieving these.

2.1.3. Future Research on the Output-Inflation Tradeoffs

The above discussion shows how incomplete, and perhaps misleading, the literature on the output-inflation tradeoffs in open economies could be. The following purposes ways to address and improve this issue.

- Start with the existing models, such as Romer's, and then reevaluate these models given that the exchange rate regimes is now assumed to be either fixed or managed exchange rate regimes, rather than flexible. Clearly, the effects on each variable will not be the same under this new assumption. This process is to outline the mechanism in which exchange rate regimes play a role in affecting the output-inflation tradeoff.
- In the next stage, a simple model of output-inflation tradeoff would be built, including parameters that can be used to conduct comparative static analysis to show how a change in degree of exchange rate flexibility affect a slope of the Phillips curve.
- As a result, policy implications regarding this issue would be developed. For example, a country with a given type of exchange rate regime – what is the best policy for them to stabilize inflation versus output? With a given stabilization objective and certain economic conditions, should a country switch the exchange rate regime to achieve a more favorable output-inflation tradeoff? These are only a few examples of policy issues that should be addressed in regarding the relationship between changing slopes of Phillips curve and exchange rate regimes.

This section shows how incentive mechanism works in affecting a country's inflation rate. Although these future plans are yet to be dealt in this dissertation, the following empirical research on the discipline effects of exchange rate regimes would shed some light on how incentive and constraint components of exchange rate regimes affect a country's inflation level, and hence the output-inflation tradeoffs.

Chapter 3. Review of the Empirical Literature

A. *Monetary Discipline*

Although there are only few studies on the subject of monetary growth, we know that movement of inflation tends to mirror growth in money supply. Hence, both variables are of interest when examining the monetary discipline. Levy-Yeyati and Sturzenneggar (2001) conducted one of these studies. They examine effects of exchange rate regimes on nominal money growth and find partial support for the hypothesis that fixed regimes are associated with lower money growth;[1] in other words, fixed exchange rate regimes increase monetary discipline. While this is consistent with the study by Ghosh, Gulde, and Wolf (2003),[2] it does not necessarily hold true for different sample sets or methodologies. Although there are only few studies on the subject of monetary discipline, we know that movement of inflation tends to mirror growth in money supply.

A number of studies on exchange rate regimes and inflation have fairly mixed conclusions. Some conclude that fixed regimes lead to lower inflation, while some conclude otherwise. Edwards (1993, 2003) finds that fixed exchange rates are associated with lower inflation, while Little et al. (1993) find a mixed result and conclude that a generalization of the effect of exchange rate regimes on inflation cannot be made.[3] Recent studies by Rogoff et al. (2003) and Husian, Mody, and Rogoff (2004) argue that

[1] They find "partial support" in the sense that although the pegs have a negative sign on money growth, it is statistically insignificant.

[2] Ghosh, Gulde, and Wolf (2003) find that inflation under fixed exchange rate regimes was significantly lower than under intermediate or freely floating arrangements. This is, they claim, due to greater confidence in the currency (a credibility effect) and lower money growth (a discipline effect). Moreover they claim that the benefits of pegged exchange rate regimes in terms of inflation performance were fairly robust to the endogeneity of regime choice.

[3] Edwards and Savastano (1999) give brief summary of these papers.

the effect of exchange rate regimes on inflation differs for different types of countries. They find that in developing countries, pegs are associated with low inflation rates; while in advanced economies, floats are associated with somewhat lower inflation rates. For emerging countries, they find that inflation is lower in regimes with harder commitment to exchange rate stability relative to floating. Therefore, they conclude that while pegs lower inflation in developing countries, they have no effect in emerging markets.

Alfaro (2005) confirms that fixed exchange rate is effective in restraining inflation, although she argues that the effects only present in a short run. Alfaro uses *de facto* classification of exchange rate regimes by Reinhart and Rogoff (2004) as a robustness check for her *de jure* classification. However, Reinhart and Rogoff's classification fails to distinguish between hard and soft fixes, which as mentioned previously are different in incentive and constraint structures, and thus are more likely to have different effects on inflation. Moreover, she groups developed and developing countries together.

B. *Fiscal Discipline*

The recent empirical literature examining the relationship between exchange rate regimes and fiscal discipline effects seems to agree that the conventional idea that pegged exchange rates would increase discipline effects is incorrect. The most notable study on the subject by Tornell and Velasco (1998, 2000) concludes that fiscal deficits tend to be larger under fixed exchange rate regimes, because fixed exchange rate regimes tend to lower a country's fiscal discipline. Although Tornell and Velasco use the term "fixed" exchange rate regimes, the authors do not make a distinction between hard and soft fixes.

The Tornell and Velasco study is consistent with Bird's (1998) survey and Willett's (2001) discussion, both of which conclude that pegged exchange rate regimes may lower a country's fiscal discipline, as the pegged exchange rates make it easier for a country to finance its deficit. On the other hand, Heinemann (1999), using a slightly different dataset, concludes that the exchange rate regime does not affect the fiscal budget balance on average. Edwards (2003), focusing on dollarization countries, also concludes that there is no difference in fiscal behavior between dollarization countries and non-dollarization countries.

Although none of these studies finds positive discipline effects of a pegged exchange rate regime, differences still exist between their results, which require further exploration. Some find that an exchange rate choice has no effect on a country's discipline, others say a peg actually reduces the discipline.[4] It is crucial, therefore, to determine under which conditions these different conclusions hold, for only when those conditions are identified can useful policy implications be drawn.

C. *Endogeneity*

When studying discipline effects, the main issue commonly raised is the "endogeneity issue," or in econometrically correct terms, "reverse causality." Rather than exchange rate regimes leading to particular fiscal or monetary policies, many argue that the causation runs from fiscal or monetary policies to exchange rate regimes. In the past, most studies on discipline effects that are aware of the "endogeneity" issue opt to study the Sub-Saharan region because the countries in this region belong to the Franc zone for political rather than economic reasons, thus eliminating the possibility of exchange rate

[4] See Table 1 for a list of relevant studies and their findings.

regime choice being endogenous to countries' fiscal policies. However, this approach to the issue has major a drawback, as it severely limits the sample size and the results obtained could suffer greatly from simple selection bias. Another more problematic type of endogeneity occurs when a country has such a high inflation rate that it cannot sustain any other regime except floating rate. Chapter 4 explains how this study deals with the endogeneity issue.

Relevant studies on exchange rate regime and discipline performance are summarized in Table 1.

TABLE 1. Effects of Exchange Rate Regimes on Economic Performance

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Alfaro (2005) 130 countries, 1973 – 1998.	- Inflation Measured by changes in the GDP deflator. Also used CPI for robustness check	- Openness - GDP per capita - Fiscal Deficit or Government Debt - Exchange rate regime Exchange rate regime is 2 if fixed, 1 if intermediate, and 0 if floating	▪ In the SR, exchange rate is better than openness in restraining inflation (negative and strong relationship between inflation and fixed ER), o Reflecting the greater observability, accountability, and transparency of ER over openness o Consistent with literature on dynamic inconsistency problems o G that decides to pursue an inflationary policy risks undermining the viability of the fixed ER regime, which can constrain its intentions. ▪ Empirically, in the ST, openness fails to work as a commitment mechanism, while exchange rate regime is an important tool in determining the benefits of surprise inflation	▪ Kudos for realizing the difference between constraint vs. incentive effects (though the discussion is not explicit) ▪ The sample includes both developed and developing countries; however, Alfaro does not distinguish between the two. ▪ Use *de jure* classification of exchange rate regimes. Also use *de facto* classification by Reinhart and Rogoff (2004) – 0 for RR's managed floats, free floats, and free falling; 1 for RR's crawling pegs; 0 for RR's fixed regimes (RR does not distinguish between hard and soft fixes) ▪ Alfaro clearly notes that her finding is not to say that a peg that is inconsistent with fiscal and monetary policies would achieve low, long-term, sustainable inflation.
Edwards (2003) * 11 Dollarization countries vs. control groups, 1970 - 1998	- Fiscal deficit - Inflation - GDP per capita growth - Current account - Investment - Term of Trade		▪ There is evidence that dollarized countries as a group have a statistically grown at a significantly lower rate than nondollarized nations ▪ Dollarized countries have experienced a significantly lower rate of π ▪ There is NO evidence that dollarized countries have run more prudent fiscal policies than non-dollarized nations ▪ In terms of current a/c balances, dollarized nations' behavior has been no different from that of non-dollarized ones	▪ Two comparison groups: (1) all emerging and advance countries & (2) all emerging countries, both excluding $' and CB regimes ▪ No horse race between dollarized countries and specific alternative regimes ▪ Test for the equality of means and medians (including nonparametric Kruskal-Wallis χ^2 test on equality of distribution.

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Fatás and Rose (2001) * study the extreme monetary regimes (currency board and currency union) 206 countries, 1960 – 1998	Fiscal policy: 1. Total expenditure 2. Current revenue 3. Overall budget surplus 4. General government consumption 5. Tax revenue * 1 & 2 measure size of government	Extreme ER regime dummies ▪ Unilateral CU ▪ Multilateral CU ▪ CB Control variables: Panel I: 1. ln (Real GDPPC) 2. log (trade as % of GDP) → openness Panel II (+) 3. log (population) 4. land area 5. urbanization rate 6. dependency rate	▪ Belonging to an int'l common currency area is not associated with fiscal discipline; if anything, spending and taxes are higher inside currency union. ▪ This effect is especially pronounced for dollarization countries that unilaterally adopt the currency of another country. ▪ Currency boards are associated with fiscal restraint (smaller G). ▪ While currency boards and multilateral currency unions are characterized by restrictive and conservative fiscal polices, unilateral currency unions are not.	▪ *I* couldn't find the source of their exchange rate regime classification ▪ OLS; the panel is split into three parts: - No time effect - Allow for time effect - Include only 'extreme monetary regimes' and fixed ER observation ▪ More sensitivity analyses: - Add a control for OECD - Add country-fixed effects - Add currency dummies*openness ▪ Endogeneity: "Some countries have experienced episodes of hyperinflation associated with loose fiscal policy that in turn led toward tighter monetary regimes." (p.41). The case of currency boards, rather than unilateral currency unions. → Acknowledge but do not deal with the issue; suggests readers to view the results as correlations rather than causal statements.
Frieden, Ghezzi and Stein (2000) Latin American and Caribbean countries, 1960 – 1994	- RER overvaluation - Inflation	- (Apply simple correlation)	▪ The fixed and forward-looking regimes, have produced, on average, both appreciated and appreciating real exchange rates. ▪ The forward-looking pegs and bands are the regimes associated w/ the most appreciated rate, followed by the fixed regimes ▪ The fixed regime, in turn, is associated w/ the lowest average inflation. This should not be surprising, as the forward-looking is usually implemented only when inflation is high enough that a peg would not be sustained.	▪ Use info provided in IMF's *Exchange Arrangements and Exchange Rate Restrictions* to classify regimes into 9 cats, which are regrouped into 4 main cat: fixed, forward-looking crawls/bands, floating, and backward-looking crawls/bands. ▪ Only conduct simple correlation between exchange rate regimes and variables of interest; (the paper actually studies what determine the choice of exchange rate regimes).

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Ghosh et al. (2002) *Almost* all IMF-reporting countries; start year varies country by country.	- Inflation - Growth	○ Two ER regime dummies ○ real GDP growth ○ money growth* ○ Trade openness ○ Central bank independence ○ TOT shock ○ Fiscal balance Simultaneous eq: Add the following variables for identification purpose ○ country size (population) ○ export concentration	▪ Before control for endogeneity issue (*def. II*): Using *de jure* classification: inflation under floats is 10.5% and 13.5% per year higher than under pegs and under intermediate regimes respectively. Using consensus classification, the difference in inflation between pegs and floats is twice as large (21% per year). ▪ Control for 'endogeneity' (grouping intermediate & float together); inflation differentials: *De jure*: 11.7 (OLS) → 7.2% Consensus: 13.5 (OLS) → 9.8% (They conclude that the benefit of pegged regimes for lowering inflation remains both economically and statistically significant)	▪ Use *de jure* and 'consensus' ER classification ▪ First: 3-way (Peg, Intermediate, & Float) ▪ Then: 6-way classification (hard pegs, single currency pegs, basket pegs, rule-based flexible, floats w/ discretionary intervention, & pure floats) ▪ Run various regressions by dividing countries into different sub-samples ▪ 'Endogeneity': 1. The possibility that money growth itself is endogenous to the ER regime (use 2SLS) 2. The decision to adopt a specific regime depends on a variety of factors (simultaneity bias – use 'simultaneous equation' framework)
Heinemann (1999) 20 OECD countries, 1970 – 1997	Primary deficit	Main *variables:* 1. ER regime 2. G durability - Election or cabinet reshuffle (instability) - A dummy for a significant Δ in G ideology (major political Δ) 3. Type of G - Coalition vs. Multiparty *Control* variables: 1. Growth 2. Unemployment 3. Openness 4. Maastricht var 5. Dummy for 90s 6. K controls 7. ER crisis indicator	▪ ER regime is not relevant for the fiscal balance (*) ▪ The higher the instability, the higher the deficit	▪ Focus on the fiscal discipline with respect to EMU ▪ Include political/institutional factors ▪ Create ER dummies from *Exchange Arrangements and Exchange Rate Restrictions*; three-category: fixed, limited flexibility, & more flexibility ▪ Dynamic fixed effect (least squares w/ White heterogeneity) ▪ Do not deal with endogeneity issue; only mention the potential of the issue in the conclusion → He notes that the main result (*) may due to the fact that the ER regime variables might not be differentiated enough and that there is a potential endogeneity of this variable.

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Husain, Mody, and Rogoff (2004) and Rogoff et al. (2003) * distinguishing b/t developing, emerging, and advanced countries All IMF-reporting countries, 1970 – 1999	inflation (scaled CPI inflation; p/(1+p)) - (RER volatility) - growth - growth volatility	○ Four ER regime dummies 1. limited flexibility 2. managed floating 3. free floating 4. free falling (pegs is the base regime) ○ money growth ○ real GDP growth ○ Trade openness ○ Terms of Trade growth ○ Government balance (% of GDP) ○ Central bank turnover rate	▪ *Developing countries* w/ little exposure to int'l K mkts, pegs are notable for their durability & their relatively LOW inflation rate ▪ *Advanced economy* – floats are distinctly more durable & also appear to be associated w/ higher growth and somewhat lower inflation rate ▪ *Emerging mkts*: the Baxter & Stockham classic ER neutrality result. Inflation tends to be lower in regimes with harder commitment to ER stability relative to floating, though pegs are the least durable and expose countries to higher risk of crisis RER are more variable, the greater the flexibility of the regime	▪ Use *de jure* classification from Ghosh et al. (2003) – three categories, and *de facto* classification from Reinhart and Rogoff (2004): pegged, limited flexibility, managed floating, intermediate, free floating, & free falling. ▪ OLS (?) – Compare country fixed and no country fixed effects ▪ 'Endogeneity': The possibility of economic performance affecting the choice of exchange rate regimes (p.24-5) ➔ Include two-year lagged regime variable in one regression and conclude that the results do not change.
Levy-Yeyati and Sturzennegger (2001) * distinguishing b/t non-industrial and industrial economies 154 countries, 1974 – 1999	- inflation - nominal money growth - real interest rates (costs of capital) - growth	*For inflation equation:* ○ ΔM2 ○ ΔReal GDP ○ Nominal int. ○ π(-1) ○ Two ER regime dummies ○ Three regional dummies *For money growth equation:* ○ ΔReal GDP(-1) ○ Fiscal surplus/GDP ○ ΔM2(-1) ○ Two ER regime dummies ○ Three regional dummies *Endogeneity issue:* ER Regime index on ○ All of the variables included in π eq, incl. π, & ○ Domestic credit/GDP ○ GDP/USGDP ○ Quasi M/Narrow Money	▪ For non-industrial economies, "long" pegs (defined as those lasting for 5 yrs or more consecutive yr) are associated w/ lower inflation than floats, but at the cost of an inferior growth performance. ▪ A similar tradeoff b/t inflation & growth is still present in the case of "hard" pegs (economies w/ currency boards or w/o separate legal tender), whose growth performance, as opposed to what is often suggested, does not differ significantly from that of conventional pegs. ▪ In contrast, "short" pegs clearly underperform floats, as they grow slower w/o providing any gains in terms of inflation	▪ Use LYS as well as IMF classification of exchange rate regimes; *de jure* and *de facto*; not detailed classification – fixed, intermediate, and float ▪ Distinguish between short and long pegs ▪ The differences in inflation performance are found only when exclude high inflation countries (π >50%) ▪ No political considerations ▪ Very limited number of control variables. ▪ π(-1) to capture for the effects of past policies on current expectations & to control for the possibility of backward-looking indexation ▪ "Endogeneity" – when level of inflation affects a choice of exchange rate regime (p.72) ▪ Use Generalized 2SIV estimator (p.95-6) ▪ Include time-fixed effect

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Tornell and Velasco (1998) or * 13 Latin American countries, 1968 – 1995.	Fiscal Balance (FB) 1. Nominal 2. Primary 3. Cyclical adjusted nominal 4. Cyclical adjusted primary Dependent Var: Δ (FB/GDP)	○ Dummy taking value of one if a country adopted money-based stabilization ○ log (ΔTOT) ○ Δ in US 3-mo. T-bill int. rate ○ lagged level of fiscal balance to GDP ratio	▪ In all cases, fiscal balance improvement is greater under money based programs ▪ The link is also found in Gavin and Perotti (1997): fiscal deficits tended to be larger under fixed ER	▪ No exchange rate regimes; just whether a country adopted money-based program or not. ▪ Provide theoretical model ▪ Use OLS ▪ Have different definitions of "changes" of fiscal balance, i.e. (t, t+1), (t-1, t+1), etc. ▪ *Do not* mention endogeneity issue
Tornell and Velasco (2000) * sub-Saharan countries, 1980 – 1987.	Fiscal Balance (FB) 1. Nominal 2. Primary 3. Cyclical adjusted nominal 4. Cyclical adjusted primary Dependent Var: Δ (FB/GDP)	○ PERS Dummy ○ Base year debt ○ Δ%TOT ○ Base year GNP	▪ In the short run, PERS deliver lower inflation than FERS, but also induce less fiscal discipline ▪ Similar to those from Tonell & Velasco ('98)	▪ Very similar to Tonell & Velasco ('98) ▪ Two alternative exchange rate arrangements: Predetermined Exchange Rates (PERS) and Flexible Exchange Rates (FERS) ▪ Provide theoretical model ▪ "Endogeneity" of exchange rate regimes➔ Sub-Saharan region belongs to the Franc zone for political rather than economic reasons, eliminating the possibility of ER regime choice being endogenous to countries' fiscal policies ▪ OLS, cross-country regressions for different time periods
Vuletin (2003) 83 countries (21 OECD and 62 non-OECD), 1974 – 1998	1. Total deficits 2. Primary deficits 3. Total expenditure 4. Primary expenditure 5. Fiscal revenue	○ Several exchange-rate classifications* ○ Shock in trade terms ○ GDP per capita ○ Openness ○ Inflation rate ○ Dummy for hyperinflation	Regimes' influence on fiscal performance depend on: - The int'l context: ▪ the possibility of indebtedness ▪ the characteristics of the int'l finance system-integration ▪ volatility ▪ dominant financial structure - Credit availability - The conditions or potential sanctioning of the finance system	▪ Generalized Method of Moment (GMM) – dynamic panel data, but also compared the method to OLS, Fixed Effects, and GLS ▪ ER classifications: 1. *De jure*: fixed, intermediate, flexible 2. *De jure*: long peg, short peg, intermediate, & flexible 3. Combination of IMF's *de jure* & LYS' *de facto* classification: 8 categories.

Chapter 4. Empirical Results on Monetary and Fiscal Discipline

4.1. Data and Empirical Model

The sample for this study, with annual data from 1990 to 2003, includes 63 countries and covers 27 emerging economies and 36 developing countries, as shown in Table 1. The start and the end year were chosen based on the availability of the main explanatory variable, which in this case is the exchange rate regime. Distinguishing between emerging and developing countries contributes to the literature since most, if not all, studies on the subject do not do so — they only distinguish between industrial and non-industrial countries. It is more than likely that the discipline effects of an exchange regime would be different between under emerging or developing economies. This is because these two types of countries are different not only in their class of institutions, but also in their degrees of capital mobility. Thus, results from previous studies could very well be misleading.

The empirical approach used in this study is the Generalized Method of Moments (GMM), a method found by Vuletin (2003) to be superior to other econometric methods including Fixed Effects and Generalized Least Squares. The GMM method better deals with the endogeneity issue where there is a possibility that the choice of exchange rate regimes is dependent on a country's fiscal and monetary policies.

In addition to its ability to deal with "reverse causality," GMM also more effectively deals with panel data where the presence of the country's fixed effects must be controlled for, as well as with the inertia behavior of the dependent variable, which in

this case, is fiscal and monetary performance. The details of the methodology are described further in the Appendix 1.

4.1.1. Dependent Variables: "The Discipline"

The main measure for "fiscal discipline" used here is the cyclically adjusted fiscal balance (CAB). Even though the best measure would be the cyclically adjusted *primary* fiscal balance, this variable is not readily available because not all countries report interest payment. This is particularly true for developing countries. Fortunately, according to Tornell and Velasco (1998), this can be dealt with by including changes in the U.S. 3-month T-bill interest rate as one of the economic control variables since the interest rate should control for the changes in the debt service.

As for "monetary discipline," one of the measures is the *growth rates of monetary aggregates*. Since concern with money growth is primarily focused on its effects on *inflation*, the latter is also used as a dependent variable.

To minimize the econometric problems of the overall validity of the instruments and serial-correlation, an additional lag is added to each right-hand-side variable. This means that there are two lags (t-1 and t-2) of the fiscal discipline measure included as the control variables. This is due to the persistent nature of fiscal balance. The adjustment of fiscal policy is likely to be incomplete because of technical or institutional rigidities, inertia, cost of change, or other such factors. Moreover, according to Greene (2003), it is expected that there may be long lags between policy changes and their impacts. In our case, this would be exchange rate regimes and fiscal balance. In addition, governments may respond not only to current values of the explanatory variables but to past values as well. This applies to monetary discipline studies; however, since monetary performance

is less persistent in nature, this paper also tries including only one lag of monetary performance. The best specifications for monetary discipline found are one lag for money growth and two lags for inflation rate.

4.1.2 Explanatory Variables

The explanatory variables can be sorted into two main categories. The first and most important one for this study is exchange rate regime. Here we use *de facto* exchange rate regimes classified by Bubula and Ötker-Robe (2002), and modified by Angkinand, Chiu, and Willett (2005). Most previous studies use *de jure* classification, and while more recent studies use coarse *de facto* classifications, they only classify exchange rate regimes into fixed, intermediate, or flexible rate categories. However, there are different degrees of flexibility in the intermediate regimes, and they could lead to different discipline effects. Therefore, types of the exchange rate regimes are broken down into the following:

1. Hard pegs (dollarization, currency board, currency union)
2. Soft pegs (conventional fixed to a single or basket of currencies)
3. Forward-looking crawls (pegs and bands)
4. Backward-looking crawls (pegs and bands)
5. Managed floats (tightly managed floats)
6. Floats (other managed floats and independently floating regimes)[1]

[1] Floating regimes are used here as a default regime, which is omitted from the regression in order to avoid the multi-collinearity problem. For robustness check, the regressions are also run using hard pegs as a default regime. The results largely remain the same. The regression results are not reported here but available upon request. One area that appears to be ambiguous pertains to the results of the emerging-market country sample, which is more than likely due to the limited number of observations of hard pegs category. For the emerging-market country sample, hard pegs are always dropped out when floats are used as a default regime. Stata automatically does so to avoid the collinearity problem. However, when hard pegs are chosen as a default regime, either forward-looking crawls or adjustable pegs is dropped by Stata, depending on specifications. This makes the discipline analysis for emerging-market sample relatively difficult.

The "crawls" category is separated into forward- and backward-looking crawls because forward-looking crawls, especially crawling pegs, are often used as nominal anchors to stabilize inflation. They are commonly referred to as "tablitas" in the literature in reference to Latin American exchange rate policies, and they have the benefit of having credibility as their main feature. Backward-looking crawls, on the other hand, tend toward regimes with more flexibility. Therefore, grouping forward- and backward-looking crawls together might not be appropriate since doing so clearly limits the amount of information obtainable from the analyses.

The second category of variables is the economic control variables, which include:

1. Openness
2. Terms of trade
3. Real GDP growth
4. Change in US 3-month T-bill interest rate
5. The ratio of fiscal balance to GDP (when studying monetary discipline)
6. Inflation rate (when studying fiscal discipline)
7. Currency crisis indicator (the idea is that crisis may be a precondition for free correction)

The economic control variables are included to minimize the omitted variable bias. Their justifications are provided in Appendix 2.

Political Variables

In the next stage, political variables are added into the analysis. The following two measures represent how politically stable a country is:

1. Government stability (STAB)

Taken from the *International Country Risk Guide* (ICRG), this measure is defined as a government's ability to carry out its declared program as well as its ability to stay in office. The risk-rating of government stability is the sum of three subcomponents:

a. Government unity
b. Legislative strength
c. Popular support

Each subcomponent has a maximum score of four points and a minimum score of zero points. Four represents very low risk and zero, a very high risk. Hence, the index ranges from zero to 12. The higher the number a government scores, the lower the risk, and thus the higher the government strength.

2. Divided government (ALLHOUSE)

From the World Bank's *Database of Political Institutions* (DPI), this variable helps determine whether the party controlling the executive branch has an absolute majority in the houses with lawmaking powers (Beck et al. 2001). Chiu and Willett (2006) create a dummy variable that captures this distinction between unified and divided government. It takes the value of 1 when the government is unified, and 0 otherwise. A government is said to be divided when the party of the president does not control the legislature in a presidential system, or when there is a coalition government in a parliamentary system.

The idea behind these variables is that the higher the instability, both political and social, and the higher the corruption, the lower the discipline. This is because with high instability, government officials may anticipate the unlikelihood of staying in office for a long period of time, and thus create high deficits they are more likely to finance with money creation.

This process is more likely in a country with a pegged exchange rate regime since the pegged regime makes it easier for the country to finance the deficits. The costs of the deficits under a pegged exchange rate regime come much later, possibly when these officials are no longer in office. This suggests the possibility of a complex interaction of exchange rate regime choice and a type of governments. The interaction between the exchange rate regime and government strength can help test the hypothesis that a strong government may be able to utilize soft pegs more effectively than a weak government. Without the interaction terms, the regression is imposed so that the increase in discipline for adopting a certain type of exchange rate regime is the same for both weak and strong government. Therefore, this study not only separately examines the discipline effects of exchange rate regimes and the political factors, but also tests for the possibility of their interaction effects.

When political consideration is taken into account, a time-inconsistency problem is also controlled for. Time-inconsistency problems happen when government officials with short-term horizons pursue expansionary macroeconomic policies to gain short-term benefits at the expense of the significant long-run costs. For example, when an election is coming up that could remove them from power, they will focus on winning the election. This is controlled for by adding the election dummy into the specification.

3. Elections

Also from DPI, the election dummy is coded as 1 when there was an election in either the legislative or executive branch and 0 otherwise.

4.2. The Results

4.2.1. A First Pass at the Data

The descriptive statistics shown in Table 2 tell us that hard pegs are generally associated with the highest discipline, both fiscal and monetary. They also show the importance of distinguishing between emerging and developing countries. For fiscal performance, hard pegs appear to be associated with the smallest fiscal deficits for developing countries, while in emerging economies, managed floats tend to be associated with the smallest deficits. On the other end of the scale, forward-looking crawls are linked to the worst fiscal performance for both emerging and developing countries; this holds for both cyclically adjusted and unadjusted budget balances.

For monetary performance, with the exception of money growth in emerging economies, hard pegs are generally found to be linked to both the lowest money growth rate and the lowest inflation rate; floats are found to be on the other extreme. While adjustable pegs appear to be linked to the lowest money growth rate in emerging economies, forward-looking crawls are associated with the highest money growth rate.

However, looking at the mean of these performance variables can be misleading since there are outliers that could bias the results. When the median is examined, the hard pegs are again associated with the best monetary performance, though forward-looking crawls are now associated with both the highest money growth and inflation rate in emerging economies, and backward-looking crawls in developing countries.

Regressions shown in Tables 3A and 3B are included for comparison to previous studies that merely look at the effect of exchange rate regimes on the discipline effect without taking other factors into consideration. Similar to the descriptive statistics shown

in Table 2, these results show the average relationship between the exchange rate regimes and the discipline effects without taking into account other factors that may affect a country's discipline, and thus may subject to omitted variable bias. In these basic OLS regressions, this study applies coefficient equality tests and finds hypotheses that all exchange rate regimes are equal in affecting a country's discipline can be rejected in all cases, except in the analysis of money growth rate for developing country sample.

Unfortunately, this simple examination of descriptive statistics or basic OLS regressions, which consider only exchange rate regimes, are insufficient since there are various factors that could affect the discipline effects. Therefore, as done in the next section, it is necessary to take into account economic and political factors and examine the discipline effects of alternative exchange rate regimes. First, the focus is on exchange rate regimes and the economic control variable specification. Then the focus is expanded to include political factors, and finally interaction terms.

4.2.2. Regression results – without political considerations

This discussion starts with results from the monetary discipline study since they are more clear cut compared to those of the fiscal discipline study. Specifications are run with two different samples. The first set contains only emerging economies, while the second includes only developing countries. The pooled results, which include both emerging-market and developing countries samples, demonstrate that previous studies that fail to distinguish between the two can be misleading. Moreover, two crisis indices created by using different standard deviation criteria are used alternatively in these regressions as a robustness check. Tables 4 – 7 report the regression results.

The previous studies on the subject may have been misleading since they focus only on the current period exchange rate regimes. The effects of adopting one exchange rate regime may not happen immediately; therefore, the study of the effect of exchange rate regime should also take the last period's regime into account as well. However, since exchange rate regimes do not change that frequently, including both can lead to a collinearity problem, hence only the last period's exchange rate regime is included in the specification.[2]

In addition, previous studies that fail to distinguish between emerging and developing countries are likely to be misleading as well. To be discussed in details in a later section, the results of this study show that emerging economies and developing countries behave significantly different from each other, as the effects of a particular type of exchange rate regime could have opposing signs for emerging and developing economies. The choice of the criterion for creating the crisis index — two- versus three-standard deviations — does not affect the results of the discipline effects of alternative exchange rate regimes.

In each specification, coefficient equality tests are applied. The first test indicates whether *all* the exchange rate regimes are the same in affecting a country's discipline. The second test shows whether a pair of exchange rate regimes are identical in terms of their discipline effects. There are four different pairs of interest. The first pair is the regimes at the opposite ends of the spectrum: hard pegs and floats. The second pair is hard pegs versus adjustable pegs. Since these two are often lumped together as one

[2] For the same reason, the time t crisis index is also dropped. Moreover, when examining money growth as a proxy for monetary discipline, the study also drops the two-period (t-2) lag of money growth from the right-hand-side, since in contrast to fiscal variable and inflation, money growth is not as persistent in nature. The results stay generally the same when the two-period lagged money growth is included; most if not all the coefficients of the variable are found to be statistically insignificant.

regime, it would be worth testing if it is appropriate to do so or not. The third is adjustable pegs and forward-looking crawling pegs and bands. These two are often grouped together as an intermediate regime in a three-way classification, but again they may not be the same analytically. The last pair is forward- and backward-looking crawling pegs and bands. These two are usually grouped together in a 'crawling pegs and crawling bands' category; however they are fairly different from each other. Forward-looking crawls are closer to a fixed exchange rate regime spectrum, while backward-looking crawls are closer to a flexible end.

i. Monetary Discipline

For the monetary discipline aspect of this study, the interest is in both money growth and inflation, as one mirrors the other. The results for the *developing countries* sample group are clear in which all other exchange rate regimes lead to higher money growth and inflation rates compared to when a country adopts a hard fix. An exception is the backward-looking crawling and managed float regimes, which are found to lower the money growth rate relative to when a country adopts a hard fix. However, the size of managed float coefficients are relatively close to that of hard fix, and thus it should not be assumed that managed floats are superior to hard fixes. On the other hand, floating regimes are associated with the worst monetary discipline. An 'endogeneity' problem, however, may play a role here. When a country has such a high inflation rate[3] that it

[3] The results of monetary discipline study could very well be driven by the extreme cases of hyperinflation. In previous specifications not reported here the hyperinflation dummy is included. Following Vuletin (2003), the threshold of inflation rate to create a hyperinflation dummy is 150 percent; this however could be too high. Thus the other choices for threshold are 100 and 120 percent. Frieden, Ghezzi, and Stein (2000) use 100 percent as the threshold for their hyperinflation dummy. The dummy works in this study's specification only when the inflation threshold is 100 percent. Including the dummy, which is economically and statistically significant, reduces the size of most coefficients of time *t* variables. When the threshold is

cannot sustain any other regime except floating rates, this type of endogeneity problem is unlikely to be solved by using GMM or a single-period lag of the exchange rate regime dummy.[4]

As for coefficient equality tests, we reject the null hypotheses that all the regimes are equal at 1 percent significance level for both money growth and inflation rate regressions. However, when looking at pairwise comparison, the results for money growth and the inflation rate are relatively different from each other. For example, while we fail to reject the null that hard pegs and adjustable pegs are the same in affecting money growth, we reject the same hypothesis for inflation rate at the 1 percent significance level. Also, while we reject the null that forward- and backward-looking crawls, and backward-looking crawls and managed floats, are the same for money growth at 5 and 10 percent significance level respectively, we fail to reject these hypotheses for inflation rate. In both cases, we fail to reject the hypothesis that forward-looking crawls and adjustable pegs are the same.

For *emerging economies*, all regimes except managed floats and adjustable pegs lead to higher money growth, and thus lower monetary discipline, compared to the floating regimes.[5] However, most of these coefficients are found to be statistically insignificant. When inflation is examined, results are fairly different from when money

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higher – 120 and 150 percent – the dummy is automatically dropped out of the regression due to collinearity. Therefore, the study also tries to exclude hyperinflation observations and examine effects of exchange rate regimes at a more stable period. Excluding the hyperinflation observations when the threshold is 100 percent does not lead to very different results from those when the inflation dummy is included. However, when the threshold is increased to 120 or 150 percent, the results are identical to those when hyperinflation episodes are not excluded at all. This could mean that severe hyperinflation incidents do not have much of an effect on either M2 growth or inflation, but it may be due to the fact that there are not as many hyperinflation cases.

[4] Reinhart and Rogoff's (2004) "free-falling" category should help alleviate this type of endogeneity. However, the results pertaining to alternative exchange rate regimes, especially floating rates, should be interpreted with caution.

[5] Hard pegs are automatically dropped from the regressions by Stata to avoid the collinearity problem.

growth is examined. With inflation, all other regimes are found to be inferior to backward-looking crawls in delivering the lowest inflation rate. The evidence nonetheless shows that adjustable pegs do not lead to higher monetary discipline in terms of lowering a country's inflation rate, and backward-looking crawls are associated with the best inflation performance. Except for the adjustable pegs and backward-looking crawls categories, none of the exchange rate regimes are found to be statistically significance. Interestingly, though money growth and inflation rate are often said to mirror each other, the coefficient equality tests show otherwise. While we fail to reject the null hypothesis that all the regimes are equivalent in money growth case, we reject the same hypothesis for inflation rate analysis. Hard pegs and adjustable pegs are found to be the same, as well as backward-looking crawls and managed floats in affecting a country's money growth – this is in contrast to the inflation rate results.

ii. Fiscal Discipline

For developing countries, adjustable pegs are found to be associated with the worst fiscal discipline, while floats are associated with the smallest deficits.[6] Applying coefficient equality tests, we reject the null hypothesis that all the exchange rate regimes are equal. Looking at a pair level, we fail to reject that the pairs – hard pegs and adjustable pegs, forward-looking crawls and adjustable pegs, and backward-looking crawls and managed floats – are the same in delivering a country's fiscal discipline. However, we can reject the hypothesis that forward-looking crawls and backward-

[6] Interestingly, the size of the regime coefficients as well as their statistical significance lowered when two-standard deviation crisis index is replaced by the three-standard deviation index. This is not the case when nominal fiscal balance is used, as shown in Table 7. When cyclically unadjusted fiscal balance is examined, backward-looking crawls and floats are found to be the most effective in delivering a 'fiscal' discipline, while hard pegs are found to be the least effective. This result contradicts most studies on the subject.

looking crawls are the same at 5 percent significance level.

Compared to the results of developing country sample, the regime coefficients for emerging-market sample are significantly smaller, where adjustable pegs and forward-looking crawls are found to be the most and least effective regime in delivering a fiscal discipline respectively.[7] Note that it cannot be unambiguously inferred about hard pegs and its discipline effects in emerging-market economies due to its limited number of observations and consequent exclusion from the sample by Stata to avoid collinearity problem. When the default regime is hard pegs, results for emerging economies are sensitive to the choice of exchange rate regime being dropped from the regression due to a plausible collinearity problem. When forward-looking crawls are dropped, adjustable pegs are found to have the highest discipline effect. Managed floats, floats, and backward-looking crawls are all better than hard pegs in disciplining a country's fiscal balance. This finding is odd in that it contradicts to conventional wisdom that hard pegs are the most effective regime in delivering discipline. However, this is not the case if adjustable pegs are the regime that is dropped from the specification. In this instance, hard pegs are the exchange rate regime with the best fiscal discipline effect, while forward-looking crawls result in the worst effect. This mixed result suggests that there is no clear evidence that the choice of exchange rate regime affects fiscal discipline, and thus a country should be wary of adopting an exchange rate regime in hope of imposing discipline on its fiscal policy.

It may be a concern that real GDP growth, included as one of the economic control variables, is correlated to Cyclically Adjusted Balance (CAB; the dependent

[7] In contrast, when nominal fiscal balance is examined, we find that adjustable pegs are the least effective in delivering 'fiscal' discipline. Which regime is the most effective depends on the crisis index used.

variable) both at time *t* and in their lags. However, the results largely remain the same when the real GDP growth (as well as its lag) are dropped from the regression.[8] Table 7 shows the fiscal discipline results when cyclically unadjusted fiscal balance is used.

4.2.3. Regression results – with political considerations

Taking political factors into account does not significantly affect the results of economic control variables. As with the previous section, choice of crisis index does not affect the variables of interest, which are exchange rate regimes, political factors and their interaction terms. Each of following discussions consists of two main specifications – one with and the other without the interaction terms. In specifications with interaction terms, hard pegs are also used as a default regime for comparison. However, the following discussion focuses on the floating regime as a default. The regression results of this section are shown in Tables 8 – 11.

i. Monetary Discipline

When examining monetary discipline via a country's money growth, adding political factors, such as the government's strength (*STAB*) or its type (*ALLHOUSE*), does not affect the results of exchange rate regimes' discipline performance in emerging-market country sample. This is not the case with developing country sample, where the coefficient sizes of the exchange rate regimes are largely increased when the political factors are taken into consideration. However, the percentage changes of the exchange rate regimes' coefficients may not be significantly different between emerging-market and developing countries, since the coefficient size in the latter is larger than in the

[8] The results of this specification are not reported in the tables but are available upon request.

former.

Both *STAB* and *ALLHOUSE* are found to be negative; in other words, higher political stability leads to higher monetary discipline.[9] Last year's election is found to increase this year's money growth rate in emerging-market countries, while lowering the rate in developing countries. This finding for developing country sample that money growth slows after the election is consistent with political business cycle (PBC) theory. The different results between emerging-market and developing country sample may be due to the fact that developing countries tend to be less stable and have more poverty, resulting in more reasons for voters to not reelect the government. Thus, the stakes are higher for governments in developing countries and, therefore, there is more incentive for them to play the PBC. In addition, the higher degree of capital mobility in emerging-market economies possibly inhabits their governments from boosting their economy for the election, and hence its statistical insignificance.

Next, we look at the results when interaction terms are included (Tables 4c – 4d). Adding the interaction terms largely affects the exchange rate regime coefficients. However, the direction and size of changes vary depending on which political factor and type of country are being examined. For example, in emerging-market economies, adding interaction terms of a government's strength (*STAB*) increases the size of exchange rate regime coefficients dramatically, while adding the interaction terms of type of government (*ALLHOUSE*) lowers them. The absolute changes in the former are, however, larger than those of the latter. Both political results in emerging-market sample maintain that political stability and unified government are associated with lower money

[9] This is not the case with a government's strength in the developing country sample, although this is not statistically significant.

growth. However, the interaction terms results are different from *STAB* to *ALLHOUSE*. In emerging-market economies with strong government (*STAB*), all exchange rate regimes lower money growth relative to floating regimes. In other words, all exchange rate regimes provide lesser monetary discipline than floats when a country is under a weak government. Examining the total effects, hard pegs under strong governments appear to be the most effective regime in delivering a monetary discipline in emerging-market economy sample. With a unified government, hard pegs are found to be associated with higher money growth, and hence lower monetary discipline, while backward-looking crawling pegs and bands appear to be the most effective exchange rate regime to provide monetary discipline.

In developing country sample, adding the interaction terms of either *STAB* or *ALLHOUSE* increases the coefficients of exchange rate regimes, but in the former the exchange rate regimes lose their statistical significance. In contrast to emerging-market economy results, strong government (either defined as one that is unified or has less political risk) leads to higher money growth. Examining the interaction effects, high stability strengthens the effectiveness of exchange rate regimes in providing monetary discipline. Determining which exchange rate regime is the most effective depends on how politically stable the economy is. In developing countries, under unified governments, hard pegs appear to be the most effective regime in delivering monetary discipline.[10] Elections are again found to matter relatively more in developing countries than emerging-market economies, according to their statistical significance. The results generally support the PBC theory.

[10] Due to its limited number of observations in developing country sample, when examining the interaction terms of *ALLHOUSE*, Stata automatically drops an interaction term between *ALLHOUSE* and a regime. In this case, it drops backward-looking crawling pegs and bands.

Tables 5a – 5d show the monetary discipline effects through inflation performance. With no interaction terms, adding the political variables does not affect the exchange rate regime coefficients by much, except the case of *ALLHOUSE* in developing countries. As with money growth results, stability and unified government lead to lower inflation rate in emerging-market economies. However, in the developing country sample, the two political variables are different. While unified government leads to lower inflation rate, higher stability leads to higher inflation rate in developing countries. Only in the case of the emerging-market economy sample are political factors found to be statistically significant. Elections do not appear to play a significant role in affecting a country's inflation rate in both country groups. In general, last year's election is found to be associated with a higher inflation rate today.

With interaction terms, adding *STAB* interaction terms increases the size of exchange rate regime coefficients, as well as their statistical significance in emerging-market economy, and decreases the exchange rate regime coefficients in the developing country sample. Likewise, adding *ALLHOUSE* interaction terms increases the coefficient size of exchange rate regimes in emerging-market economy, although the change is not nearly as much as the change in the *STAB* specification. The direction of change for developing country sample when *ALLHOUSE* interaction terms are added is less conclusive – some are increased, some are lowered. Political variable results become rather strange. High stability increases inflation rates in emerging-market economies, but lowers them in developing countries. In contrast, unified government leads to lower inflation rates in emerging-market economies, but higher inflation rates in developing countries.

Interaction term results for *STAB* and *ALLHOUSE* differ somewhat for emerging-market and developing countries (Table 5c – 5d). In the emerging-market sample, under a unified government, the results show that backward-looking crawling pegs and bands are the most effective in providing the lowest inflation rate. The results for stability depend on how politically stable the economy is. The higher the stability, the more likely the forward-looking crawling pegs and bands will be the most effective regime to deliver monetary discipline. Recall that the *STAB* variable is an index ranging from 0 to 12. To examine the total effects of an exchange rate regime (which consist of exchange rate regime effect, political stability effect, as well and the interacting effect), it is important to know where the economy is on the scale. For example, if a country's *STAB* (X) = 10, then adopting the forward-looking crawling pegs and bands would lead to 10 percent less inflation.[11] In contrast, the positive effect of the interaction terms of *STAB* in developing countries hardly offsets the negative effect of the exchange rate regime itself. In developing countries, hard pegs are found to be the most effective in delivering inflation performance under either strong or unified government.

This analysis shows that for developing countries, hard pegs in general are the most effective regime to provide monetary discipline via both money growth and inflation. Backward-looking crawling pegs and bands maybe a good alternative if governments are more concerned with money growth. Unfortunately, for emerging-market economies, the results are less clear cut.[12] Backward-looking crawling pegs and bands appear to associate with the best inflation performance in emerging-market

[11] Total effects of adopting a forward-looking crawling exchange rate regime under a given level of political stability = constant + FW regime coefficient + *STAB* coefficient + their interaction term coefficient = -0.48 + 33.851 + 0.238*X* -4.58*X*. If *X* = 10, then the total effects are -10.049.

[12] The fact that hard pegs being dropped by Stata due to limited number of hard pegs observations may play a role here.

economies. However, when political stability is high, forward-looking crawls may outperform backward-looking crawls in delivering a superior inflation performance. When examining a country's money growth, the results are more ambiguous. For example, adjustable pegs appear to be associated with the lowest money growth when there are no interaction terms. But when the interaction terms are included, hard pegs are the most effective monetary discipline tool under an environment of high political stability, while backward-looking crawls are the most effective under unified government.

ii. Fiscal Discipline

Regarding Cyclically Adjusted Balance (CAB) without interaction terms, the addition of political factors does not largely affect the fiscal performance of exchange rate regimes — there is only a slight decrease in the coefficient size. Political stability lowers fiscal discipline in emerging-market economies, while raising discipline in developing countries. On the other hand, unified governments raise fiscal discipline in emerging-market economies, but lower it in developing countries. Elections are not found to play a significant role in affecting CAB. The absolute size of the coefficient is smaller in emerging-market economies. This may signal that there is less tendency for governments in emerging-market economies to engage in the PBC game. However, for both country groups, last year's election is found to be associated with lower today's fiscal balance, or higher fiscal deficit.

With the addition of *STAB* interaction terms under extremely unstable environment, forward-looking crawling pegs appear to be the most effective fiscal

discipline tool in emerging-market economies sample. If stability is relatively high, adjustable pegs are the most effective. Emerging-market economy results are, however, sensitive to a choice of default regime, and hence the choice of another exchange rate regime Stata automatically drops. As shown in Table 6c, when hard pegs are the default regime, hard pegs are found to be the most effective exchange rate regime to provide fiscal discipline in emerging-market economies.

Without a unified government (*ALLHOUSE*), forward-looking crawling pegs and bands are associated with the worst fiscal performance in emerging-market economies. However, under a unified government, the regime could be one of the most effective regimes in providing fiscal discipline.[13] The other regime associated with better fiscal performance under a unified government is hard pegs.

In developing countries, adding *STAB* interaction terms to the specification significantly increases the size of the exchange rate regime coefficients in absolute terms. That is, when the interacting effects are being considered, the individual effects of exchange rate regimes are worsened. The result is opposite when adding *ALLHOUSE* interaction terms, where the exchange rate regimes' performance is improved, although the change is small. Examining total effects of exchange rate regimes under stable environments, higher stability helps alleviate the large negative effect of exchange rate regimes; however, since the negative effects of the exchange rate regimes are so large, the positive effects of interaction terms cannot fully offset the negative effects, and thus floating regimes are still associated with the best fiscal performance.

Results of interacting effects of *ALLHOUSE* and exchange rate regimes in

[13] The fiscal discipline of forward-looking crawling pegs and bands regime under a unified government is 0.904. Therefore, if a unified government in emerging-market economy adopts a forward-looking crawling peg or band, its fiscal balance may increase by 0.9 percent of GDP.

developing countries shows less of a pattern. Some interaction terms are positive, while some are negative. However, these interacting effects are relatively smaller than the individual effects of exchange rate regimes, and thus it remains that floating regimes are associated with the best fiscal performance. While hard pegs are found to be associated with the highest fiscal deficits when a government is divided, forward-looking crawling pegs and bands are found to be associated with the highest deficits when a government is unified.

Most results of political factors when there are no interaction terms are different from the results when interaction terms are added. For example, in emerging-market economies, stability is found to lower fiscal balance when interaction terms are excluded. However, stability is found to increase the fiscal balance when the interaction terms are included in the specifications. The same is true for the developing country sample because of the interacting effects being considered. Nevertheless, these political factors are in general not found to be statistically significant.

Tables 11a – 11d show results using cyclically unadjusted fiscal balance. As argued earlier, this nominal fiscal balance is not suitable to examine fiscal discipline effect because it tends to be subject to business cycles, and does not represent the relevant government's fiscal policy. These tables show that studies using this variable as a measure of fiscal discipline could be misleading since the results between the two variables are largely different from each other.

One main concern is related to econometric tests pertaining to the GMM method. For emerging economies, fiscal discipline regressions using CAB and monetary discipline regressions using inflation still fail the Sargan test of overall validity of the

instruments. Because GMM estimates are based on asymptotic theory, the test of the model could be biased in small samples. As this study looks at hundreds of observations and not thousands, this problem could very well arise, especially when a large number of instruments are used. Moreover, it is important to note that the low power of the test tends to over-reject the null in presence of heteroskedasticity. It could also be that the model presented here fits the developing countries better than emerging economies.

This chapter has examined the discipline effects of alternative exchange rate regimes. While hard pegs are an effective source of monetary discipline, this is not the case for fiscal discipline. Adjustable pegs are not found to be an effective source of either type of discipline. It is often argued that exchange rate regimes that lack fiscal and monetary discipline would lead to overvaluation, and hence currency crises. In the next chapter, the relationship between the exchange rate regimes and real exchange rates is examined.

Table 1. Country List

27 Emerging Economies	Argentina	Malaysia
	Brazil	Mexico
	Chile	Morocco
	China	Pakistan
	Colombia	Peru
	Czech Republic	Philippines
	Egypt	Poland
	Hong Kong	Russia
	Hungary	Singapore
	India	South Africa
	Indonesia	Thailand
	Israel	Turkey
	Jordan	Venezuela
	Korea	
36 Developing Economies	Algeria	Lithuania
	Bahrain	*Macedonia, FYR*
	Bangladesh	Nepal
	Belarus	Nigeria
	Bolivia	Panama
	Botswana	Paraguay
	Bulgaria	Romania
	Cameroon	Slovakia
	Costa Rica	*Slovenia*
	Côte d'Ivoire	Sri Lanka
	Ecuador	Syria
	El Salvador	Tanzania
	Estonia	Tunisia
	Ghana	Ukraine
	Kazakhstan	Uruguay
	Kenya	Vietnam
	Latvia	*Yemen, Republic of*
	Lebanon	Zimbabwe

* Emerging countries are those that are included in the Morgan Stanley Capital International (MSCI) index, but not identified as developed economies (Hong Kong and Singapore are the exceptions). Moreover, Taiwan, an emerging economy, is excluded from the sample because of its data unavailability.

Italics – countries that are not included in the Husian, Mody, and Rogoff (2004) study.

Table 2. Descriptive Statistics

A. Monetary Discipline (M2 Growth)

All Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	19.20	29.31	61.05	92.14	26.74	40.02	109.24	46.51
N	101	231	183	96	87	227	89	832
S.D.	39.45	122.83	242.67	332.36	18.05	126.63	685.79	268.47
Median	11.98	15.65	24.35	25.94	23.29	18.32	13.65	17.46
Min	-21.89	-25.38	-16.37	-14.13	-16.37	-57.14	-50.81	-57.14
Max	351.45	1809.15	2853.97	2853.97	118.49	1305.99	6384.92	6384.92

Emerging Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	17.74	17.46	95.30	202.94	24.26	44.68	134.90	63.34
N	23	90	83	33	50	107	64	368
S.D.	31.42	18.63	355.64	551.43	11.07	174.77	805.95	388.09
Median	10.49	14.79	25.16	44.60	22.10	16.84	12.50	16.71
Min	-19.44	-1.53	8.02	9.79	8.02	-2.40	-4.49	-19.44
Max	141.34	160.12	2853.97	2853.97	61.15	1305.99	6384.92	6384.92

Developing Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	19.63	36.88	32.92	34.10	30.10	35.87	43.55	33.16
N	78	141	100	63	37	120	25	464
S.D.	41.69	156.26	41.52	48.58	24.31	56.63	114.32	97.88
Median	13.34	17.44	21.40	19.67	26.79	25.03	17.10	18.72
Min	-21.89	-25.38	-16.37	-14.13	-16.37	-57.14	-50.81	-57.14
Max	351.45	1809.15	276.00	276.00	118.49	567.91	575.98	1809.15

* Note that the observations of 'All Regimes' might not be equal to the combined observations of all categories because there are cases where there are missing exchange rate regime data but not the variable of interest.

Table 2 (continued). Descriptive Statistics

B. Inflation (CPI)

All Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	20.45	42.07	46.61	70.41	22.00	49.64	185.25	58.63
N	101	224	177	90	87	225	93	821
S.D.	106.87	325.93	165.13	228.78	20.75	249.77	862.25	372.45
Median	3.18	6.64	15.76	14.15	16.20	9.30	7.13	8.59
Min	-3.96	-3.85	0.92	0.92	1.10	-1.71	0.19	-3.96
Max	1058.37	4734.92	1927.98	1927.98	112.53	2947.73	7481.66	7481.66

Emerging Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	10.84	23.90	68.72	146.08	17.67	59.59	168.90	68.29
N	25	91	83	33	50	107	64	371
S.D.	34.15	107.37	236.06	363.59	15.05	346.70	973.35	462.03
Median	3.38	5.27	19.01	54.92	14.66	6.34	6.29	7.54
Min	-3.96	-1.41	1.10	3.20	1.10	-0.39	0.19	-3.96
Max	171.67	874.62	1927.98	1927.98	99.88	2974.73	7481.66	7481.66

Developing Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	23.61	54.52	27.09	26.60	27.85	40.61	221.33	50.67
N	76	133	94	57	37	118	29	450
S.D.	121.72	413.79	40.64	48.15	25.67	101.81	556.09	278.01
Median	3.15	8.24	12.13	10.99	22.54	12.99	16.09	9.68
Min	-3.21	-3.85	0.92	0.92	3.33	-1.71	0.98	-3.85
Max	1058.37	4734.92	293.68	293.68	112.53	891.19	2221.02	4734.92

Table 2 (continued). Descriptive Statistics

C. Cyclically Adjusted Balance (CAB)

All Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-1.34	-3.67	-4.94	-6.73	-2.98	-3.63	-3.43	-3.61
N	89	227	183	96	87	234	96	847
S.D.	1.73	5.86	7.65	9.79	3.24	13.04	7.37	8.73
Median	-1.58	-2.78	-2.50	-3.77	-1.74	-2.01	-1.71	-2.16
Min	-5.55	-46.96	-62.45	-62.45	-13.10	-127.57	-55.29	-127.59
Max	2.39	13.11	9.39	9.39	1.48	20.08	5.79	20.08

Emerging Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-1.44	-2.97	-2.78	-3.49	-2.32	-1.08	-2.00	-2.13
N	11	92	83	33	50	108	64	363
S.D.	0.36	1.96	3.80	5.34	2.23	5.39	2.75	3.85
Median	-1.34	-2.63	-1.80	-2.00	-1.74	-2.03	-1.45	-2.02
Min	-2.38	-10.30	-14.68	-14.68	-10.06	-8.95	-11.38	-14.68
Max	-1.17	2.08	9.39	9.39	0.41	20.08	5.79	20.08

Developing Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-1.33	-4.14	-6.74	-8.42	-3.87	-5.82	-6.30	-4.72
N	78	135	100	63	37	126	32	484
S.D.	1.85	7.41	9.41	11.12	4.10	16.79	11.77	10.93
Median	-1.64	-2.94	-3.77	-4.51	-1.93	-2.01	-1.85	-2.27
Min	-5.55	-46.96	-62.45	-62.45	-13.10	-127.57	-55.29	-127.57
Max	2.39	13.11	1.48	-0.00005	1.48	8.23	3.78	13.11

Table 2 (continued). Descriptive Statistics

D. Cyclically Unadjusted Fiscal Balance

All Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-0.47	-3.52	-3.20	-4.60	-1.78	-1.30	-1.95	-2.36
N	65	199	167	84	83	204	70	705
S.D.	2.39	9.27	4.21	4.71	3.07	4.65	5.82	6.30
Median	-0.41	-2.39	-2.66	-3.83	-1.40	-1.49	-1.80	-1.85
Min	-6.93	-98.28	-24.59	-24.59	-9.46	-18.96	-19.64	-98.28
Max	5.27	11.31	4.17	1.86	4.17	16.90	20.14	20.14

Emerging Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-1.44	-2.47	-2.51	-4.62	-1.33	-0.75	-1.40	-1.75
N	11	87	78	28	50	102	50	328
S.D.	1.06	3.17	3.54	3.83	2.77	5.29	6.26	4.56
Median	-1.39	-2.49	-2.29	-4.00	-1.67	-1.59	-1.78	-2.01
Min	-3.25	-9.37	-13.09	-13.09	-6.79	-8.22	-19.64	-19.64
Max	-0.03	5.00	4.17	0.94	4.17	16.90	20.14	20.14

Developing Countries

	Hard Pegs	Adjustable Pegs	Crawls	Forward-Looking Crawls	Backward-Looking Crawls	Managed Floats	Floats	All Regimes*
Mean	-0.27	-4.33	-3.80	-4.59	-2.46	-1.85	-3.32	-2.90
N	54	112	89	56	33	102	20	377
S.D.	2.54	12.00	4.66	5.12	3.41	3.85	4.37	7.45
Median	-0.04	-2.08	-2.85	-3.25	-1.23	-1.36	-2.18	-1.58
Min	-6.93	-98.28	-24.59	-24.59	-9.46	-18.96	-18.90	-98.28
Max	5.27	11.31	2.35	1.86	2.35	10.02	1.64	11.31

Table 3. Basic OLS Regressions

A. Monetary Discipline

MONEY (M2) GROWTH		Emerging-Market	Developing
Hard Pegs	t-1	-8.492 (-0.19)	-52.376** (-2.32)
Adjustable Pegs	t-1	-3.830 (-0.12)	-37.956* (-1.80)
Forward-looking Crawls	t-1	198.691*** (4.94)	-32.659 (-1.41)
Backward-looking Crawls	t-1	0.736 (0.02)	-42.547^{0} (1.64)
Managed Floats	t-1	5.116 (0.86)	-18.368 (-0.86)
Constant		20.943 (0.85)	66.048*** (3.44)
OLS *F-test* (p-value)		0.00	0.13
Coefficient equality test *F-test* (p-value)*		0.00	0.13 *0.23*
No. of observation		344	440

INFLATION (CPI)		Emerging-Market	Developing
Hard Pegs	t-1	-16.024 (-0.40)	-277.905*** (-4.55)
Adjustable Pegs	t-1	-8.202 (-0.29)	-261.539*** (04.62)
Forward-looking Crawls	t-1	167.064*** (4.64)	-260.833*** (-4.12)
Backward-looking Crawls	t-1	-6.920 (-0.22)	-260.746*** (-3.70)
Managed Floats	t-1	4.124 (0.15)	-215.801*** (-3.76)
Constant		20.810 (0.94)	286.067*** (5.62)
OLS *F-test* (p-value)		0.00	0.00
Coefficient equality test *F-test* (p-value)*		0.00	0.00 *0.61*
No. of observation		346	426

* The *italic* value is the p-value for coefficient equality tests when the default regime is excluded.

Table 3 (continued). Basic OLS Regressions

B. Fiscal Discipline

CYCLICALLY ADJUSTED BALANCE (CAB)		Emerging-Market	Developing
Hard Pegs	t-1	0.439 (0.37)	3.182^{0} (1.64)
Adjustable Pegs	t-1	-1.025* (-1.69)	0.141 (0.08)
Forward-looking Crawls	t-1	-1.481* (-1.90)	-3.047 (-1.52)
Backward-looking Crawls	t-1	-0.330 (-0.48)	0.802 (0.35)
Managed Floats	t-1	0.626 (1.06)	-0.745 (-0.42)
Constant		-1.807*** (-3.88)	-4.504*** (-2.92)
OLS *F-test* (p-value)		0.02	0.02
Coefficient equality test *F-test* (p-value)*		0.02 *0.01*	0.02 *0.01*
No. of observation		338	450

NOMINAL FISCAL BALANCE		Emerging-Market	Developing
Hard Pegs	t-1	-0.794 (-0.53)	2.041 (1.05)
Adjustable Pegs	t-1	-1.671** (-2.00)	-1.730 (-0.97)
Forward-looking Crawls	t-1	-4.457*** (-4.19)	-2.368 (-1.24)
Backward-looking Crawls	t-1	-0.760 (-0.82)	-0.842 (-0.39)
Managed Floats	t-1	0.019 (0.02)	0.163 (0.09)
Constant		-0.699 (-1.03)	-2.259 (-1.39)
OLS *F-test* (p-value)		0.00	0.03
Coefficient equality test *F-test* (p-value)*		0.00	0.03 *0.01*
No. of observation		305	355

* The *italic* value is the p-value for coefficient equality tests when the default regime is excluded.

Table 4. Monetary Discipline – Money Growth with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Money (M2) Growth	t-1	0.332*** (5.31)	0.327*** (5.25)	0.329*** (4.47)	0.324*** (4.42)	0.326*** (3.66)	0.336*** (3.70)
Hard Pegs	t-1	-13.710 (-0.84)	-14.024 (-0.85)	*(dropped)*	*(dropped)*	-59.287*** (-3.01)	-62.594** (-3.07)
Adjustable Pegs	t-1	-2.218 (-0.39)	-1.905 (-0.33)	-1.887 (-0.35)	-1.964 (-0.36)	-51.194*** (-2.68)	-50.154** (-2.65)
Forward-looking Crawls	t-1	0.815 (0.14)	1.303 (0.22)	10.043* (1.70)	9.770◊ (1.61)	-56.769*** (-3.01)	-56.528** (-3.03)
Backward-looking Crawls	t-1	-8.463* (-1.73)	-7.951◊ (-1.61)	0.437 (0.10)	0.262 (0.06)	-77.212*** (-4.40)	-77.540*** (-4.44)
Managed Floats	t-1	-0.934 (-0.19)	-0.798 (-0.16)	-1.713 (-0.36)	-1.832 (-0.38)	-59.965*** (-3.04)	-57.102** (-3.02)
Openness	t	24.098** (2.07)	22.959** (1.96)	29.869** (2.34)	30.173** (2.53)	-1.985 (-0.10)	-2.745 (-0.14)
	t-1	-0.468 (-0.04)	-0.191 (-0.02)	-7.489 (-0.59)	-7.838 (-0.62)	11.235 (0.64)	11.076 (0.64)
Terms of Trade	t	0.012 (0.50)	0.012 (0.51)	0.368** (2.48)	0.380** (2.53)	0.003 (0.11)	0.004 (0.13)
	t-1	0.012 (0.48)	0.011 (0.47)	0.003 (0.02)	0.0004 (0.00)	0.004 (0.15)	0.004 (0.15)
Real GDP growth	t	-0.314** (-2.18)	-0.292** (-2.03)	-0.748*** (2.71)	-0.724*** (2.60)	-0.020 (-0.12)	-0.041 (-0.25)
	t-1	-0.147 (-1.12)	-0.125 (-0.96)	0.241 (1.02)	0.256 (1.09)	-0.019 (-0.12)	-0.007 (-0.04)
Change in US T-bills	t	0.016 (0.60)	0.018 (0.68)	-0.002 (-0.07)	-0.002 (-0.08)	0.001 (0.03)	0.003 (0.07)
	t-1	0.003 (0.12)	0.002 (0.08)	-0.005 (-0.16)	-0.005 (-0.16)	-0.019 (-0.40)	-0.020 (-0.42)
Fiscal Balance (CAB)	t	-0.011 (-0.02)	-0.071 (-0.15)	0.365 (0.59)	0.370 (0.60)	-0.079 (-0.11)	-0.106 (-0.15)
	t-1	-0.571 (-1.28)	-0.606 (-1.35)	-1.211** (-2.27)	-1.210** (-2.26)	-0.229 (-0.35)	-0.294 (-0.44)
Crisis Index, *ci7*	t-1	-2.459 (-1.02)	-	-2.752 (-0.95)	-	0.545 (0.14)	-
Crisis Index, *ci14*	t-1	-	0.336 (0.09)	-	-2.544 (-0.62)	-	4.581 (0.71)
Constant		-1.694*** (-4.19)	-1.585*** (-3.89)	-1.464*** (-3.19)	-1.445*** (-3.14)	-0.928◊ (-1.61)	-0.854 (-1.47)
Sargan Test (p-value)		0.18	0.14	0.07	0.06	0.36	0.41
Second-order serial correlation test (p-value)		0.96	0.90	0.18	0.22	0.09	0.10
No. of observation		402	402	243	243	159	159
No. of countries		43	43	24	24	19	19

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 5. Monetary Discipline – Inflation with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Inflation (CPI)	t-1	0.588***	0.586***	0.478***	0.463***	0.671***	0.694***
		(12.65)	(12.70)	(9.65)	(9.43)	(10.31)	(10.49)
	t-2	-0.024***	-0.024***	-0.018***	-0.017***	-0.130**	-0.141**
		(-6.90)	(-6.86)	(-5.07)	(-4.91)	(-2.05)	(-2.16)
Hard Pegs	t-1	-38.297***	-40.113***	*(dropped)*	*(dropped)*	-58.919***	-55.250 ***
		(-5.32)	(-5.55)			(-6.24)	(-5.66)
Adjustable Pegs	t-1	3.738***	4.091	4.562*	5.028**	-36.462***	-35.072***
		(1.31)	(1.44)	(1.76)	(1.96)	(-3.97)	(-3.80)
Forward-looking Crawls	t-1	0.163	0.951	0.753	3.005	-38.823***	-37.400***
		(0.06)	(0.32)	(0.26)	(1.04)	(-4.39)	(-4.21)
Backward-looking Crawls	t-1	-11.086***	-10.524***	-8.272***	-7.124***	-43.020***	-41.011***
		(-4.50)	(-4.28)	(-4.09)	(-3.52)	(-5.36)	(-5.11)
Managed Floats	t-1	-0.048	0.235	2.589	2.854	-40.678***	-38.939***
		(-0.02)	(0.09)	(1.12)	(1.25)	(-4.48)	(-4.28)
Openness	t	39.401***	38.576***	39.427***	37.270***	33.725***	34.866***
		(6.66)	(6.56)	(6.11)	(5.82)	(3.49)	(3.57)
	t-1	-25.627***	-24.783***	-22.123***	-20.399***	-20.610**	-21.165**
		(-4.32)	(-4.19)	(-3.40)	(-3.16)	(-2.20)	(-2.22)
Terms of Trade	t	-0.002	-0.002	-0.017	-0.034	-0.004	-0.004
		(-0.13)	(-0.17)	(-0.24)	(-0.49)	(-0.34)	(-0.34)
	t-1	-0.006	-0.006	0.069	0.065	-0.009	-0.008
		(-0.47)	(-0.51)	(1.00)	(0.96)	(-0.69)	(-0.64)
Real GDP growth	t	-0.465***	-0.458***	-0.754***	-0.624***	-0.367***	-0.368***
		(-6.63)	(-6.59)	(-5.87)	(-4.85)	(-4.66)	(-4.60)
	t-1	-0.047	-0.046	0.101	0.100	0.003	-0.034
		(-0.67)	(-0.67)	(0.86)	(0.87)	(0.03)	(-0.38)
Change in US T-bills	t	0.005	0.006	0.024	0.023	-0.009	-0.012
		(0.37)	(0.45)	(1.46)	(1.45)	(-0.37)	(-0.51)
	t-1	0.019	0.017	0.017	0.015	-0.013	-0.013
		(1.33)	(1.15)	(1.10)	(0.94)	(-0.50)	(-0.53)
Fiscal Balance (CAB)	t	-0.416*	-0.449*	0.018	-0.027	-0.871**	-0.724**
		(-1.67)	(-1.81)	(0.06)	(-0.09)	(-2.38)	(-1.96)
	t-1	0.242	0.181	0.069	-0.049	0.519	0.613*
		(1.03)	(0.77)	(0.25)	(-0.17)	(1.54)	(1.76)
Crisis Index, *ci7*	t-1	0.719	-	-0.262	-	2.776	-
		(0.58)		(-0.19)		(1.41)	
Crisis Index, *ci14*	t-1	-	3.163*	-	5.017***	-	-3.376
			(1.73)		(2.57)		(-1.01)
Constant		-1.092***	-1.035***	-1.061***	-0.947***	-1.427***	-1.640***
		(-5.03)	(-4.81)	(-4.51)	(-4.08)	(-4.64)	(-5.28)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.83	0.87
Second-order serial correlation test (p-value)		0.63	0.54	0.39	0.53	0.13	0.19
No. of observation		402	402	243	243	159	159
No. of countries		43	43	24	24	19	19

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 6. Cyclically Adjusted Balance (CAB) with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.129***	0.126**	0.068	0.072	0.156*	0.138◊
		(2.57)	(2.48)	(1.06)	(1.13)	(1.91)	(1.56)
	t-2	0.240***	0.241***	0.339***	0.339***	0.168**	0.172**
		(5.42)	(5.42)	(6.47)	(6.49)	(2.15)	(2.13)
Hard Pegs	t-1	-1.173	-1.303	*(dropped)*	*(dropped)*	-3.287	-3.174
		(-0.50)	(-0.54)			(-1.14)	(-1.05)
Adjustable Pegs	t-1	-0.447	-0.335	0.617	0.615	-7.529***	-5.103*
		(-0.64)	(-0.48)	(0.93)	(0.92)	(-2.58)	(-1.71)
Forward-looking Crawls	t-1	-1.260*	-1.327*	-1.419*	-1.529**	-6.118**	-3.739
		(-1.80)	(-1.87)	(-1.88)	(-1.98)	(-2.11)	(-1.25)
Backward-looking Crawls	t-1	-0.711	-0.681	-0.982*	-1.008*	-3.717	-1.549
		(-1.16)	(-1.10)	(-1.69)	(-1.73)	(-1.36)	(-0.56)
Managed Floats	t-1	0.330	0.457	0.111	0.124	-5.147*	-2.569
		(0.52)	(0.71)	(0.18)	(0.20)	(-1.74)	(-0.85)
Openness	t	0.619	0.932	-2.017	-1.947	4.138	5.060*
		(0.42)	(0.62)	(-1.33)	(-1.27)	(1.58)	(1.88)
	t-1	-1.584	-1.624	1.952	1.914	-1.874	-1.545
		(-1.15)	(-1.17)	(1.38)	(1.35)	(-0.80)	(-0.64)
Terms of Trade	t	0.001	0.001	0.026	0.026	0.001	0.0003
		(0.34)	(0.29)	(1.50)	(1.50)	(0.18)	(0.08)
	t-1	0.001	0.001	0.006	0.006	0.002	0.002
		(0.51)	(0.45)	(0.37)	(0.36)	(0.66)	(0.57)
Real GDP growth	t	-0.048**	-0.054***	-0.083**	-0.091***	-0.047*	-0.050**
		(-2.56)	(-2.90)	(-2.50)	(-2.71)	(-1.95)	(-2.01)
	t-1	0.015	0.009	0.105***	0.104***	-0.015	-0.026
		(0.84)	(0.53)	(3.68)	(3.65)	(-0.64)	(-1.06)
Change in US T-bills	t	0.0001	0.0002	0.006*	0.006*	-0.010◊	-0.010◊
		(0.03)	(0.05)	(1.65)	(1.67)	(-1.60)	(-1.58)
	t-1	0.002	0.002	0.0001	0.0003	-0.001	-0.003
		(0.52)	(0.52)	(0.03)	(0.07)	(-0.08)	(-0.52)
Inflation	t	-0.035**	-0.039***	-0.003	-0.001	-0.063**	-0.059**
		(-2.38)	(-2.57)	(-0.15)	(-0.08)	(-2.48)	(-2.26)
	t-1	0.006	0.007	0.014	0.014	-0.010	-0.011
		(0.64)	(0.75)	(1.40)	(1.39)	(-0.49)	(-0.53)
Crisis Index, *ci7*	t-1	0.745**	-	0.133	-	1.754***	-
		(2.35)		(0.37)		(3.26)	
Crisis Index, *ci14*	t-1	-	0.520	-	-0.162	-	1.600*
			(1.11)		(-0.32)		(1.70)
Constant		0.071	0.052	0.103*	0.096◊	-0.037	-0.045
		(1.20)	(0.88)	(1.66)	(1.58)	(-0.35)	(-0.41)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.07	0.08
Second-order serial correlation test (p-value)		0.16	0.10	0.74	0.69	0.28	0.18
No. of observation		370	370	225	225	145	145
No. of countries		43	43	24	24	19	19

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 7. Fiscal Balance (cyclically unadjusted) with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.335***	0.335***	0.388***	0.371***	0.234***	0.233***
		(5.13)	(5.15)	(4.25)	(4.14)	(2.58)	(2.56)
	t-2	-0.207***	-0.212***	0.172***	0.167**	-0.466***	-0.471***
		(-3.24)	(-3.32)	(2.35)	(2.29)	(-4.68)	(-4.73)
Hard Pegs	t-1	-3.503	-4.372	*(dropped)*	*(dropped)*	-6.673	-7.832◊
		(-1.04)	(-1.28)			(-1.32)	(-1.55)
Adjustable Pegs	t-1	0.322	0.278	-1.584*	-1.593*	-0.223	-2.044
		(0.31)	(0.27)	(-1.83)	(-1.85)	(-0.04)	(-0.40)
Forward-looking Crawls	t-1	-0.060	0.020	0.286	0.461	-1.801	-3.508
		(-0.04)	(0.01)	(0.12)	(0.34)	(-0.34)	(-0.68)
Backward-looking Crawls	t-1	1.621◊	1.625◊	0.371	0.404	0.224	-1.489
		(1.63)	(1.64)	(0.44)	(0.48)	(0.05)	(-0.32)
Managed Floats	t-1	-0.365	-0.458	-1.532*	-1.571**	-1.083	-2.952
		(-0.38)	(-0.47)	(-1.92)	(-1.98)	(-0.21)	(-0.57)
Openness	t	-2.653	-2.885	-1.632	-1.711	-4.334	-4.778
		(-1.19)	(-1.30)	(-0.81)	(-0.85)	(-0.95)	(-1.05)
	t-1	-1.052	-0.854	-3.489*	-3.341*	5.002	5.403
		(-0.49)	(-0.40)	(-1.80)	(-1.73)	(1.17)	(1.27)
Terms of Trade	t	0.006	0.006	0.043*	0.038◊	0.003	0.003
		(1.30)	(1.27)	(1.86)	(1.64)	(0.60)	(0.52)
	t-1	0.001	0.001	0.005	0.005	-0.001	-0.002
		(0.27)	(0.23)	(0.20)	(0.24)	(-0.26)	(-0.39)
Real GDP growth	t	0.076**	0.080**	0.136***	0.142***	0.025	0.024
		(2.33)	(2.48)	(2.93)	(3.12)	(0.51)	(0.48)
	t-1	-0.004	0.0001	0.061	0.060	-0.021	-0.003
		(-0.13)	(0.00)	(1.51)	(1.51)	(-0.48)	(-0.07)
Change in US T-bills	t	0.007	0.008	0.007	0.007	0.004	0.007
		(1.30)	(1.42)	(1.41)	(1.42)	(0.35)	(0.58)
	t-1	0.005	0.004	-0.002	-0.002	-0.003	-0.003
		(0.78)	(0.65)	(-0.41)	(-0.43)	(-0.23)	(-0.21)
Inflation	t	0.010	0.006	0.050**	0.042*	-0.072*	-0.078*
		(0.46)	(0.26)	(2.07)	(1.73)	(-1.69)	(-1.86)
	t-1	0.017	0.017	0.011	0.012	0.062*	0.062*
		(1.09)	(1.12)	(0.82)	(0.85)	(1.80)	(1.78)
Crisis Index, *ci7*	t-1	-0.234	-	0.409	-	-1.185	-
		(-0.50)		(0.88)		(-1.32)	
Crisis Index, *ci14*	t-1	-	0.692	-	0.907	-	0.142
			(0.98)		(1.33)		(0.09)
Constant		-0.010	-0.019	0.048	0.035	-0.073	-0.059
		(-0.12)	(-0.22)	(0.64)	(0.47)	(-0.42)	(-0.34)
Sargan Test (p-value)		0.00	0.00	0.13	0.11	0.07	0.07
Second-order serial correlation test (p-value)		0.20	0.18	0.16	0.13	0.26	0.19
No. of observation		357	357	221	221	136	136
No. of countries		41	41	23	23	18	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 8a. Monetary Discipline – Money Growth with and political & economic variables only. *Arellano-Bond Dynamic Panel-Data Estimation* (z-stats are shown in parentheses.

		All		Emerging Economies		Developing Countries	
Money (M2) Growth	t-1	0.323*** (5.19)	0.302*** (4.90)	0.317*** (4.40)	0.359*** (4.70)	0.313*** (3.59)	0.239*** (3.67)
Hard Pegs	t-1	-13.457 (-0.83)	-6.380 (-0.40)	*(dropped)*	*(dropped)*	-56.940*** (-2.95)	-48.124** (-2.52)
Adjustable Pegs	t-1	-2.794 (-0.49)	-1.999 (-0.35)	-3.627 (-0.69)	-2.973 (-0.54)	-43.993** (-2.33)	-33.439* (-1.78)
Forward-looking Crawls	t-1	1.045 (0.18)	1.549 (0.26)	10.462* (1.82)	8.389 (1.38)	-49.589*** (-2.65)	-45.323** (-2.47)
Backward-looking Crawls	t-1	-7.883◊ (-1.60)	-7.514◊ (-1.54)	2.708 (0.61)	-0.159 (0.03)	-73.980*** (-4.30)	-66.179*** (-3.93)
Managed Floats	t-1	-1.303 (-0.26)	-1.441 (-0.29)	-2.449 (-0.52)	-2.422 (-0.49)	-50.075*** (2.65)	-46.110** (-2.49)
Government Stability	t-1	-0.991 (-1.48)	-	-2.751*** (-3.80)	-	1.316 (1.08)	-
Divided Government	t-1	-	-1.410 (-0.37)	-	-6.012 (-1.49)	-	-0.941 (-0.14)
Election Dummy	t-1	-1.368 (-0.88)	-1.351 (-0.87)	0.351 (0.21)	0.512 (0.29)	-5.372** (-2.06)	-5.572** (-2.17)
Openness	t	24.283** (2.09)	30.175** (2.54)	32.998*** (2.64)	29.725** (2.29)	2.321 (0.12)	2.395 (0.12)
	t-1	-2.041 (-0.18)	-2.919 (-0.25)	-8.366 (-0.68)	-7.553 (-0.59)	6.630 (0.39)	14.518 (0.80)
Terms of Trade	t	0.012 (0.50)	0.012 (0.49)	0.398*** (2.73)	0.353** (2.34)	-0.001 (-0.02)	-0.001 (-0.04)
	t-1	0.013 (0.53)	0.013 (0.55)	0.008 (0.06)	-0.032 (0.22)	0.0004 (0.02)	-0.001 (-0.04)
Real GDP growth	t	-0.324** (-2.25)	-0.299** (-2.05)	-0.865*** (-3.22)	-0.833*** (-2.93)	0.020 (0.12)	-0.037 (-0.23)
	t-1	-0.149 (-1.14)	-0.176 (-1.35)	0.329 (1.42)	0.281 (1.16)	-0.009 (-0.06)	-0.058 (-0.38)
Change in US T-bills	t	0.019 (0.69)	0.017 (0.61)	0.011 (0.37)	0.004 (0.11)	0.013 (0.29)	0.025 (0.59)
	t-1	0.001 (0.04)	0.011 (0.39)	-0.015 (-0.48)	-0.004 (-0.13)	-0.002 (-0.04)	0.009 (0.20)
Fiscal Balance (CAB)	t	-0.025 (-0.05)	-0.238 (-0.41)	0.200 (0.33)	0.361 (0.57)	-0.228 (-0.33)	-0.872 (-0.82)
	t-1	-0.561 (-1.26)	-0.987 (-1.97)	-1.151** (-2.21)	-1.157** (-2.13)	-0.079 (-0.12)	-0.856 (-0.89)
Crisis Index, *ci7*	t-1	-2.330 (-0.97)	-2.053 (-0.85)	-3.057 (-1.08)	-3.111 (-1.05)	0.381 (0.10)	-0.387 (-0.10)
Constant		-1.268*** (-2.62)	-1.827*** (-4.35)	-0.349 (-0.65)	-1.618*** (-3.37)	-1.405* (-1.87)	-0.690 (-1.11)
Sargan Test (p-value)		0.21	0.11	0.20	0.09	0.40	0.40
Second-order serial correlation test (p-value)		0.99	0.91	0.11	0.12	0.06	0.07
No. of observation		402	394	243	243	159	151
No. of countries		43	42	24	24	19	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats);
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 8b. Monetary Discipline – Money Growth with and political & economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Money (M2) Growth	t-1	0.319*** (5.12)	0.299*** (4.86)	0.317*** (4.42)	0.354*** (4.64)	0.318*** (3.58)	0.243*** (2.68)
Hard Pegs	t-1	-13.369 (-0.81)	-6.584 (-0.41)	*(dropped)*	*(dropped)*	-58.805*** (-2.93)	-50.086** (-2.55)
Adjustable Pegs	t-1	-2.610 (-0.46)	-1.839 (-0.32)	-4.009 (-0.76)	-3.221 (-0.58)	-42.954** (-2.30)	-33.024* (-1.78)
Forward-looking Crawls	t-1	1.329 (0.22)	1.911 (0.32)	9.402◊ (1.58)	8.046 (1.28)	-49.277*** (-2.65)	-45.757** (-2.51)
Backward-looking Crawls	t-1	-7.542 (-1.52)	-7.167 (-1.46)	2.063 (0.46)	-0.431 (-0.09)	-73.872*** (-4.30)	-66.812*** (-3.98)
Managed Floats	t-1	-1.275 (-0.25)	-1.420 (-0.28)	-2.828 (-0.60)	-2.682 (-0.55)	-49.185*** (2.62)	-46.004** (2.50)
Government Stability	t-1	-0.984 (-1.46)	-	-2.844*** (-3.90)	-	1.147 (1.09)	-
Divided Government	t-1	-	-1.575 (-0.41)	-	-5.977 (-1.48)	-	-1.196 (-0.17)
Election Dummy	t-1	-1.525 (-0.98)	-1.472 (-0.95)	0.145 (0.09)	0.267 (0.15)	-5.224** (-1.98)	-5.393** (-2.09)
Openness	t	23.456** (2.01)	29.500** (2.46)	34.078*** (2.71)	30.141** (2.31)	2.100 (0.11)	1.516 (0.07)
	t-1	-1.991 (-0.18)	-2.971 (-0.25)	-9.584 (-0.78)	-8.495 (-0.66)	6.554 (0.38)	13.857 (0.77)
Terms of Trade	t	0.012 (0.51)	0.012 (0.49)	0.422*** (2.87)	0.367*** (2.41)	-0.001 (-0.02)	-0.001 (-0.02)
	t-1	0.013 (0.52)	0.013 (0.53)	0.003 (0.02)	-0.037 (-0.26)	0.0001 (0.00)	-0.0001 (-0.04)
Real GDP growth	t	-0.305** (-2.12)	-0.282* (-1.94)	-0.893*** (-3.23)	-0.803*** (-2.76)	0.004 (0.02)	-0.050 (-0.30)
	t-1	-0.129 (-1.00)	-0.158 (-1.23)	0.343 (1.49)	0.299 (1.24)	-0.002 (-0.02)	-0.043 (-0.29)
Change in US T-bills	t	0.021 (0.77)	0.018 (0.67)	0.011 (0.38)	0.003 (0.09)	0.014 (0.31)	0.027 (0.63)
	t-1	0.0003 (0.01)	0.010 (0.36)	-0.014 (-0.46)	-0.004 (-0.12)	-0.002 (-0.04)	0.010 (0.21)
Fiscal Balance (CAB)	t	-0.078 (-0.16)	0.207 (0.36)	0.194 (0.32)	0.358 (0.57)	-0.239 (-0.35)	-0.821 (-0.77)
	t-1	-0.585 (-1.31)	-1.024** (-2.03)	-1.128** (-2.16)	-1.153** (-2.12)	-0.121 (-0.18)	-0.954 (-0.99)
Crisis Index, *ci14*	t-1	-0.214 (-0.06)	0.090 (0.03)	-4.639 (-1.14)	-2.897 (-0.69)	2.829 (0.44)	2.504 (0.40)
Constant		-1.182** (-2.45)	-1.747*** (-4.12)	-0.318*** (-0.60)	-1.591*** (-3.31)	-1.375* (-1.83)	-0.650 (-1.04)
Sargan Test (p-value)		0.17	0.10	0.20	0.08	0.44	0.43
Second-order serial correlation test (p-value)		0.93	0.86	0.17	0.15	0.06	0.07
No. of observation		402	394	243	243	159	151
No. of countries		43	42	24	24	19	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats);
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 8c. Monetary Discipline – Money Growth with interaction terms (*ci7*)

		Emerging-Market Economies				Developing Countries			
Money (M2) Growth	t-1	0.267*** (3.68)	0.267*** (3.68)	0.352*** (4.68)	0.352*** (4.68)	0.246*** (2.71)	0.246*** (2.71)	0.270*** (2.86)	0.270*** (2.86)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-23.940 (-0.44)	-	-47.177** (-2.40)	-
Adjustable Pegs	t-1	7.776 (0.49)	-41.775*** (-2.94)	-6.184 (-0.82)	*(dropped)*	-12.852 (-0.25)	-11.087 (-0.38)	-9.174* (-0.43)	38.004** (2.06)
Forward-looking Crawls	t-1	49.551*** (2.97)	*(dropped)*	8.236 (1.23)	14.420* (1.83)	-24.651 (-0.48)	-0.711 (-0.03)	-40.628** (-2.00)	6.549 (0.36)
Backward-looking Crawls	t-1	39.794** (2.49)	-9.757 (-0.62)	3.276 (0.57)	9.460◊ (1.61)	0.266 (0.00)	24.206 (0.89)	-66.556*** (-3.84)	-19.379◊ (-1.55)
Managed Floats	t-1	25.413◊ (1.64)	-24.138* (-1.69)	-7.467 (-1.02)	-1.283 (-0.21)	-19.335 (-0.37)	4.605 (0.17)	-18.919 (-0.81)	28.258 (1.31)
Floats	t-1	-	-49.551*** (-2.97)	-	6.184 (0.82)	-	23.940 (0.44)	-	47.177** (2.40)
Government Stability	t-1	-0.158 (-0.11)	-8.117*** (-2.82)	-	-	4.024 (0.77)	1.605 (0.82)	-	-
Divided Government	t-1	-	-	-6.753 (-1.17)	8.007 (0.81)	-	-	36.946* (1.78)	-13.390 (-1.23)
Hard pegs and Stab/Div	t-1	-7.959** (-2.51)	-	14.759 (1.31)	-	-2.419 (-0.43)	-	-50.336** (-2.13)	-
Adj pegs and Stab/Div	t-1	-0.486 (-0.26)	7.473** (2.49)	12.228 (1.15)	-2.531 (-0.17)	-2.952 (-0.54)	-0.533 (-0.19)	-50.235** (-2.19)	0.101 (0.00)
FW and Stab/Div	t-1	-4.796** (-2.35)	3.163 (1.02)	-1.501 (-0.16)	-16.260 (-1.28)	-2.015 (-0.37)	0.405 (0.15)	-14.307 (-0.76)	36.029* (1.95)
BW and Stab/Div	t-1	-4.201** (-2.31)	3.759 (1.23)	-11.239 (-1.47)	-25.998** (-2.19)	-8.162 (-1.41)	-5.743* (-1.92)	*(dropped)*	50.336** (2.13)
Managed float and Stab/Div	t-1	-2.712 (-1.53)	5.247* (1.80)	12.479 (1.37)	-2.280 (-0.18)	-2.961 (-0.54)	-0.542 (-0.23)	-40.511* (-1.72)	9.824 (0.65)
Floats and Stab/Div	t-1	-	7.959** (2.51)	-	-14.759 (-1.31)	-	2.419 (0.43)	-	*(dropped)*
Election Dummy	t-1	-0.093 (-0.06)	-0.093 (-0.06)	0.206 (0.12)	0.206 (0.12)	-5.177** (-1.99)	-5.177** (-1.99)	-4.992* (-1.90)	-4.992* (-1.90)
Openness	t	29.015** (2.39)	29.015** (2.39)	25.059* (1.88)	25.059* (1.88)	4.554 (0.23)	4.554 (0.23)	3.525 (0.16)	3.525 (0.16)
	t-1	-4.918 (-0.41)	-4.918 (-0.41)	-12.017 (-0.94)	-12.017 (-0.94)	8.015 (0.43)	8.015 (0.43)	14.084 (0.74)	14.084 (0.74)
Terms of Trade	t	0.447*** (3.15)	0.447*** (3.15)	0.337** (2.25)	0.337** (2.25)	-0.006 (-0.25)	-0.006 (-0.25)	0.002 (0.07)	0.002 (0.07)
	t-1	0.027 (0.20)	0.027 (0.20)	-0.075 (-0.53)	-0.075 (-0.53)	-0.002 (-0.07)	-0.002 (-0.07)	0.001 (0.06)	0.001 (0.06)
Real GDP growth	t	-1.044*** (-3.93)	-1.044*** (-3.93)	-0.955*** (-3.24)	-0.955*** (-3.24)	-0.031 (-0.18)	-0.031 (-0.18)	-0.113 (-0.67)	-0.113 (-0.67)
	t-1	0.171 (0.74)	0.171 (0.74)	0.276 (1.12)	0.276 (1.12)	-0.078 (-0.49)	-0.078 (-0.49)	-0.085 (-0.54)	-0.085 (-0.54)
Change in US T-bills	t	0.014 (0.45)	0.014 (0.45)	-0.001 (-0.04)	-0.001 (-0.04)	0.012 (0.26)	0.012 (0.26)	0.017 (0.37)	0.017 (0.37)
	t-1	-0.001 (-0.04)	-0.001 (-0.04)	-0.011 (-0.33)	-0.011 (-0.33)	-0.017 (-0.36)	-0.017 (-0.36)	0.034 (0.68)	0.034 (0.68)
Fiscal Balance (CAB)	t	-0.040 (-0.07)	-0.040 (-0.07)	0.343 (0.55)	0.343 (0.55)	-0.007 (-0.01)	-0.007 (-0.01)	-0.916 (-0.85)	-0.916 (-0.85)
	t-1	-1.375*** (-2.69)	-1.375*** (-2.69)	-1.169** (-2.11)	-1.169** (-2.11)	-0.018 (-0.03)	-0.018 (-0.03)	-0.453 (-0.45)	-0.453 (-0.45)
Crisis Index, *ci7*	t-1	-2.192 (-0.79)	-2.192 (-0.79)	-4.219 (-1.42)	-4.219 (-1.42)	1.340 (0.36)	1.340 (0.36)	-2.616 (-0.67)	-2.616 (-0.67)
Constant		-0.294 (-0.54)	-0.294 (-0.54)	-1.390*** (-2.88)	-1.390*** (-2.88)	-1.720** (-2.23)	-1.720** (-2.23)	-0.884 (-1.23)	-0.884 (-1.23)
Sargan Test (p-value)		0.20	0.20	0.13	0.13	0.32	0.32	0.57	0.57
Second-order serial correlation test (p-value)		0.20	0.20	0.15	0.15	0.06	0.06	0.07	0.07
No. of observation		243	243	243	243	159	159	151	151
No. of countries		24	24	24	24	19	19	18	18

Table 8d. Monetary Discipline – Money Growth with interaction terms (*ci14*)

		Emerging-Market Economies				Developing Countries			
Money (M2) Growth	t-1	0.270*** (3.73)	0.270*** (3.73)	0.346*** (4.60)	0.346*** (4.60)	0.252*** (2.74)	0.252*** (2.74)	0.267*** (2.83)	0.267*** (2.83)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-30.532 (-0.56)	-	-49.555** (-2.46)	-
Adjustable Pegs	t-1	7.722 (0.48)	-41.294*** (-2.91)	-6.422 (-0.85)	-14.513* (-1.82)	-16.080 (-0.31)	14.452 (0.49)	-11.822* (-0.57)	37.733** (2.02)
Forward-looking Crawls	t-1	49.016*** (2.95)	*(dropped)*	8.090 (1.18)	*(dropped)*	-29.412 (-0.58)	1.120 (0.04)	-42.780** (-2.13)	6.775 (0.37)
Backward-looking Crawls	t-1	39.884** (2.50)	-9.132 (-0.59)	2.700 (0.46)	-5.391 (-0.80)	-6.199 (-0.11)	24.333 (0.88)	-68.457*** (-3.97)	-18.902 (-1.48)
Managed Floats	t-1	25.039◊ (1.62)	-23.978* (-1.68)	-7.010 (-0.96)	-15.100* (-1.81)	-22.919 (-0.44)	7.613 (0.27)	-20.407 (-0.88)	29.148 (1.32)
Floats	t-1	-	-49.016*** (-2.95)	-	-8.090 (-1.18)	-	30.532 (0.56)	-	49.555** (2.46)
Government Stability	t-1	-0.207 (-0.15)	-8.196*** (-2.85)	-	-	3.445 (0.67)	1.601 (0.82)	-	-
Divided Government	t-1	-	-	-6.318 (-1.10)	7.712 (0.78)	-	-	35.961* (1.74)	-12.926 (-1.19)
Hard pegs and Stab/Div	t-1	-7.989** (-2.52)	-	14.030 (1.24)	-	-1.845 (-0.33)	-	-48.887** (-2.09)	-
Adj pegs and Stab/Div	t-1	-0.514 (-0.27)	7.474** (2.49)	11.786 (1.11)	-2.244 (-0.15)	-2.372 (-0.45)	-0.527 (-0.19)	-48.696** (-2.15)	0.191 (0.01)
FW and Stab/Div	t-1	-4.848** (-2.38)	3.141 (1.01)	-2.797 (-0.29)	-16.827 (-1.32)	-1.363 (-0.26)	0.482 (0.18)	-14.753 (-0.78)	34.135* (1.86)
BW and Stab/Div	t-1	-4.266** (-2.36)	3.723 (1.21)	-11.189 (-1.47)	-25.219** (-2.12)	-7.303 (-1.29)	-5.458 (-1.83)	*(dropped)*	48.887** (2.09)
Managed float and Stab/Div	t-1	-2.699 (-1.53)	5.289* (1.81)	11.059 (1.22)	-2.970 (-0.23)	-2.286 (-0.42)	-0.442 (-0.18)	-41.311* (-1.74)	7.576* (0.50)
Floats and Stab/Div	t-1	-	7.989** (2.52)	-	-14.030 (-1.24)	-	1.845 (0.33)	-	*(dropped)*
Election Dummy	t-1	-0.323 (-0.20)	-0.323 (-0.20)	-0.112 (0.06)	-0.112 (0.06)	-5.106* (-1.95)	-5.106* (-1.95)	-4.891* (-1.85)	-4.891* (-1.85)
Openness	t	30.072** (2.47)	30.072** (2.47)	25.433* (1.90)	25.433* (1.90)	5.709 (0.29)	5.709 (0.29)	2.040 (0.09)	2.040 (0.09)
	t-1	-6.590 (-0.55)	-6.590 (-0.55)	-12.975 (-1.01)	-12.975 (-1.01)	8.537 (0.45)	8.537 (0.45)	12.379 (0.65)	12.379 (0.65)
Terms of Trade	t	0.463*** (3.24)	0.463*** (3.24)	0.358** (2.37)	0.358** (2.37)	-0.006 (-0.24)	-0.006 (-0.24)	0.002 (0.07)	0.002 (0.07)
	t-1	0.024 (0.18)	0.024 (0.18)	-0.080 (-0.56)	-0.080 (-0.56)	-0.002 (-0.07)	-0.002 (-0.07)	0.0001 (0.00)	0.0001 (0.00)
Real GDP growth	t	-1.072*** (-3.93)	-1.072*** (-3.93)	-0.912*** (-3.03)	-0.912*** (-3.03)	-0.047 (-0.28)	-0.047 (-0.28)	-0.115 (-0.67)	-0.115 (-0.67)
	t-1	0.178 (0.77)	0.178 (0.77)	0.301 (1.23)	0.301 (1.23)	-0.081 (-0.52)	-0.081 (-0.52)	-0.049 (-0.32)	-0.049 (-0.32)
Change in US T-bills	t	0.013 (0.44)	0.013 (0.44)	-0.002 (-0.06)	-0.002 (-0.06)	0.012 (0.27)	0.012 (0.27)	0.024 (0.52)	0.024 (0.52)
	t-1	-0.000003 (-0.00)	-0.000003 (-0.00)	-0.010 (-0.32)	-0.010 (-0.32)	-0.017 (-0.35)	-0.017 (-0.35)	0.036 (0.73)	0.036 (0.73)
Fiscal Balance (CAB)	t	-0.055 (-0.09)	-0.055 (-0.09)	0.329 (0.53)	0.329 (0.53)	-0.009 (-0.01)	-0.009 (-0.01)	-0.920 (-0.85)	-0.920 (-0.85)
	t-1	-1.359*** (-2.66)	-1.359*** (-2.66)	-1.180** (-2.13)	-1.180** (-2.13)	-0.058 (-0.09)	-0.058 (-0.09)	-0.643 (-0.64)	-0.643 (-0.64)
Crisis Index, *ci14*	t-1	-3.758 (-0.95)	-3.758 (-0.95)	-3.972 (-0.95)	-3.972 (-0.95)	2.712 (0.43)	2.712 (0.43)	2.379 (0.37)	2.379 (0.37)
Constant		-0.261 (-0.48)	-0.261 (-0.48)	-1.374*** (-2.84)	-1.374*** (-2.84)	-1.732** (-2.26)	-1.732** (-2.26)	-0.717 (-1.00)	-0.717 (-1.00)
Sargan Test (p-value)		0.20	0.20	0.12	0.12	0.37	0.37	0.56	0.56
Second-order serial correlation test (p-value)		0.26	0.26	0.20	0.20	0.07	0.07	0.06	0.06
No. of observation		243	243	243	243	159	159	151	151
No. of countries		24	24	24	24	19	19	18	18

Table 9a. Monetary Discipline – Inflation with political and economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Inflation (CPI)	t-1	0.573*** (12.17)	0.564*** (12.12)	0.445*** (8.94)	0.473*** (9.41)	0.672*** (10.13)	0.701*** (10.38)
	t-2	-0.024*** (-6.67)	-0.023*** (-6.60)	-0.016*** (-4.60)	-0.017*** (-4.88)	-0.127** (-1.96)	-0.040 (-0.62)
Hard Pegs	t-1	-37.774*** (-5.26)	-35.782*** (-5.29)	*(dropped)*	*(dropped)*	-58.910*** (-6.19)	-65.109*** (-8.11)
Adjustable Pegs	t-1	3.183 (1.12)	2.016 (0.75)	3.498 (1.36)	4.158** (1.58)	-37.343*** (-4.00)	-47.330*** (-6.10)
Forward-looking Crawls	t-1	0.213 (0.07)	-0.642 (0.23)	0.913 (0.32)	-0.313 (-0.11)	-39.872*** (-4.44)	-46.838*** (-6.46)
Backward-looking Crawls	t-1	-10.843*** (-4.40)	-11.796*** (-5.08)	-7.205*** (-3.57)	-7.990*** (-3.89)	-43.709*** (-5.39)	-46.520*** (-6.88)
Managed Floats	t-1	-0.243 (-0.10)	0.090 (0.04)	2.300 (1.00)	2.277 (0.97)	-41.735*** (-4.52)	-50.161*** (-6.65)
Government Stability	t-1	-0.632* (-1.82)	-	-1.369*** (-3.72)	-	0.470 (0.80)	-
Divided Government	t-1	-	-3.297* (-1.82)	-	-7.450*** (-3.83)	-	-1.088 (-0.36)
Election Dummy	t-1	-0.353 (-0.44)	-0.091 (-0.12)	-0.097 (-0.11)	0.262 (0.33)	0.408 (0.30)	0.551 (0.47)
Openness	t	39.512*** (6.71)	40.929*** (7.10)	40.727*** (6.40)	39.368*** (6.03)	35.602*** (3.62)	22.213** (2.46)
	t-1	-25.543*** (-4.32)	-25.100*** (-4.32)	-20.975*** (-3.27)	-19.343*** (-2.92)	-21.156** (-2.24)	-14.129◊ (-1.61)
Terms of Trade	t	-0.001 (-0.05)	0.003 (0.21)	-0.005 (-0.07)	-0.040 (-0.55)	-0.002 (-0.12)	0.001 (0.09)
	t-1	-0.004 (-0.34)	-0.003 (-0.24)	0.068 (1.01)	0.023 (0.33)	-0.008 (-0.63)	-0.007 (-0.61)
Real GDP growth	t	-0.475*** (-6.77)	-0.458*** (-6.75)	-0.814*** (-6.37)	-0.833*** (-6.33)	-0.372*** (-4.67)	-0.427*** (-6.08)
	t-1	-0.056 (-0.79)	-0.062 (-0.93)	0.123 (1.06)	0.140 (1.17)	0.012 (0.14)	0.025 (0.32)
Change in US T-bills	t	0.007 (0.53)	0.006 (0.45)	0.033** (2.05)	0.032* (1.95)	-0.014 (-0.57)	-0.018 (-0.91)
	t-1	0.017 (1.18)	0.021 (1.54)	0.013 (0.82)	0.015 (0.93)	-0.009 (-0.34)	-0.007 (-0.30)
Fiscal Balance (CAB)	t	-0.424* (-1.70)	-0.313 (-1.11)	-0.085 (-0.27)	0.002 (0.01)	-0.905** (-2.43)	-2.088*** (-4.48)
	t-1	0.226 (0.97)	0.228 (0.88)	0.058 (0.21)	0.120 (0.42)	0.605 (1.75)	1.364*** (3.28)
Crisis Index, *ci7*	t-1	0.773 (0.63)	0.630 (0.54)	-0.382 (-0.27)	-0.395 (-0.27)	2.803 (1.41)	2.196 (1.29)
Constant		-0.862*** (-3.45)	-1.289*** (-5.91)	-0.571** (-2.13)	-1.342*** (-5.42)	-1.665*** (-4.23)	-0.914*** (-3.13)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.71	0.62
Second-order serial correlation test (p-value)		0.50	0.81	0.80	0.20	0.15	0.01
No. of observation		402	394	243	243	159	156
No. of countries		43	42	24	24	19	19

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 9b. Monetary Discipline – Inflation with political and economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Inflation (CPI)	t-1	0.573*** (12.26)	0.562*** (12.14)	0.434*** (8.81)	0.458*** (9.20)	0.693*** (10.32)	0.720*** (10.22)
	t-2	-0.023*** (-6.66)	-0.023*** (-6.52)	-0.015*** (-4.49)	-0.016*** (-4.72)	-0.138** (-2.09)	-0.042** (-0.64)
Hard Pegs	t-1	-39.455*** (-5.46)	-37.367*** (-5.51)	*(dropped)*	*(dropped)*	-54.922*** (-5.57)	-63.313*** (-7.60)
Adjustable Pegs	t-1	3.528 (1.25)	2.383 (0.89)	3.910 (1.53)	4.542* (1.75)	-35.778*** (-3.81)	-45.842*** (-5.88)
Forward-looking Crawls	t-1	0.888 (0.30)	0.061 (0.02)	2.810 (0.98)	1.845 (0.63)	-38.245*** (-4.24)	-45.217*** (-6.21)
Backward-looking Crawls	t-1	-10.355*** (-4.20)	-11.244*** (-4.85)	-6.367*** (-3.15)	-6.938*** (-3.37)	-41.483*** (-5.11)	-44.828*** (-6.61)
Managed Floats	t-1	0.019 (0.01)	0.333 (0.14)	2.498 (1.10)	2.434 (1.05)	-39.742*** (-4.30)	-48.738*** (-6.42)
Government Stability	t-1	-0.576* (-1.66)	-	-1.231*** (-3.36)	-	0.394 (0.66)	-
Divided Government	t-1	-	-3.419* (-1.90)	-	-7.356*** (-3.83)	-	-0.459 (-0.15)
Election Dummy	t-1	-0.312 (-0.40)	-0.068 (-0.09)	-0.232 (-0.28)	0.112 (0.13)	0.251 (0.18)	0.446 (0.37)
Openness	t	38.839*** (6.63)	39.866*** (6.92)	38.880*** (6.13)	37.284*** (5.75)	36.685*** (3.69)	22.906*** (2.48)
	t-1	-24.817*** (-4.20)	-24.016*** (-4.13)	-19.652*** (-3.08)	-17.782*** (-2.71)	-21.788** (-2.27)	-13.303** (-1.49)
Terms of Trade	t	-0.001 (-0.08)	0.002 (0.19)	-0.022 (-0.31)	-0.056 (-0.79)	-0.002 (-0.15)	0.001 (0.06)
	t-1	-0.005 (-0.38)	-0.003 (-0.27)	0.066 (0.98)	0.019 (0.27)	-0.008 (-0.60)	-0.007 (-0.60)
Real GDP growth	t	-0.469*** (-6.74)	-0.455*** (-6.77)	-0.693*** (-5.35)	-0.709*** (-5.35)	-0.373*** (-4.61)	-0.430*** (-6.00)
	t-1	-0.055 (-0.79)	-0.062 (-0.94)	0.117 (1.02)	0.138 (1.17)	-0.028 (-0.32)	0.001 (002)
Change in US T-bills	t	0.008 (0.58)	0.007 (0.55)	0.032** (1.99)	0.031* (1.93)	-0.016 (-0.66)	-0.021 (-1.03)
	t-1	0.015 (1.03)	0.019 (1.38)	0.011 (0.70)	0.012 (0.78)	-0.010 (-0.38)	-0.009 (-0.39)
Fiscal Balance (CAB)	t	-0.451* (-1.82)	-0.378 (-1.35)	-0.117 (-0.38)	-0.046 (-0.14)	-0.755** (-2.01)	-2.083*** (-4.35)
	t-1	0.137 (0.74)	0.162 (0.63)	-0.043 (-0.16)	-0.007 (-0.03)	0.686* (1.93)	1.502*** (3.52)
Crisis Index, *ci14*	t-1	2.860◊ (1.57)	2.912* (1.70)	4.207** (2.16)	4.662** (2.35)	-3.480 (-1.02)	-1.659 (-0.56)
Constant		-0.835*** (-3.39)	-1.230*** (-5.68)	-0.524** (-1.99)	-1.229*** (-5.02)	-1.853*** (-4.69)	-0.998*** (-3.33)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.78	0.66
Second-order serial correlation test (p-value)		0.44	0.90	0.84	0.28	0.20	0.02
No. of observation		402	394	243	243	159	151
No. of countries		43	42	24	24	19	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 9c. Monetary Discipline – Inflation with interaction terms (*ci7*)

		Emerging-Market Economies				Developing Countries			
Inflation (CPI)	t-1	0.475*** (9.13)	0.475*** (9.13)	0.476*** (9.09)	0.476*** (9.09)	0.673*** (9.87)	0.673*** (9.87)	0.695*** (10.50)	0.695*** (10.50)
	t-2	-0.017*** (-4.82)	-0.017*** (-4.82)	-0.017*** (-4.81)	-0.017*** (-4.81)	-0.120* (-1.84)	-0.120* (-1.84)	-0.055 (-0.85)	-0.055 (-0.85)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-72.119*** (-2.63)	-	-66.026*** (-8.29)	-
Adjustable Pegs	t-1	17.725** (2.18)	17.725** (2.18)	7.456** (2.04)	*(dropped)*	-61.295** (-2.53)	10.824 (0.74)	-46.070*** (-5.68)	19.957*** (2.86)
Forward-looking Crawls	t-1	33.851*** (3.99)	33.851*** (3.99)	0.612 (0.18)	-6.844* (-1.72)	-62.583** (-2.49)	9.536 (0.64)	-41.596*** (-5.55)	24.430*** (3.47)
Backward-looking Crawls	t-1	6.803*** (0.76)	6.803*** (0.76)	-7.213*** (-2.61)	-14.669*** (-1.72)	-54.049** (-2.21)	18.070 (1.36)	-48.131*** (-7.13)	17.895*** (3.30)
Managed Floats	t-1	14.631* (1.86)	14.631* (1.86)	4.092 (1.16)	-3.364 (-1.10)	-72.329*** (-3.06)	-0.210 (-0.01)	-39.871*** (-4.38)	26.155*** (3.16)
Floats	t-1	-	*(dropped)*	-	-7.456** (-2.04)	-	72.119*** (2.63)	-	66.026*** (8.29)
Government Stability	t-1	0.238 (0.32)	0.260 (0.18)	-	-	-2.146 (-0.84)	-0.356 (-0.32)	-	-
Divided Government	t-1	-	-	-5.212* (-1.75)	-11.983** (-2.43)	-	-	11.857° (1.58)	0.416 (0.09)
Hard pegs and Stab/Div	t-1	0.022 (0.01)	-	-6.771 (-1.18)	-	1.789 (0.62)	-	-11.441 (-1.30)	-
Adj pegs and Stab/Div	t-1	-1.560° (-1.63)	-1.582 (-1.07)	-8.211° (-1.55)	-1.440 (-0.20)	2.668 (0.99)	0.878 (0.60)	*(dropped)*	11.441 (1.30)
FW and Stab/Div	t-1	-4.580*** (-4.45)	-4.602*** (-3.05)	-0.564 (-0.12)	6.207 (0.99)	2.623 (0.95)	0.834 (0.56)	-14.596* (-1.76)	-3.155 (-0.42)
BW and Stab/Div	t-1	-1.533 (-1.48)	-1.555 (-1.03)	0.403 (0.10)	7.174 (1.21)	1.103 (0.41)	-0.686 (-0.46)	-0.864 (-0.09)	10.577 (1.22)
Managed float and Stab/Div	t-1	-1.384 (-1.53)	-1.406 (-0.99)	-4.513* (-0.96)	2.258 (0.35)	3.510 (1.38)	1.720 (1.29)	-17.475** (-2.43)	-6.034 (-0.93)
Floats and Stab/Div	t-1	-	-0.022 (-0.01)	-	6.771 (1.18)	-	-1.789 (-0.62)	-	*(dropped)*
Election Dummy	t-1	-0.072 (-0.08)	-0.072 (-0.08)	0.182 (0.20)	0.182 (0.20)	0.835 (0.60)	0.835 (0.60)	0.225 (0.20)	0.225 (0.20)
Openness	t	40.101*** (6.29)	40.101*** (6.29)	40.840*** (5.95)	40.840*** (5.95)	35.286*** (3.55)	35.286*** (3.55)	19.034** (2.06)	19.034** (2.06)
	t-1	-20.954*** (-3.25)	-20.954*** (-3.25)	-19.673*** (-2.92)	-19.673*** (-2.92)	-20.000** (-1.98)	-20.000** (-1.98)	-11.508 (-1.27)	-11.508 (-1.27)
Terms of Trade	t	-0.006 (-0.08)	-0.006 (-0.08)	-0.037 (-0.50)	-0.037 (-0.50)	-0.005 (-0.39)	-0.005 (-0.39)	0.0005 (0.04)	0.0005 (0.04)
	t-1	0.110° (1.60)	0.110° (1.60)	0.041 (0.56)	0.041 (0.56)	-0.011 (-0.80)	-0.011 (-0.80)	-0.007 (-0.69)	-0.007 (-0.69)
Real GDP growth	t	-0.848*** (-6.37)	-0.848*** (-6.37)	-0.760*** (-5.35)	-0.760*** (-5.35)	-0.435*** (-5.05)	-0.435*** (-5.05)	-0.421*** (-6.04)	-0.421*** (-6.04)
	t-1	0.178 (1.46)	0.178 (1.46)	0.139 (1.10)	0.139 (1.10)	-0.033 (-0.35)	-0.033 (-0.35)	0.054 (0.67)	0.054 (0.67)
Change in US T-bills	t	0.037** (2.29)	0.037** (2.29)	0.030* (1.73)	0.030* (1.73)	-0.019 (-0.79)	-0.019 (-0.79)	-0.003 (-0.13)	-0.003 (-0.13)
	t-1	0.007 (0.46)	0.007 (0.46)	0.015 (0.93)	0.015 (0.93)	-0.013 (-0.49)	-0.013 (-0.49)	0.001 (0.04)	0.001 (0.04)
Fiscal Balance (CAB)	t	-0.189 (-0.59)	-0.189 (-0.59)	0.050 (0.15)	0.050 (0.15)	-0.822** (-2.13)	-0.822** (-2.13)	-2.217*** (-4.73)	-2.217*** (-4.73)
	t-1	0.203 (0.72)	0.203 (0.72)	0.131 (0.44)	0.131 (0.44)	0.651* (1.93)	0.651* (1.93)	1.069*** (2.61)	1.069*** (2.61)
Crisis Index, *ci7*	t-1	-0.725 (-0.51)	-0.725 (-0.51)	-0.186 (-0.19)	-0.186 (-0.19)	3.347* (1.65)	3.347* (1.65)	3.020* (1.76)	3.020* (1.76)
Constant		-0.480* (-1.74)	-0.480* (-1.74)	-1.339*** (-5.26)	-1.339*** (-5.26)	-1.691*** (-4.17)	-1.691*** (-4.17)	-0.569* (-1.70)	-0.569* (-1.70)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.70	0.70	0.51	0.51
Second-order serial correlation test (p-value)		0.37	0.37	0.17	0.17	0.22	0.22	0.04	0.04
No. of observation		243	243	243	243	159	159	151	151
No. of countries		24	24	24	24	19	19	18	18

Table 9d. Monetary Discipline – Inflation with interaction terms (*ci14*)

		Emerging-Market Economies				Developing Countries			
Inflation (CPI)	t-1	0.462***	0.462***	0.462***	0.462***	0.700***	0.700***	0.707***	0.707***
		(8.96)	(8.96)	(8.92)	(8.92)	(10.07)	(10.07)	(10.20)	(10.20)
	t-2	-0.016***	-0.016***	-0.017***	-0.017***	-0.127*	-0.127*	-0.054	-0.054
		(-4.64)	(-4.64)	(-4.68)	(-4.68)	(-1.90)	(-1.90)	(-0.81)	(-0.81)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-61.624**	-	-64.012***	-
						(-2.17)		(-7.73)	
Adjustable Pegs	t-1	17.715**	8.016	7.846**	5.020	-54.181**	7.443	-43.649***	20.363***
		(2.21)	(1.13)	(2.18)	(1.26)	(-2.20)	(0.49)	(-5.37)	(2.74)
Forward-looking Crawls	t-1	34.548***	24.848***	2.826	*(dropped)*	-53.243**	8.381	-39.987***	24.026***
		(4.11)	(3.22)	(0.83)		(-2.10)	(0.55)	(-5.27)	(3.23)
Backward-looking Crawls	t-1	9.700***	*(dropped)*	-6.375**	-9.201**	-47.527**	14.098	-46.222***	17.791***
		(1.10)		(-2.33)	(-2.73)	(-1.91)	(1.02)	(-6.79)	(2.83)
Managed Floats	t-1	16.078**	6.379	4.154	1.328	-63.476***	-1.852	-38.487***	25.525***
		(2.06)	(0.88)	(1.20)	(0.32)	(-3.06)	(-0.13)	(-4.15)	(2.89)
Floats	t-1	-	-9.700	-	-2.826	-	61.624**	-	64.012***
			(-1.10)		(-0.83)		(2.17)		(7.73)
Government Stability	t-1	0.431	0.492	-	-	-1.454	-0.518	-	-
		(0.59)	(0.35)			(-0.55)	(-0.46)		
Divided Government	t-1	-	-	-5.030*	-13.078***	-	-	10.517	0.154
				(-1.72)	(-2.65)			(1.38)	(0.03)
Hard pegs and Stab/Div	t-1	0.061	-	-8.049	-	0.935	-	-10.364	-
		(0.04)		(-1.42)		(0.32)		(-1.16)	
Adj pegs and Stab/Div	t-1	-1.523◊	1.584	-8.513◊	-0.464	2.092	1.156	*(dropped)*	10.364
		(-1.61)	(-1.09)	(-1.63)	(-0.07)	(0.76)	(0.77)		(1.16)
FW and Stab/Div	t-1	-4.400***	-4.461***	-0.711	7.338	1.744	0.808	-12.401	-2.037
		(-4.32)	(-2.99)	(-0.15)	(1.18)	(0.62)	(0.53)	(-1.48)	(-0.26)
BW and Stab/Div	t-1	-1.809*	-1.870	0.846	8.894	0.677	-0.258	1.341	11.705
		(-1.77)	(-1.25)	(0.22)	(1.52)	(0.25)	(-0.17)	(0.14)	(1.13)
Managed float and Stab/Div	t-1	-1.549	-1.611	-4.540	3.509	2.731	1.795	-15.302**	-4.938
		(-1.73)	(-1.15)	(-0.98)	(0.55)	(1.05)	(1.32)	(-2.09)	(-0.74)
Floats and Stab/Div	t-1	-	-0.061	-	8.049	-	-0.935	-	*(dropped)*
			(-0.04)		(1.42)		(-0.32)		
Election Dummy	t-1	-0.230	-0.230	0.067	0.067	0.733	0.733	0.255	0.255
		(-0.27)	(-0.27)	(0.08)	(0.08)	(0.51)	(0.51)	(0.22)	(0.22)
Openness	t	38.500***	38.500***	38.604***	38.604***	36.898***	36.898***	20.083**	20.083**
		(6.06)	(6.06)	(5.67)	(5.67)	(3.65)	(3.65)	(2.13)	(2.13)
	t-1	-19.617***	-19.617***	-17.739***	-17.739***	-20.199**	-20.199**	-10.675	-10.675
		(-3.06)	(-3.06)	(-2.65)	(-2.65)	(-1.96)	(-1.96)	(-1.15)	(-1.15)
Terms of Trade	t	-0.016	-0.016	-0.053	-0.053	-0.005	-0.005	0.00007	0.00007
		(-0.23)	(-0.23)	(-0.73)	(-0.73)	(-0.38)	(-0.38)	(0.00)	(0.00)
	t-1	0.100	0.100	0.039	0.039	-0.010	-0.010	-0.008	-0.008
		(1.48)	(1.48)	(0.55)	(0.55)	(-0.76)	(-0.76)	(-0.69)	(-0.69)
Real GDP growth	t	-0.734***	-0.734***	-0.624***	-0.624***	-0.430***	-0.430***	-0.433***	-0.433***
		(-5.53)	(-5.53)	(-4.37)	(-4.37)	(-4.88)	(-4.88)	(-6.09)	(-6.09)
	t-1	0.170	0.170	0.141	0.141	-0.068	-0.068	0.016	0.016
		(1.41)	(1.41)	(1.14)	(1.14)	(-0.71)	(-0.71)	(0.20)	(0.20)
Change in US T-bills	t	0.035**	0.035**	0.030*	0.030*	-0.021	-0.021	-0.007	-0.007
		(2.22)	(2.22)	(1.74)	(1.74)	(-0.85)	(-0.85)	(-0.34)	(-0.34)
	t-1	0.006	0.006	0.013	0.013	-0.015	-0.015	-0.002	-0.002
		(0.35)	(0.35)	(0.78)	(0.78)	(-0.58)	(-0.58)	(-0.10)	(-0.10)
Fiscal Balance (CAB)	t	-0.214	-0.214	0.010	0.010	-0.671*	-0.671*	-2.226***	-2.226***
		(-0.68)	(-0.68)	(0.03)	(0.03)	(-1.71)	(-1.71)	(-4.60)	(-4.60)
	t-1	0.084	0.084	0.022	0.022	0.737**	0.737**	1.225***	1.225***
		(0.30)	(0.30)	(0.07)	(0.07)	(2.10)	(2.10)	(2.89)	(2.89)
Crisis Index, *ci14*	t-1	3.661*	3.661*	4.966**	4.966**	-2.355	-2.355	-0.395	-0.395
		(1.85)	(1.85)	(2.46)	(2.46)	(-0.67)	(-0.67)	(-0.13)	(-0.13)
Constant		-0.448◊	-0.448◊	-1.236***	-1.236***	-1.884***	-1.884***	-0.733**	-0.733**
		(-1.64)	(-1.64)	(-4.91)	(-4.91)	(-4.60)	(-4.60)	(-2.15)	(-2.15)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.75	0.75	0.54	0.54
Second-order serial correlation test (p-value)		0.42	0.42	0.24	0.24	0.29	0.29	0.05	0.05
No. of observation		243	243	243	243	159	159	151	151
No. of countries		24	24	24	24	19	19	18	18

Table 10a. Cyclically Adjusted Balance (CAB) with political and economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.124**	0.184**	0.072	0.068	0.177**	0.462***
		(2.46)	(3.67)	(1.13)	(1.06)	(2.20)	(6.64)
	t-2	0.239***	0.267***	0.338***	0.340***	0.178**	-0.034
		(5.41)	(6.29)	(6.44)	(6.46)	(2.31)	(-0.53)
Hard Pegs	t-1	-1.402	-0.365	*(dropped)*	*(dropped)*	-3.024	-3.362**
		(-0.60)	(-0.18)			(-1.07)	(-2.00)
Adjustable Pegs	t-1	-0.318	0.582	0.574	0.582	-6.829**	-3.084*
		(-0.44)	(0.92)	(0.86)	(0.87)	(-2.36)	(-1.68)
Forward-looking Crawls	t-1	-1.079	-1.212*	-1.403*	-1.367*	-5.348*	-3.845**
		(-1.43)	(-1.91)	(-1.85)	(-1.79)	(-1.86)	(-2.16)
Backward-looking Crawls	t-1	-0.798	-0.572	-0.975*	-0.986*	-3.490	-2.049
		(-1.24)	(-1.05)	(-1.67)	(-1.68)	(-1.30)	(-1.24)
Managed Floats	t-1	0.399	0.127	0.061	0.058	-4.307	-3.817**
		(0.59)	(0.22)	(0.10)	(0.09)	(-1.47)	(-2.11)
Government Stability	t-1	0.136◊	-	-0.070	-	0.379**	-
		(1.56)		(-0.74)		(2.51)	
Divided Government	t-1	-	0.281	-	0.123	-	-0.014
			(0.67)		(0.25)		(-0.03)
Election Dummy	t-1	-0.244	-0.269◊	-0.080	-0.088	-0.206	-0.212
		(-1.26)	(-1.61)	(-0.38)	(-0.42)	(-0.58)	(-1.00)
Openness	t	0.562	-2.252*	-1.885	-2.073	4.863*	-1.970
		(0.38)	(-1.73)	(-1.23)	(-1.36)	(1.88)	(-1.20)
	t-1	-1.422	1.456	1.922	1.911	-2.427	4.059***
		(-1.03)	(1.20)	(1.38)	(1.35)	(-1.05)	(2.70)
Terms of Trade	t	0.001	0.001	0.028◊	0.026	0.0001	0.0001
		(0.21)	(0.29)	(1.58)	(1.50)	(0.04)	(0.06)
	t-1	0.001	0.0002	0.006	0.004	0.001	-0.0003
		(0.35)	(0.06)	(0.34)	(0.25)	(0.43)	(-0.17)
Real GDP growth	t	-0.043**	-0.046***	-0.088***	-0.080**	-0.039◊	-0.056***
		(-2.30)	(-2.86)	(-2.50)	(-2.36)	(-1.63)	(-3.79)
	t-1	0.016	0.020	0.108***	0.105***	-0.006	-0.009
		(0.91)	(1.35)	(3.75)	(3.64)	(-0.24)	(-0.62)
Change in US T-bills	t	-0.0004	0.003	0.007*	0.006◊	-0.010◊	-0.005
		(-0.12)	(0.91)	(1.74)	(1.55)	(-1.62)	(-1.53)
	t-1	0.002	0.003	0.0005	0.0003	0.001	-0.0002
		(0.60)	(1.01)	(0.00)	(0.07)	(0.23)	(-0.05)
Inflation	t	-0.032**	-0.009	-0.005	-0.001	-0.057**	-0.057***
		(-2.18)	(-0.63)	(-0.30)	(-0.04)	(-2.27)	(-3.16)
	t-1	0.007	0.001	0.014	0.013	-0.001	0.022◊
		(0.69)	(0.17)	(1.38)	(1.28)	(-0.06)	(1.55)
Crisis Index, *ci7*	t-1	0.785**	0.347	0.136	0.149	1.743***	0.337
		(2.48)	(1.27)	(0.37)	(0.41)	(3.30)	(1.02)
Constant		0.026	0.085◊	0.125*	0.104◊	-0.176	0.018
		(0.39)	(1.57)	(1.80)	(1.61)	(-0.49)	(0.28)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.10	0.01
Second-order serial correlation test (p-value)		0.25	0.84	0.73	0.76	0.45	0.68
No. of observation		370	363	225	225	145	138
No. of countries		43	42	24	24	19	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 10b. Cyclically Adjusted Balance (CAB) with political and economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.119**	0.178**	0.078	0.072	0.159*	0.438***
		(2.32)	(3.52)	(1.21)	(1.13)	(1.82)	(5.94)
	t-2	0.241***	0.268***	0.339***	0.340***	0.180**	-0.031
		(5.42)	(6.34)	(6.46)	(6.48)	(2.26)	(-0.48)
Hard Pegs	t-1	-1.579	-0.815	*(dropped)*	*(dropped)*	-2.904	-3.804**
		(-0.65)	(-0.39)			(-0.98)	(-2.09)
Adjustable Pegs	t-1	-0.211	0.684	0.565	0.582	-4.408**	-2.439
		(-0.29)	(1.08)	(0.84)	(0.87)	(-1.49)	(-1.35)
Forward-looking Crawls	t-1	-1.125	-1.176*	-1.536**	-1.489*	-2.982*	-3.307*
		(-1.47)	(-1.84)	(-1.98)	(-1.91)	(-1.00)	(-1.87)
Backward-looking Crawls	t-1	-0.753	-0.524	-1.004*	-1.012*	-1.320	-1.582
		(-1.16)	(-0.96)	(-1.71)	(-1.72)	(-1.48)	(-0.97)
Managed Floats	t-1	0.517	0.193	0.075	0.076	-1.740	-3.218*
		(0.76)	(0.33)	(0.12)	(0.12)	(-1.58)	(-1.80)
Government Stability	t-1	0.139◊	-	-0.077	-	0.384**	-
		(1.57)		(-0.82)		(2.46)	
Divided Government	t-1	-	0.268	-	0.110	-	-0.015
			(0.64)		(0.22)		(-0.03)
Election Dummy	t-1	-0.211	-0.258◊	-0.065	-0.072	-0.181	-0.198
		(-1.08)	(-1.56)	(-0.32)	(-0.34)	(-0.49)	(-0.93)
Openness	t	0.865	-2.241*	-1.791	-2.004	5.782**	-1.957
		(0.58)	(-1.73)	(-1.16)	(-1.31)	(2.18)	(-1.20)
	t-1	-1.450	1.544	1.871	1.882	-2.085	4.254***
		(-1.04)	(1.27)	(1.32)	(1.32)	(-0.87)	(2.87)
Terms of Trade	t	0.0005	0.001	0.028◊	0.027	-0.0002	0.0001
		(0.16)	(0.26)	(1.60)	(1.52)	(-0.05)	(0.03)
	t-1	0.001	0.00003	0.006	0.004	0.001	-0.0004
		(0.30)	(0.01)	(0.34)	(0.23)	(0.36)	(-0.23)
Real GDP growth	t	-0.049***	-0.049***	-0.097***	-0.088***	-0.042*	-0.057***
		(-2.63)	(-3.04)	(-2.85)	(-2.60)	(-1.69)	(-3.89)
	t-1	0.011	0.018	0.107***	0.104***	-0.016	-0.011
		(0.60)	(1.22)	(3.73)	(3.61)	(-0.67)	(-0.77)
Change in US T-bills	t	-0.0004	0.003	0.007*	0.006◊	-0.010◊	-0.005
		(0.12)	(0.95)	(1.77)	(1.57)	(-1.62)	(-1.50)
	t-1	0.002	0.003	0.0001	0.0004	0.002	-0.0008
		(0.58)	(0.96)	(0.04)	(0.10)	(0.24)	(-0.20)
Inflation	t	-0.036**	-0.012	-0.004	0.001	-0.053**	-0.056***
		(-2.38)	(-0.84)	(-0.24)	(0.03)	(-2.04)	(-3.14)
	t-1	0.008	0.002	0.014	0.013	-0.002	0.021
		(0.81)	(0.25)	(1.37)	(1.27)	(-0.11)	(1.42)
Crisis Index, *ci14*	t-1	0.575	0.491	-0.210	-0.172	1.561*	0.656
		(1.23)	(1.24)	(-0.41)	(-0.34)	(1.69)	(1.20)
Constant		0.007	0.080	0.120*	0.097	-0.185	0.023
		(0.11)	(1.50)	(1.76)	(1.52)	(-1.52)	(0.36)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.12	0.01
Second-order serial correlation test (p-value)		0.16	0.78	0.64	0.69	0.27	0.70
No. of observation		370	363	225	225	145	138
No. of countries		43	42	24	24	19	18

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 10c. Fiscal Discipline – Cyclically adjusted fiscal balance with interaction terms (*ci7*)

		Emerging-Market Economies				Developing Countries			
CAB	t-1	0.052	0.052	0.061	0.061	0.132◊	0.132◊	0.425***	0.425***
		(0.84)	(0.84)	(0.95)	(0.95)	(1.56)	(1.56)	(6.00)	(6.00)
	t-2	0.352***	0.352***	0.358***	0.358***	0.129◊	0.129◊	-0.070	-0.070
		(6.86)	(6.86)	(6.62)	(6.62)	(1.57)	(1.57)	(-1.08)	(-1.08)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-10.166	-	-4.575**	-
						(-1.25)		(-2.46)	
Adjustable Pegs	t-1	0.584	-3.339*	0.157	2.324**	-15.444**	-5.278	-2.457	2.118
		(0.28)	(-1.94)	(0.19)	(2.44)	(-1.96)	(-1.14)	(-1.21)	(1.07)
Forward-looking Crawls	t-1	3.923*	*(dropped)*	-2.168***	*(dropped)*	-17.722**	-7.556*	-1.658	2.916
		(1.80)		(-2.58)		(-2.32)	(-1.69)	(-0.84)	(1.44)
Backward-looking Crawls	t-1	0.252	-3.672**	-1.220*	0.947	-14.324*	-4.158	-2.981*	1.594
		(0.12)	(-1.96)	(-1.74)	(1.06)	(-1.78)	(-0.93)	(-1.77)	(1.10)
Managed Floats	t-1	0.181	-3.742**	0.039	2.206**	-13.783*	-3.617	-2.406	2.169
		(0.09)	(-2.01)	(0.05)	(2.16)	(-1.77)	(-0.83)	(-1.13)	(1.01)
Floats	t-1	-	-3.923*	-	2.168***	-	10.166	-	4.575**
			(-1.80)		(2.58)		(1.25)		(2.46)
Government Stability	t-1	0.041	-0.326	-	-	-0.762	0.157	-	-
		(0.22)	(-0.62)			(-0.96)	(0.45)		
Divided Government	t-1	-	-	-0.770	1.373	-	-	0.008	0.008
				(-1.10)	(0.82)			(0.01)	(0.01)
Hard pegs and Stab/Div	t-1	-0.368	-	2.143	-	0.919	-	*(dropped)*	-
		(-0.65)		(1.18)		(1.07)			
Adj pegs and Stab/Div	t-1	0.088	0.455	1.413	-0.730	0.933	0.014	1.664	1.664
		(0.36)	(0.84)	(1.09)	(-0.34)	(1.12)	(0.03)	(1.01)	(1.01)
FW and Stab/Div	t-1	-0.773***	-0.406	2.203*	0.060	1.459*	0.540	-1.122	-1.122
		(-2.92)	(-0.72)	(1.89)	(0.03)	(1.83)	(1.30)	(-0.80)	(-0.80)
BW and Stab/Div	t-1	-0.128	0.239	0.739	-1.404	1.191	0.272	2.686	2.686
		(-0.51)	(0.43)	(0.81)	(-0.75)	(1.41)	(0.62)	(1.46)	(1.46)
Managed float and Stab/Div	t-1	0.046	0.413	0.292	-1.851	1.092	0.173	0.038	0.038
		(0.20)	(0.76)	(0.25)	(-0.91)	(1.36)	(0.45)	(0.03)	(0.03)
Floats and Stab/Div	t-1	-	0.368	-	-2.143	-	-0.919	-	*(dropped)*
			(0.65)		(-1.18)		(-1.07)		
Election Dummy	t-1	-0.095	-0.095	-0.054	-0.054	-0.261	-0.261	-0.221	-0.221
		(-0.48)	(-0.48)	(-0.25)	(-0.25)	(-0.73)	(-0.73)	(-1.04)	(-1.04)
Openness	t	-1.857	-1.857	-2.360	-2.360	4.472*	4.472*	-2.341	-2.341
		(-1.27)	(-1.27)	(-1.49)	(-1.49)	(1.73)	(1.73)	(-1.40)	(-1.40)
	t-1	1.880	1.880	2.156	2.156	-3.645	-3.645	3.749**	3.749**
		(1.39)	(1.39)	(1.52)	(1.52)	(-1.47)	(-1.47)	(2.37)	(2.37)
Terms of Trade	t	0.025	0.025	0.030*	0.030*	0.0002	0.0002	-0.0003	-0.0003
		(1.47)	(1.47)	(1.72)	(1.72)	(0.06)	(0.06)	(-0.18)	(-0.18)
	t-1	0.008	0.008	0.002	0.002	0.002	0.002	-0.001	-0.001
		(0.51)	(0.51)	(0.13)	(0.13)	(0.56)	(0.56)	(-0.66)	(-0.66)
Real GDP growth	t	-0.117***	-0.117***	-0.107***	-0.107***	-0.040◊	-0.040◊	-0.057***	-0.057***
		(-3.50)	(-3.50)	(-3.00)	(-3.00)	(-1.62)	(-1.62)	(-3.77)	(-3.77)
	t-1	0.102***	0.102***	0.106***	0.106***	-0.016	-0.016	-0.003	-0.003
		(3.64)	(3.64)	(3.63)	(3.63)	(-0.68)	(-0.68)	(-0.22)	(-0.22)
Change in US T-bills	t	0.007*	0.007*	0.008*	0.008*	-0.010*	-0.010*	-0.002	-0.002
		(1.76)	(1.76)	(1.95)	(1.95)	(-1.64)	(-1.64)	(-0.61)	(-0.61)
	t-1	0.001	0.001	0.002	0.002	0.004	0.004	0.001	0.001
		(0.32)	(0.32)	(0.41)	(0.41)	(0.60)	(0.60)	(0.16)	(0.16)
Inflation	t	-0.020	-0.020	-0.0001	-0.0001	-0.052**	-0.052**	-0.069***	-0.069***
		(-1.16)	(-1.16)	(-0.01)	(-0.01)	(-2.03)	(-2.03)	(-3.68)	(-3.68)
	t-1	0.013	0.013	0.014	0.014	-0.006	-0.006	0.028*	0.028*
		(1.31)	(1.31)	(1.42)	(1.42)	(-0.28)	(-0.28)	(1.92)	(1.92)
Crisis Index, *ci7*	t-1	-0.044	-0.044	0.136	0.136	1.744***	1.744***	0.434	0.434
		(-0.12)	(-0.12)	(0.37)	(0.37)	(3.22)	(3.22)	(1.28)	(1.28)
Constant		0.079*	0.079*	0.099	0.099	-0.136	-0.136	0.066	0.066
		(1.15)	(1.15)	(1.51)	(1.51)	(-1.11)	(-1.11)	(0.96)	(0.96)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.17	0.17	0.03	0.03
Second-order serial correlation test (p-value)		0.45	0.45	0.29	0.29	0.54	0.54	0.81	0.81
No. of observation		225	225	225	225	145	145	138	138
No. of countries		24	24	24	24	19	19	18	18

Table 10d. Fiscal Discipline – Cyclically adjusted fiscal balance with interaction terms (*ci14*)

		Emerging-Market Economies				Developing Countries			
CAB	t-1	0.058	0.058	0.067	0.067	0.113	0.113	0.398***	0.398***
		(0.94)	(0.94)	(1.04)	(1.04)	(1.23)	(1.23)	(5.30)	(5.30)
	t-2	0.350***	0.350***	0.360***	0.360***	0.133°	0.133°	-0.066	-0.066
		(6.84)	(6.84)	(6.66)	(6.66)	(1.56)	(1.56)	(-1.01)	(-1.01)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-7.103	-	-4.768**	-
						(-0.86)		(-2.55)	
Adjustable Pegs	t-1	0.365	-3.330*	0.154	0.130	-11.520	-4.417	-1.516	3.252*
		(0.17)	(-1.94)	(0.19)	(0.19)	(-1.43)	(-0.92)	(-0.77)	(1.66)
Forward-looking Crawls	t-1	3.695*	*(dropped)*	-2.330***	-2.353**	-13.857*	-6.754	-0.993	3.776*
		(1.69)		(-1.79)	(-2.27)	(-1.76)	(-1.46)	(-0.51)	(1.85)
Backward-looking Crawls	t-1	-0.034	-3.729**	-1.240*	-1.264	-11.040	-3.937	-2.433	2.335°
		(-0.02)	(-2.00)	(-1.77)	(-1.44)	(-1.34)	(-0.84)	(-1.48)	(1.62)
Managed Floats	t-1	0.001	-3.694**	0.023	*(dropped)*	-8.823	-1.720	-1.520	3.249
		(0.00)	(-2.00)	(0.03)		(-1.11)	(-0.38)	(-0.73)	(1.50)
Floats	t-1	-	-3.695*	-	-0.023	-	7.103	-	4.768**
			(-1.69)		(-0.03)		(0.86)		(2.55)
Government Stability	t-1	0.014	-0.326	-	-	-0.540	0.058	-	-
		(0.08)	(-0.62)			(-0.67)	(0.16)		
Divided Government	t-1	-	-	-0.791	1.447	-	-	1.414	-0.036
				(-1.13)	(0.87)			(1.03)	(-0.04)
Hard pegs and Stab/Div	t-1	-0.340	-	2.238	-	0.598	-	-1.450	-
		(-0.60)		(1.23)		(0.69)		(-0.89)	
Adj pegs and Stab/Div	t-1	0.110	0.450	1.424	-0.814	0.798	0.200	*(dropped)*	1.450
		(0.44)	(0.83)	(1.10)	(-0.38)	(0.94)	(0.42)		(0.89)
FW and Stab/Div	t-1	-0.767***	-0.427	2.241*	0.003	1.279°	0.681°	-2.480°	-1.030
		(-2.91)	(-0.76)	(1.92)	(0.00)	(1.57)	(1.61)	(-1.64)	(-1.74)
BW and Stab/Div	t-1	-0.101	0.239	0.690	-1.548	1.050	0.452	1.513	2.963°
		(-0.41)	(0.43)	(0.76)	(-0.83)	(1.22)	(1.00)	(0.80)	(1.62)
Managed float and Stab/Div	t-1	0.067	0.407	0.362	-1.876	0.805	0.206	-1.481	-0.032
		(0.29)	(0.75)	(0.31)	(-0.93)	(0.99)	(0.52)	(-1.17)	(-0.02)
Floats and Stab/Div	t-1	-	0.340	-	-2.238	-	-0.598	-	*(dropped)*
			(0.60)		(-1.23)		(-0.69)		
Election Dummy	t-1	-0.086	-0.086	-0.041	-0.041	-0.237	-0.237	-0.199	-0.199
		(-0.43)	(-0.43)	(-0.19)	(-0.19)	(-0.64)	(-0.64)	(-0.93)	(-0.93)
Openness	t	-1.748	-1.748	-2.259	-2.259	5.229**	5.229**	-2.258	-2.258
		(-1.19)	(-1.19)	(-1.42)	(-1.42)	(1.96)	(1.96)	(-1.36)	(-1.36)
	t-1	1.782	1.782	2.095	2.095	-3.678	-3.678	3.895**	3.895**
		(1.31)	(1.31)	(1.47)	(1.47)	(-1.44)	(-1.44)	(2.48)	(2.48)
Terms of Trade	t	0.026°	0.026°	0.030*	0.030*	-0.000008	-0.000008	-0.0004	-0.0004
		(1.56)	(1.56)	(1.74)	(1.74)	(-0.00)	(-0.00)	(-0.24)	(-0.24)
	t-1	0.008	0.008	0.002	0.002	0.002	0.002	-0.001	-0.001
		(0.51)	(0.51)	(0.11)	(0.11)	(0.49)	(0.49)	(-0.78)	(-0.78)
Real GDP growth	t	-0.125***	-0.125***	-0.117**	-0.117**	-0.042*	-0.042*	-0.059***	-0.059***
		(-3.74)	(-3.74)	(-3.27)	(-3.27)	(-1.64)	(-1.64)	(-3.91)	(-3.91)
	t-1	0.102***	0.102***	0.104***	0.104***	-0.027	-0.027	-0.006	-0.006
		(3.68)	(3.68)	(3.60)	(3.60)	(-1.12)	(-1.12)	(-0.42)	(-0.42)
Change in US T-bills	t	0.007*	0.007*	0.008**	0.008**	-0.010°	-0.010°	-0.002	-0.002
		(1.78)	(1.78)	(1.96)	(1.96)	(-1.63)	(-1.63)	(-0.58)	(-0.58)
	t-1	0.001	0.001	0.002	0.002	0.001	0.001	-0.0001	-0.0001
		(0.35)	(0.35)	(0.45)	(0.45)	(0.17)	(0.17)	(-0.02)	(-0.02)
Inflation	t	-0.018	-0.018	0.001	0.001	-0.049*	-0.049*	-0.069***	-0.069***
		(-1.04)	(-1.04)	(0.07)	(0.07)	(-1.86)	(-1.86)	(-3.70)	(-3.70)
	t-1	0.012	0.012	0.014	0.014	-0.008	-0.008	0.026*	0.026*
		(1.28)	(1.28)	(1.41)	(1.41)	(-0.40)	(-0.40)	(1.75)	(1.75)
Crisis Index, *ci14*	t-1	-0.423	-0.423	-0.248	-0.248	1.626*	1.626*	0.770	0.770
		(-0.85)	(-0.85)	(-0.48)	(-0.48)	(1.75)	(1.75)	(1.40)	(1.40)
Constant		0.079	0.079	0.092	0.092	-0.155	-0.155	0.018	0.018
		(1.16)	(1.16)	(1.42)	(1.42)	(-1.24)	(-1.24)	(0.28)	(0.28)
Sargan Test (p-value)		0.00	0.00	0.00	0.00	0.19	0.19	0.03	0.03
Second-order serial correlation test (p-value)		0.42	0.42	0.27	0.27	0.28	0.28	0.81	0.81
No. of observation		225	225	225	225	145	145	138	138
No. of countries		24	24	24	24	19	19	18	18

Table 11a. Fiscal Balance (cyclically unadjusted) with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.329***	0.363***	0.400***	0.378***	0.225**	0.187**
		(5.00)	(5.00)	(4.35)	(4.07)	(2.43)	(2.00)
	t-2	-0.216***	-0.105*	0.184**	0.153**	-0.487***	-0.456***
		(-3.35)	(-1.64)	(2.49)	(2.02)	(-4.69)	(-4.93)
Hard Pegs	t-1	-3.345	-2.400	*(dropped)*	*(dropped)*	-6.585	-2.323
		(-0.99)	(-0.85)			(-1.29)	(-0.61)
Adjustable Pegs	t-1	0.607	-0.599	-1.043	-1.459*	-0.299	-1.222
		(0.53)	(-0.62)	(-1.16)	(-1.66)	(-0.06)	(-0.31)
Forward-looking Crawls	t-1	0.046	-0.601	0.594	0.384	-1.619	-2.217
		(0.03)	(-0.45)	(0.43)	(0.28)	(-0.30)	(-0.57)
Backward-looking Crawls	t-1	1.710◊	1.072	0.510	0.534	-0.018	0.490
		(1.59)	(1.18)	(0.59)	(0.62)	(-0.00)	(0.14)
Managed Floats	t-1	-0.043	-0.552	-1.175	-1.399*	-1.072	-0.309
		(-0.04)	(-0.61)	(-1.42)	(-1.71)	(-0.20)	(-0.08)
Government Stability	t-1	0.196◊	-	0.286**	-	0.261	-
		(1.40)		(2.23)		(0.94)	
Divided Government	t-1	-	-0.090	-	0.750	-	-1.715
			(-0.12)		(0.94)		(-1.31)
Election Dummy	t-1	0.201	0.156	0.210	0.165	-0.105	-0.262
		(0.64)	(0.59)	(0.73)	(0.57)	(-0.15)	(-0.55)
Openness	t	-2.775	0.224	-2.167	-1.642	-4.009	2.002
		(-1.24)	(0.11)	(-1.06)	(-0.81)	(-0.87)	(0.56)
	t-1	-0.722	-3.305*	-3.052◊	-3.624*	4.945	-2.235
		(-0.34)	(-1.76)	(-1.57)	(-1.86)	(1.14)	(-0.68)
Terms of Trade	t	0.006	0.004	0.036◊	0.045*	0.003	0.002
		(1.28)	(1.01)	(1.55)	(1.91)	(0.56)	(0.63)
	t-1	0.001	0.001	0.002	0.010	-0.002	-0.0003
		(0.23)	(0.24)	(0.09)	(0.44)	(-0.34)	(-0.07)
Real GDP growth	t	0.079**	0.090***	0.154***	0.141***	0.024	0.050
		(2.38)	(3.22)	(3.28)	(3.03)	(0.48)	(1.37)
	t-1	-0.003	0.001	0.052	0.057	-0.018	-0.015
		(-0.09)	(0.06)	(1.27)	(1.41)	(-0.41)	(-0.47)
Change in US T-bills	t	0.007	0.006	0.006	0.006	0.004	0.003
		(1.21)	(1.25)	(1.12)	(1.19)	(0.37)	(0.41)
	t-1	0.005	-0.001	-0.0005	-0.002	-0.001	-0.007
		(0.90)	(-0.12)	(-0.09)	(-0.41)	(-0.06)	(-0.69)
Inflation	t	0.014	0.018	0.062**	0.053**	-0.072*	-0.028
		(0.64)	(0.88)	(2.52)	(2.18)	(-1.67)	(-0.78)
	t-1	0.018	0.006	0.012	0.011	0.068*	0.007
		(1.15)	(0.45)	(0.83)	(0.78)	(1.87)	(0.22)
Crisis Index, *ci7*	t-1	-0.300	0.305	0.335	0.363	-1.159	0.089
		(-0.64)	(0.76)	(0.71)	(0.78)	(-1.27)	(0.13)
Constant		-0.084	-0.050	-0.044	0.067	-0.181	-0.230◊
		(-0.83)	(-0.62)	(-0.51)	(0.85)	(-0.85)	(-1.64)
Sargan Test (p-value)		0.00	0.00	0.23	0.14	0.10	0.05
Second-order serial correlation test (p-value)		0.23	0.03	0.26	0.16	0.35	0.03
No. of observation		357	349	221	221	136	128
No. of countries		41	40	23	23	18	17

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 11b. Fiscal Balance (cyclically unadjusted) with economic variables only.
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses

		All		Emerging Economies		Developing Countries	
Fiscal Balance	t-1	0.330***	0.352***	0.386***	0.364***	0.222**	0.180*
		(5.03)	(4.90)	(4.27)	(3.98)	(2.39)	(1.94)
	t-2	-0.221***	-0.108*	0.178**	0.148**	-0.497***	-0.459***
		(-3.43)	(-1.70)	(2.43)	(1.96)	(-4.77)	(-4.96)
Hard Pegs	t-1	-4.263	-2.702	*(dropped)*	*(dropped)*	-7.766	-2.595
		(-1.24)	(-0.94)			(-1.51)	(-0.68)
Adjustable Pegs	t-1	0.529	-0.582	-1.029	-1.461*	-2.202	-1.734
		(0.46)	(-0.61)	(-1.15)	(-1.68)	(-0.42)	(-0.44)
Forward-looking Crawls	t-1	0.074	-0.475	0.781	0.552	-3.401	-2.451
		(0.05)	(-0.36)	(0.57)	(0.40)	(-0.64)	(-0.64)
Backward-looking Crawls	t-1	1.681◊	1.130	0.550	0.569	-1.835	0.290
		(1.57)	(1.25)	(0.65)	(0.67)	(-0.39)	(0.09)
Managed Floats	t-1	-0.176	-0.528	-1.206	-1.429*	-3.026	-0.682
		(-0.16)	(-0.59)	(-1.48)	(-1.77)	(-0.56)	(-0.17)
Government Stability	t-1	0.191	-	0.296**	-	0.308	-
		(1.37)		(2.32)		(1.11)	
Divided Government	t-1	-	-0.094	-	0.729	-	-1.882
			(-0.13)		(0.92)		(-1.44)
Election Dummy	t-1	0.180	0.140	0.236	0.193	-0.072	-0.191
		(0.58)	(0.07)	(0.83)	(0.68)	(-0.11)	(-0.39)
Openness	t	-3.030	0.140	-2.292	-1.746	-4.456	2.002
		(-1.36)	(0.07)	(-1.13)	(-0.87)	(-0.97)	(0.55)
	t-1	-0.517	-3.197*	-2.838	-3.443*	5.356	-2.376
		(-0.24)	(-1.71)	(-1.46)	(-1.77)	(1.24)	(-0.73)
Terms of Trade	t	0.006	0.004	0.031	0.040*	0.003	0.002
		(1.25)	(0.99)	(1.31)	(1.68)	(0.49)	(0.62)
	t-1	0.001	0.001	0.003	0.011	-0.003	-0.0004
		(0.18)	(0.22)	(0.12)	(0.47)	(-0.45)	(-0.11)
Real GDP growth	t	0.083**	0.090***	0.165***	0.150***	0.022	0.049
		(2.38)	(3.26)	(3.54)	(3.24)	(0.44)	(1.35)
	t-1	0.002	0.001	0.051	0.057	0.001	-0.012
		(0.06)	(0.03)	(1.27)	(1.42)	(0.02)	(-0.36)
Change in US T-bills	t	0.008	0.006	0.006	0.006	0.007	0.004
		(1.35)	(1.25)	(1.12)	(1.21)	(0.58)	(0.42)
	t-1	0.004	-0.001	-0.001	-0.002	-0.001	-0.007
		(0.76)	(-0.20)	(-0.11)	(-0.43)	(-0.06)	(-0.79)
Inflation	t	0.010	0.016	0.054**	0.046*	-0.079*	-0.027
		(0.42)	(0.78)	(2.17)	(1.84)	(-1.84)	(-0.76)
	t-1	0.018	0.006	0.012	0.011	0.068*	0.008
		(1.17)	(0.48)	(0.85)	(0.81)	(1.88)	(0.25)
Crisis Index, *ci14*	t-1	0.682	0.604	0.956	0.904	0.169	0.432
		(0.96)	(1.01)	(1.40)	(1.33)	(0.11)	(0.39)
Constant		-0.074	-0.055	-0.059	0.054	-0.189	-0.227◊
		(-0.74)	(-0.69)	(-0.70)	(0.70)	(-0.88)	(-1.62)
Sargan Test (p-value)		0.00	0.00	0.20	0.12	0.11	0.06
Second-order serial correlation test (p-value)		0.20	0.04	0.23	0.14	0.28	0.03
No. of observation		357	349	221	221	136	128
No. of countries		41	40	23	23	18	17

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 11c. Fiscal Discipline – Fiscal balance (unadjusted) with interaction terms (*ci7*)

		Emerging-Market Economies				Developing Countries			
Fiscal balance	t-1	0.377***	0.377***	0.391***	0.391***	0.222**	0.222**	0.156°	0.156°
		(4.15)	(4.15)	(4.10)	(4.10)	(2.34)	(2.34)	(1.63)	(1.63)
	t-2	0.202***	0.202***	0.149*	0.149*	-0.501***	-0.501***	-0.481***	-0.481***
		(2.70)	(2.70)	(1.93)	(1.93)	(-4.55)	(-4.55)	(-5.09)	(-5.09)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	0.655	-	-1.903	-
						(0.05)		(-0.48)	
Adjustable Pegs	t-1	-7.164**	-1.277	-1.356	-1.356	3.918	3.263	3.382	5.285
		(-2.35)	(-0.47)	(-1.05)	(-1.05)	(0.35)	(0.38)	(0.76)	(1.31)
Forward-looking Crawls	t-1	-5.887°	*(dropped)*	-0.768	-0.768	-0.359	-1.014	4.870	6.773°
		(-1.60)		(-0.44)	(-0.44)	(-0.35)	(-0.11)	(1.11)	(1.57)
Backward-looking Crawls	t-1	-4.355	1.533	1.066	1.066	2.881	2.226	1.021	2.924
		(-1.42)	(0.52)	(0.92)	(0.92)	(0.25)	(0.24)	(0.29)	(0.97)
Managed Floats	t-1	-3.661	2.226	-0.537	-0.537	2.072	1.417	2.916	4.819
		(-1.17)	(0.77)	(-0.43)	(-0.43)	(0.18)	(0.16)	(0.62)	(1.08)
Floats	t-1		5.887°	-	*(dropped)*	-	-0.655	-	1.903
			(1.60)				(-0.05)		(0.48)
Government Stability	t-1	-0.171	0.389	-	-	0.607	-0.223	-	-
		(-0.59)	(0.51)			(0.56)	(-0.32)		
Divided Government	t-1	-	-	0.798	-0.318	-	-	-0.637	2.446
				(0.73)	(-0.14)			(-0.35)	(0.69)
Hard pegs and Stab/Div	t-1	0.559	-	-1.116	-	-0.784	-	*(dropped)*	-
		(0.69)		(-0.45)		(-0.63)			
Adj pegs and Stab/Div	t-1	0.707**	0.147	0.072	1.188	-0.530	0.254	-2.748	-5.831
		(2.09)	(0.19)	(0.04)	(0.42)	(-0.46)	(0.29)	(-1.00)	(-1.46)
FW and Stab/Div	t-1	0.834*	0.275	3.261°	4.376°	0.031	0.815	-4.787°	-7.870**
		(1.76)	(0.32)	(1.59)	(1.54)	(0.03)	(0.87)	(1.60)	(-2.49)
BW and Stab/Div	t-1	0.558°	-0.002	-0.419	0.697	-0.321	0.463	3.083	*(dropped)*
		(1.62)	(-0.00)	(-0.31)	(0.28)	(-0.27)	(0.48)	(0.73)	
Managed float and Stab/Div	t-1	0.252	-0.308	-1.162	-0.046	-0.331	0.784	*(dropped)*	-3.083
		(0.75)	(-0.40)	(-0.72)	(-0.02)	(-0.29)	(0.63)		(-0.73)
Floats and Stab/Div	t-1	-	-0.559	-	1.116	-	0.784	-	*(dropped)*
			(-0.69)		(0.45)		(0.63)		
Election Dummy	t-1	0.289	0.289	0.224	0.224	-0.223	-0.223	-0.325	-0.325
		(1.00)	(1.00)	(0.77)	(0.77)	(-0.32)	(-0.32)	(-0.67)	(-0.67)
Openness	t	-2.147	-2.147	-2.032	-2.032	-4.601	-4.601	-0.466	-0.466
		(-1.06)	(-1.06)	(-0.94)	(-0.94)	(-0.95)	(-0.95)	(-0.13)	(-0.13)
	t-1	-3.810**	-3.810**	-3.210°	-3.210°	4.498	4.498	-3.773	-3.773
		(-1.97)	(-1.97)	(-1.61)	(-1.61)	(0.91)	(0.91)	(-1.11)	(-1.11)
Terms of Trade	t	0.036	0.036	0.049**	0.049**	0.004	0.004	0.003	0.003
		(1.54)	(1.54)	(2.08)	(2.08)	(0.62)	(0.62)	(0.77)	(0.77)
	t-1	-0.005	-0.005	0.008	0.008	-0.002	-0.002	-0.001	-0.001
		(-0.20)	(-0.20)	(0.34)	(0.34)	(-0.27)	(-0.27)	(-0.20)	(-0.20)
Real GDP growth	t	0.162***	0.162***	0.137***	0.137***	0.031	0.031	0.054	0.054
		(3.48)	(3.48)	(2.87)	(2.87)	(0.57)	(0.57)	(1.44)	(1.44)
	t-1	0.053	0.053	0.065°	0.065°	-0.029	-0.029	-0.013	-0.013
		(1.32)	(1.32)	(1.57)	(1.57)	(-0.62)	(-0.62)	(-0.38)	(-0.38)
Change in US T-bills	t	0.005	0.005	0.009°	0.009°	0.005	0.005	0.009	0.009
		(0.88)	(0.88)	(1.59)	(1.59)	(0.41)	(0.41)	(1.01)	(1.01)
	t-1	0.001	0.001	-0.003	-0.003	-0.00004	-0.00004	-0.007	-0.007
		(0.26)	(0.26)	(-0.51)	(-0.51)	(-0.00)	(-0.00)	(-0.70)	(-0.70)
Inflation	t	0.066***	0.066***	0.061**	0.061**	-0.074*	-0.074*	-0.022	-0.022
		(2.71)	(2.71)	(2.43)	(2.43)	(-1.66)	(-1.66)	(-0.57)	(-0.57)
	t-1	0.008	0.008	0.012	0.012	0.064*	0.064*	0.010	0.010
		(0.57)	(0.57)	(0.82)	(0.82)	(1.71)	(1.71)	(0.29)	(0.29)
Crisis Index, *ci7*	t-1	0.412	0.412	0.316	0.316	-1.180	-1.180	-0.125	-0.125
		(0.88)	(0.88)	(0.65)	(0.65)	(-1.24)	(-1.24)	(-0.18)	(-0.18)
Constant		-0.058	-0.058	0.105	0.105	-0.221	-0.221	-0.192	-0.192
		(-0.65)	(-0.65)	(1.30)	(1.30)	(-0.99)	(-0.99)	(-1.30)	(-1.30)
Sargan Test (p-value)		0.27	0.27	0.18	0.18	0.18	0.18	0.07	0.07
Second-order serial correlation test (p-value)		0.34	0.34	0.12	0.12	0.40	0.40	0.05	0.05
No. of observation		221	221	221	221	136	136	128	128
No. of countries		23	23	23	23	18	18	17	17

Table 11d. Fiscal Discipline – Fiscal balance (unadjusted) with interaction terms (*ci14*)

		Emerging-Market Economies				Developing Countries			
Fiscal Balance	t-1	0.363***	0.363***	0.379***	0.379***	0.213**	0.213**	0.150°	0.150°
		(4.08)	(4.08)	(4.05)	(4.05)	(2.24)	(2.24)	(1.58)	(1.58)
	t-2	0.196***	0.196***	0.143*	0.143*	-0.512***	-0.512***	-0.488***	-0.488***
		(2.65)	(2.65)	(1.87)	(1.87)	(-4.65)	(-4.65)	(-5.19)	(-5.19)
Hard Pegs	t-1	*(dropped)*	-	*(dropped)*	-	-4.516	-	-2.469	-
						(-0.36)		(-0.63)	
Adjustable Pegs	t-1	-7.288**	-7.288**	-1.308	-0.742	-0.739	3.777	2.500	4.969
		(-2.41)	(-2.41)	(-1.02)	(-0.47)	(-0.07)	(0.43)	(0.58)	(1.23)
Forward-looking Crawls	t-1	-5.952°	-5.952°	-0.565	*(dropped)*	-5.816	-1.299	4.876	7.345*
		(-1.63)	(-1.63)	(-0.33)		(-0.52)	(-0.14)	(1.14)	(1.71)
Backward-looking Crawls	t-1	-4.425	-4.425	1.110	1.675	-0.520	3.997	0.468	2.937
		(-1.46)	(-1.46)	(0.97)	(1.11)	(-0.04)	(0.43)	(0.14)	(0.98)
Managed Floats	t-1	-3.762	-3.762	-0.608	-0.043	-2.552	1.965	2.566	5.035
		(-1.21)	(-1.21)	(-0.49)	(-0.03)	(-0.22)	(0.22)	(0.56)	(1.12)
Floats	t-1	-	*(dropped)*	-	0.565	-	4.516	-	2.469
					(0.33)		(0.36)		(0.63)
Government Stability	t-1	-0.172	0.364	-	-	0.352	0.001	-	-
		(-0.60)	(0.49)			(0.33)	(0.00)		
Divided Government	t-1	-	-	0.821	-0.659	-	-	-0.940	2.786
				(0.76)	(-0.29)			(-0.51)	(0.80)
Hard pegs and Stab/Div	t-1	0.536	-	-1.480	-	-0.351	-	*(dropped)*	-
		(0.67)		(-0.60)		(-0.28)			
Adj pegs and Stab/Div	t-1	0.725**	0.189	-0.005	1.475	-0.253	0.098	-1.900	-5.625
		(2.17)	(0.25)	(-0.00)	(0.53)	(-0.22)	(0.11)	(-0.70)	(-1.41)
FW and Stab/Div	t-1	0.880*	0.344	3.101	4.581	0.482	0.833	-4.703°	-8.429***
		(1.86)	(0.40)	(1.53)	(1.53)	(0.42)	(0.89)	(1.56)	(-2.68)
BW and Stab/Div	t-1	0.574*	0.038	-0.467	1.014°	-0.182	0.169	3.725	*(dropped)*
		(1.68)	(0.05)	(-0.35)	(0.41)	(-0.15)	(0.18)	(0.88)	
Managed float and Stab/Div	t-1	0.259	-0.277	-1.136	0.345	-0.057	0.294	*(dropped)*	-3.725
		(0.78)	(-0.36)	(-0.71)	(0.13)	(-0.05)	(0.35)		(-0.88)
Floats and Stab/Div	t-1	-	-0.536	-	1.480	-	0.351	-	*(dropped)*
			(-0.67)		(0.60)		(0.28)		
Election Dummy	t-1	0.321	0.321	0.250	0.250	-0.151	-0.151	-0.212	-0.212
		(1.12)	(1.12)	(0.87)	(0.87)	(-0.21)	(-0.21)	(-0.43)	(-0.43)
Openness	t	-2.309	-2.309	-2.107	-2.107	-5.366	-5.366	-0.351	-0.351
		(-1.15)	(-1.15)	(-0.99)	(-0.99)	(-1.12)	(-1.12)	(-0.09)	(-0.09)
	t-1	-3.545*	-3.545*	-3.021	-3.021	4.315	4.315	-3.911	-3.911
		(-1.84)	(-1.84)	(-1.52)	(-1.52)	(0.90)	(0.90)	(-1.16)	(-1.16)
Terms of Trade	t	0.029	0.029	0.044*	0.044*	0.003	0.003	0.003	0.003
		(1.25)	(1.25)	(1.85)	(1.85)	(0.51)	(0.51)	(0.72)	(0.72)
	t-1	-0.004	-0.004	0.008	0.008	-0.002	-0.002	-0.001	-0.001
		(-0.18)	(-0.18)	(0.33)	(0.33)	(-0.38)	(-0.38)	(-0.21)	(-0.21)
Real GDP growth	t	0.173***	0.173***	0.146***	0.146***	0.026	0.026	0.054	0.054
		(3.76)	(3.76)	(3.10)	(3.10)	(0.48)	(0.48)	(1.43)	(1.43)
	t-1	0.051	0.051	0.064°	0.064°	-0.009	-0.009	-0.005	-0.005
		(1.26)	(1.26)	(1.57)	(1.57)	(-0.20)	(-0.20)	(-0.14)	(-0.14)
Change in US T-bills	t	0.005	0.005	0.009°	0.009°	0.007	0.007	0.010	0.010
		(0.90)	(0.90)	(1.58)	(1.58)	(0.60)	(0.60)	(1.10)	(1.10)
	t-1	0.001	0.001	-0.003	-0.003	-0.001	-0.001	-0.008	-0.008
		(0.25)	(0.25)	(-0.54)	(-0.54)	(-0.04)	(-0.04)	(-0.87)	(-0.87)
Inflation	t	0.057**	0.057**	0.053**	0.053**	-0.081*	-0.081*	-0.022	-0.022
		(2.30)	(2.30)	(2.07)	(2.07)	(-1.85)	(-1.85)	(-0.60)	(-0.60)
	t-1	0.008	0.008	0.012	0.012	0.067*	0.067*	0.013	0.013
		(0.57)	(0.57)	(0.84)	(0.84)	(1.78)	(1.78)	(0.39)	(0.39)
Crisis Index, *ci14*	t-1	1.178*	1.178*	0.877	0.877	0.268	0.268	0.401	0.401
		(1.75)	(1.75)	(1.27)	(1.27)	(0.17)	(0.17)	(0.36)	(0.36)
Constant		-0.075	-0.075	0.091	0.091	-0.222	-0.222	-0.178	-0.178
		(-0.84)	(-0.84)	(1.13)	(1.13)	(-1.00)	(-1.00)	(-1.21)	(-1.21)
Sargan Test (p-value)		0.27	0.27	0.15	0.15	0.19	0.19	0.10	0.10
Second-order serial correlation test (p-value)		0.30	0.30	0.13	0.13	0.33	0.33	0.06	0.06
No. of observation		221	221	221	221	136	136	128	128
No. of countries		23	23	23	23	18	18	17	17

Appendix 1

The Methodology: Generalized Method of Moment

The empirical model can be summarized as:

$$Y_{it} = \alpha Y_{i,t-1} + \mathbf{X}_{it}'\beta + \nu_i + \varepsilon_{it} \qquad i=1,\ldots,N \qquad t = 1,\ldots,T \qquad (1)$$

where Y_{it} is either fiscal or monetary performance of country i at time t, α is a parameter to be estimated, $\boldsymbol{\beta}$ is a vector (k x 1) of parameters to be estimated, $\boldsymbol{X_{it}}$ is a vector (k x 1) of variables that possibly affect the discipline level of a country, $v_i \sim$ i.i.d (0, σ_v^2) are country-specific effects, and $\varepsilon_{it} \sim$ i.i.d (0, σ_ε^2) are the error terms.

Since the lagged dependent variable is correlated with the error term, the OLS estimator, FE estimator, and the GLS estimator will be biased. This problem persists even if the error terms are not serially correlated.[14] GMM estimator for dynamic panel data models, developed by Arellano and Bond (1991), is found to successfully solve the problems presented above. The method starts with taking the first difference of equation (1), which will remove the fixed effects v_i:

$$\Delta Y_{it} = \alpha \cdot \Delta Y_{i,t-1} + \Delta \mathbf{X}_{it}'\beta + \Delta\varepsilon_{it} \qquad (2)$$

where Δ is the first difference operator. However, by construction, the differenced lagged dependent variable is correlated with the differenced error term. Arellano and Bond (1991) therefore suggest the use of lagged levels of the explanatory variables and lagged levels of the dependent variables as instrumentals. The lags could be two or more period. Note that the GMM estimator will be consistent if and only if the lagged levels of explanatory variables are valid instrument for differenced explanatory variables, which

[14] See Vuletin (2003) for more details on why OLS, FE, and GLS estimators are biased. He also briefly discusses about First Difference Transformation method and why it is not superior to GMM.

hold when the error term is not serially correlated. This assumption, according to Vuletin (2003), can be tested using Arellano and Bond's (1991) proposed methods:

1. Sargan test of overidentifying restrictions, which tests the overall validity of the instruments, and
2. A test for serial correlation in the error term

Arellano and Bover (1995), cited in Aisen and Veiga (2005), show that when the explanatory variables are uncorrelated with the individual effects, lagged differences of both explanatory and dependent variables may also be valid instruments for the level equation. This estimation method is found to be preferable to that of Arellano and Bond (1991) when the dependent variable and/or the independent variables are persistent. [15] Therefore, this dissertation will apply GMM estimation in both variations: Arellano and Bond's (1991) and Arellano and Bover (1995). The other methods, nevertheless, will also be applied for comparison.

[15] See Blundell and Bond (1998).

Appendix 2: Justification of Economic Control Variables

The Controls: Economic Variables

For Fiscal Discipline Study:

The following are control economic variables included in various studies on the subject:

1. Openness
    a. log of trade as a percentage of GDP (Tornell and Velasco, 1998)
    b. Total of trade as a percentage of GDP (Vuletin, 2003)
    c. Heinemann (1999), on the other hand, uses openness as a proxy for the sensitivity to exchange rate fluctuation. He measures openness as the mean of the ratio of import- and export-to-GDP.
2. Terms of Trade:

Tornell and Velasco (1998) points to the possibility that changes in terms of trade shocks may affect the fiscal balance through the changes in fiscal revenue. According to the authors, this should especially be the case for countries that highly depend on the exports of primary commodities such as oil or copper.

    i. log of change in terms of trade (Tornell and Velasco, 1998)
    ii. shock in trade terms[16] (Vuletin, 2003)

3. How Developed is the Economy?

This variable is included due mainly to the famous Wagner's Law, which states that the development of an economy, as measured by an increase in per

[16] Vuletin (2003) defines shocks in trade terms as Δ% on the exports' price*(Exports/GDP) - Δ % on the imports' price*(Imports/GDP).

capita real income, will be accompanied by an increased share of government or public expenditure in GNP.

a. Natural log of real GDP per capita (Fatás and Rose, 2001)

b. Real GDP per capita (Vuletin, 2003)

c. Growth (Heinemann, 1999)

4. Change in US 3-month T-bill interest rate (Tornell and Velasco, 1998)

Tornell and Velasco (1998) include this variable to control for changes in debt service. However, this should not be a concern when the left hand side variable is primary deficits, defined as the nominal deficits less the interest payments.

5. Inflation (Vuletin, 2003).

Vuletin (2003) includes inflation as one of his control variables since inflation will increase the costs for fiscal authority.

6. Capital controls (Heinemann, 1999)

Heinemann (1999) includes capital controls as one of his control variables because, he believes, such restrictions can be expected to limit disciplining pressure from foreign exchange markets. In other words, it is expected that capital controls would lower the discipline of a country. In his study, Heinmann uses data from IMF *Exchange Arrangements and Exchange Restrictions* to construct a dummy equal to one if there exist significant capital account restrictions, and zero otherwise. While capital control measures are not included in the study, the distinction between emerging-market and developing countries should help take this issue into consideration.

7. Exchange rate crisis indicators (Heinemann, 1999)

The variable is included in Heinemann's (1999) study, basing on the idea that crisis may be a precondition for corrections.

For Monetary Discipline Study:

The following are economic control variables in monetary discipline study:

1. Inflation rate (in case the dependent variable is nominal money growth) or money growth (when the dependent variable is inflation rate)
2. Real GDP growth
3. Nominal interest rate

(1) – (3) are from standard money equation.

4. Trade openness

Levy-Yeyati and Sturzenegger (2001) include openness to control for the disciplinary effect induced by international arbitrage.

5. The ratio of fiscal balance to GDP

It is often argued that fiscal deficit is a real cause of persistent high inflation. This is because fiscal deficit is often financed by seigniorage, rather than an increase in tax.

6. Terms of Trade growth

Terms of Trade growth is included because a change in terms of trade will affect real income flowing into a country, which in turn affects domestic expenditure, and therefore inflation rate.

Since these are economic control variables and they are not of main interest, we include the following variables for both fiscal and monetary discipline analyses.

1. Openness
2. Terms of Trade
3. Real GDP growth
4. Change in US 3-month T-bill interest rate
5. The ratio of fiscal balance to GDP (when study monetary discipline)
6. Inflation rate (when study fiscal discipline)
7. Currency crisis index

Appendix 3. Crisis Models

First Generation Crisis Model:

The first-generation (1G) crisis model, whose main contributor is Paul Krugman, demonstrates how a speculative attack, which may collapse a pegged exchange rate regime, can occur before a country's foreign reserves are exhausted. In other words, countries' attempts to defend a fixed exchange rate may not be successful in face of speculative attack. The 1G crisis model is said to be able to pin down the time of the crisis.

The main assumptions in the 1G crisis models are:

1. Payments imbalances and crises are a result from governments running excessive expansionary monetary and fiscal policies;
2. Governments finances their deficit by printing money (seigniorage); and
3. Central bank (CB) has no ability to replenish reserves by borrowing abroad.

The last assumption is doubtful – since international financial markets continue to expand, it is very unlikely that central bank cannot borrow abroad. The 1G crisis model implies that governments are myopic and follow silly policies. In the 1G crisis model, speculators are assumed to be homogenous and therefore there exists either no speculation or huge speculation during the crisis. Moreover, the model states that capital controls have only the effect of altering the timing of the attack, which is done by making it more difficult for investors to shift between domestic and foreign assets. In other words, capital controls can delay the day of the crisis, but not infinitely.

According to 1G crisis model, the indicators of crisis are: budget deficit, excessive rates of growth in money supply, and decreasing reserves. These indicators are

mainly related to macroeconomic fundamentals. Other 1G advocates have added excessive inflation rates, real exchange rate overvaluation, and rising interest rates as additional indicators of crisis. The 1G model is basically a question of good or bad fundamentals.

The main concept of the 1G crisis model is that the crisis, which is due to "fundamental disequilibrium," is inevitable and that devaluation will occur with or without the attack. This disequilibrium is a result of inconsistency between the exchange rate and domestic policies. Put differently, in the 1G model, countries face a situation in which underlying fundamentals were persistently deteriorating and thus they face an eventually inevitable collapse of their currencies. This is truly based on the assumption that the fixed rate is ultimately unsustainable, which sets a unique relationship between fundamentals and the timing of crisis. The 1G crisis model predicts that a currency crisis will occur as soon as a speculative attack can succeed.

It is important to broaden the traditional definition of fundamentals that only imply major macroeconomic fundamentals to include (1) domestic financial considerations, (2) exchange rate positions and balance of payments flows, (3) international liquidity consideration, and (4) political considerations. By doing so, the 1G crisis model is well applied to some Asian crisis countries.

Second Generation Crisis Model:

The second-generation (2G) crisis model, whose main advocate is Maurice Obstfeld, says that timing of speculative attack is arbitrary. In this model, which includes political economy as well as governments' reaction function, the role of governments is

important to the occurrence of the crisis. Governments in the 2G crisis model are not as stupid as those in the 1G model; they balance the benefits of continuing to defend currency peg, through the maintenance of tight monetary policies and high interest rates, against the costs of giving up the peg. They want to enhance the credibility of their commitments to defending the currency and to maintaining the price stabilities.

By doing so, the countries incur costs from adverse impact of high interest rates on the economy and the financial system. High interest rates increase unemployment, worsen an already weak banking system (by forcing bank borrowers into default), and increase the burden on an already overtaxed government of servicing a large short-term debt. If a country has these adverse effects of high interest, it then enters zone of vulnerability, and it is in this zone of vulnerability that a self-fulfilling crisis will occur.

Unlike the 1G crisis model, this model does not give emphasis to either reserve levels or governments' ability to borrow abroad. Therefore, the indicators of crisis for the 2G model are less easily measured; they include (1) strength of the banking system, (2) prospects for economic growth, and (3) domestic political support for the government and its policies. Since governments are now agents trying to minimize a loss function, no matter what the condition of domestic economy is, the governments will cave in when the costs of defending currency exceed the benefits. In other words, governments choose to abandon the defense of the currency as a matter of economic and political self-interest.

Capital controls are also crucial in the 2G crisis model; they can tip the balance between the collapse of a currency and its maintenance forever breaking the link between domestic and foreign interest rates.

The crucial factor for the happening of a crisis is whether a country is in zones of vulnerability. Within these zones, countries have in-between fundamentals – neither strong nor weak, and are vulnerable to self-fulfilling speculative attacks and contagion effects from crises hitting other countries. These speculative attacks are not totally separated from fundamentals, but they are not inevitable. In short, a 2G crisis, which involves multiple equilibria, is not inevitable and would not occur in the absence of speculative attacks.

Note that speculative attacks are more likely when a country has high unemployment. Speculative attacks tend to depreciate a currency, thus if the national government wants to maintain its exchange rate, it would need to increase domestic interest rates to attract international capital inflows. When unemployment is high, the costs of raising interest rates hike. Speculators realize this and thus reassess the possibility of successful speculative attack. The higher the possibility of a success, the more likely the speculators will attack.

Moral Hazard:

Many economists say that moral hazard is a main ingredient of the third-generation, or 2.5 generation crisis model. In despite of its role in recent crises, it may not be appropriate to treat moral hazard as a new generation of crisis model. Even the originator of the idea, Michael Dooley, rather classifies "moral hazard" as one of the factors in the 1G crisis model. If moral hazard creates the fundamental disequilibrium, then it should definitely be treated as a factor in the 1G crisis model. Therefore, it is important to differentiate among different types of moral hazard:

1. Implicit or explicit guarantees from national governments
    a. on domestic lending and investing (which lead to excessive lending and investments in inefficient or low profitable sectors), and
    b. against major depreciations (which lead to excessive unhedged short-term international borrowing).
2. Implicit or explicit guarantees from the prospect of international bailouts. This type of moral hazard is directly linked to the International Monetary Fund. The belief that a country will be bailed out once the crisis hit leads to excessive international lending by private sector and less attention paid to sound policies by national government.

For more specific discussions on fiscal deficits and balance of payment imbalance, see Bird and Mandilaras (2004). Focusing particularly on Latin American crises, they also show how monetary excesses play a role.

Chapter 5. Real Appreciation and Exchange Rate Regimes

A currency crisis is costly for a country. It affects not only its financial sector, but also the living standards of its citizens. It is therefore crucial to examine the plausible causes of currency crises. While some claim that overvaluation can signal crises, it is more commonly argued that overvaluation is actually one of the main causes of a crisis.[1] But what causes overvaluation?

Although there are a large number of factors that may affect overvaluation, we are interested particularly in the effects of exchange rate regimes. There are a few studies that argue a choice of exchange rate regimes can affect the degree of overvaluation, but their results are mixed.[2] This may be due to different methodologies and samples. Most studies do not distinguish between hard and soft pegs, and some only use *de jure* classification of exchange rate regimes. This, however, may be inappropriate. Moreover, there is a need to distinguish between emerging-market economies and developing countries since these two types of countries are different not only in institutional structures but also in their degree of capital mobility.[3]

The objective of this chapter is to examine whether a real appreciation is more likely under certain exchange rate regime. In other words, it aims to identify major differences across the exchange rate regimes on the behavior of real exchange rates. The

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[1] From Kaminsky, Lizondo, and Reinhart (1998), Appendix 4 gives a list of studies that examine either overvaluation or real appreciation as the cause of crises, along with their sample and their definition of real exchange rate.

[2] More details in Literature Review section.

[3] In crisis literature, it is clear how degree of capital mobility is of importance; the higher the capital mobility, the greater the probability of crisis. In real exchange rate literature, capital flow is one of the main fundamentals used to obtain the equilibrium real exchange rate. It is generally found that capital inflows generate real exchange rate appreciation. Interestingly, capital controls, especially on inflows, are not found to be effective in reducing the extent of real exchange rate appreciation. For more details, see Edwards and Savastano (1999).

next section presents a brief background on different concepts of the real exchange rate as well as a literature review on exchange rate regimes and the real exchange rate. Section 2 discusses data and methodology. Section 3 gives the results. Section 4 concludes.

5.1. Background

5.1.1. Concepts of Real Exchange Rate

There are various definitions of real exchange rates (RER). The standard definition is the nominal exchange rate adjusted for relative prices between the countries under consideration:

$$RER = \frac{S \cdot P}{P^*} \tag{1}$$

where S is a nominal exchange rate defined in units of foreign currency per unit of home, P is the index of domestic price level, and * denotes the foreign country. The logarithmic transformation of equation (1) is:

$$rer = s + p - p^* \tag{2}$$

where rer, s, p, p^* are the logarithms of RER, S, P, P^*.

Equations (1) and (2) are a restatement of a purchasing power parity (PPP) hypothesis.[4] Aggregate price level for domestic economy is composed of a weighted average of the price on tradables (p_T) and nontradables (p_N):

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[4] There are two main variants of PPP theory: an absolute PPP and a relative PPP hypothesis. An absolute PPP hypothesis asserts that a basket of goods in one country must equal to a basket of goods in another country when expressed in a same currency. Absolute PPP can be expressed as:

$$S = \frac{P^*}{P} \text{ or } s = p^* - p.$$

While the absolute PPP is unlikely to hold because of various transaction costs, the weaker variant of the PPP hypothesis, a relative PPP, can be expected to hold even in the presence of such transaction costs. Relative PPP hypothesis states that an inflation differential between two economies determines a change in a nominal exchange rate:

$$p = \alpha p_N + (1-\alpha) p_T \tag{3}$$

where α is a proportion of nontraded goods in the domestic price index;

$$p^* = \beta p_N^* + (1-\beta) p_T^* \tag{4}$$

where β is a proportion of nontraded goods in the foreign price index. Substituting (3) and (4) into equation (2) yields:

$$rer = (s + p_T - p_T^*) + \alpha(p_N - p_T) - \beta(p_N^* - p_T^*) \tag{5}$$

From equation (5), RER can be expressed as (i) a relative price of tradables, (ii) a relative price of nontradables to tradables in the domestic country, and (iii) a relative price of nontradables to tradables in the foreign country. If PPP is assumed to hold for all goods, then a RER is a constant. On the other hand, if PPP is assumed to hold only for tradables, then the RER is determined by the relative price of nontradables to tradables. Thus, a rise in the domestic price of nontradables in relative to a domestic price of tradables will lead to an appreciation of RER.[5]

As a consequence, which specific relative price is a concern leads to different definitions of RER. Chinn (2002) suggests that there are four main different models of RER. In both dependent economy model and Scandinavian model, RER is a function of productivity. While both models focus on the relative nontradable price, they differ in their focus of shifts in the price. The relative price of nontradables moves to achieve a country's internal balance. In this case, the relevant price indices would be the ratio of Consumer Price Index (CPI) to Producer Price Index (PPI).[6]

$\%\Delta s = \%\Delta p^* - \%\Delta p$.

[5] For more details, see Pilbeam (2006).

[6] While CPI is thought of weighting fairly heavily nontraded goods such as consumer services, it is still an imperfect measure of nontradable prices.

If the objective, however, is to achieve external balance in trade in goods and services, then the focus would be on the relative tradable prices. This definition of RER is often used as a measure for price competitiveness. A stronger currency in real terms makes it easier to obtain foreign goods. However, this also means that it is more expensive for foreigners to obtain domestic goods, indicating a loss in competitiveness for the domestic economy. Here, the price indices used to adjust the nominal exchange rate is PPI or Wholesale Price Index (WPI).[7]

In addition, RER can be used as a cost competitiveness measure. Here the RER is a nominal exchange rate adjusted by wages and productivity levels. The relevant relative price is the Unit Labor Cost (ULC). As productivity rises, the real exchange rate depreciates, and vice versa. The definition is consistent with a Ricardian model of trade.

According to Chinn (2002), there is also another strand of RER model that considers exports competing with another country's exports, or competitiveness in third markets. In this model, the focus would be on the relative price of homes versus foreign exports. Export prices have also been wrongly used to show that PPP theory holds.

Moreover, there is a monetarist way to defined RER. This definition is based on the Monetary Approach, where the inflation rate is used to obtain the real value of the currency. This is analogous to how the monetary approach defines the real interest rate: the nominal interest rate less inflation. With this definition it is appropriate to use more readily available broad-price indices to calculate the real exchange rate.

The decision to use which price indices for RER measure relies not only on theory, but also on data availability. As Chinn (2002) puts it, "The decision to calculate the CPI

[7] Drawbacks of PPI and WPI include greater variation in how these price indices are constructed across countries, compared to that of CPI. Moreover, PPI and WPI may include a large component of imported intermediate goods, which make them an inappropriate measure for competitiveness.

deflated RER is almost always driven by 'expediency' and 'data availability' rather than an interest in this variable directly (although the financial crisis-early warning system literature constitutes one exception)" (p.6). Appendix 5 gives pros and cons of each price index.

Recent international finance literature generally gives attention to achieving external balance, and hence the use of price competitiveness definition of RER. Most RER databases, such as that from JP Morgan's, tries to achieve this 'competitiveness' definition by using 'core-price' indices. Due to data unavailability or unreliability, most of the time there would still be some nontradable components in the price indices used to calculate the RER, and hence the imperfect measure for the price competitiveness. In addition, this use of RER for competitiveness is not necessarily always applicable. For example, if a country is in a competitive market, it is required to be a price taker. However, at this competitive price, there could be no supplier.

Additionally, it is also important to distinguish between real appreciation and overvaluation, also known as misalignment. Although these terms are often used interchangeably in the literature, they are not the same. Real appreciation applies to an actual change in the RER, specifically when a given unit of currency increases in real value, either by an appreciation of a nominal currency or a reduction in relative prices. On the other hand, to calculate overvaluation, one needs to estimate real exchange rate equilibrium. The equilibrium of real exchange rate can also appreciate, and thus an increase in real exchange rate does not necessarily indicate an overvaluation. While overvaluation is often argued as one of the main causes of currency crises, there is as yet

no satisfactory way to calculate the overvaluation. Chinn (1998, 2002) discusses the pros and cons of various ways economists calculate the overvaluation.

Overvaluation is the ideal measure, but since there is no sure way of obtaining the series, real appreciation is used in this study. Real appreciation is an economic performance factor often used in various studies. Therefore, using real appreciation rather than overvaluation should not greatly limit the value of this study. In addition to exchange rate regimes, some economic fundamentals are included in the study, not only to correct for limited variable bias, but also to control for those factors that might affect the RER equilibrium, and hence overvaluation.

5.1.2. Literature Review

There are only a handful of studies examining the effects of exchange rate regimes on real exchange rates. Among these studies, some focus on overvaluation and misalignment, while others focus on the behavior of real exchange rates. The former requires a calculation of equilibrium real exchange rate, while the latter does not. This is, however, not the main cause for the differences in conclusions on the subject. According to Chinn (1998), there is also no consensus on the study of overvaluation, which is mostly due to the use of different techniques to calculate the overvaluation. Moreover, the difference in time periods and countries examined as well as different classifications of exchange rate regimes could also contribute to the inconclusiveness.

Appendix 3 briefly summarizes recent literature on real exchange rates and different exchange rate regimes. It has been shown in various studies, including Frieden, Ghezzi, and Stein (2000) and Shambaugh (2004) that real appreciation is more likely

under a pegged exchange rate system compared to a more flexible exchange rate regime. Focusing on Latin American and Caribbean countries during the 1960-1994 period, Frieden, Ghezzi, and Stein find that the average Latin American country with a fixed exchange rate has a real exchange rate 8.6 percent more appreciated than the average country with a floating rate. Grouping *de facto* classifications into four categories: fixed, forward-looking crawls, floating, and backward-looking crawls, they find that forward-looking pegs and bands are associated with the most appreciated real exchange rate, followed by the fixed regimes.

Similarly, Shambaugh (2004) concludes that countries with fixed exchange rate regimes, on average, have a real exchange rate 13 percent more appreciated than those with flexible exchange rate regimes.[8] His study uses a large sample set, which includes all developing countries where data are available over the period 1973-2000. However, Shambaugh only distinguishes between two *de jure* exchange rate classifications: fixed and flexible.

This result is somewhat consistent with the finding of Goldfajn and Valdés (1996, 1999) that overvaluations have been much less likely to occur in regimes with *de jure* flexible exchange rate regimes. Goldfajn and Valdés define overvaluations as the episodes of Purchasing Power Parity (PPP) departure in the short run and medium run. They include a number of economic fundamentals when calculating the real exchange rate equilibrium. Nevertheless, the study only focuses on a three-way classification of

[8] Appendix 3 gives brief summary of each study, including their RER measures.

exchange rate regimes: fixed, flexible[9], and floating. Their sample includes monthly data from 93 countries from 1960 to 1994.

Using the same methodology to construct the equilibrium real exchange rate series as Goldfajn and Valdés (1996), Terra and Valladares (2004), however, find that there is no evidence of any effects of different exchange rate regimes on the degree of overvaluation. In addition to the Goldfajn and Valdés methodology, Terra and Valladares also use a Markov Switching Model (MSM), which specifically deals with situations where discrete shifts in regime — when there is an existence of episodes across which the dynamic behavior of the series is substantially different — are possible. As a result, they argue that most overvaluation is due to "regime switching," which refers to a country changing from one exchange rate regime to another. The Terra and Valladares study is purely empiric, where their findings are based on the MSM, and does not have theoretical background. Basing on Goldfajn and Valdés study, Terra and Valladares have a similar sample set that includes data from 85 countries over the 1960-1998 period.[10]

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[9] Their flexible regimes include crawling pegs, adjustable bands, adjustable pegs to basket, and managed floats.

[10] In addition to overvaluation, a large number of studies also focus on the variations of real exchange rate. Husain, Mody and Rogoff (2004) and Rogoff et al. (2003), for example, find that the more variable real exchange rates, the greater the flexibility of the regime. Kent and Naja (1998) differentiate between the uses of "bilateral" and "effective" real exchange rate, and find that the former tends to overstate the effects of exchange rate regimes on the variance of real exchange rates. Kent and Naja argue that existing evidence shows that the short-term volatility of "bilateral" real exchange rates is on average about 12 times higher under floating nominal exchange rate regimes than under fixed regimes. However, the "effective" real exchange rate is only twice as volatile under floating regimes as under fixed regimes. More interestingly, Kent and Naja find that despite the statistically significant result mentioned previously, results within countries show that for most countries there was no significant increase in the variance of the "effective" real exchange rate when the countries moved to more flexible exchange rate regimes. Kent and Naja, studying the relationship between variations of real exchange rate and exchange rate regimes, use inflation and GDP growth to separate their country sample. They focus especially on the set of countries with low and stable inflation and stable GDP growth rate.

These differences, as already stated, may be due to different classifications of exchange rate regimes and different indices of real exchange rates. Moreover, most of these studies tend to focus only on fixed versus flexible exchange rate regimes. However, it is crucial to differentiate between adjustable pegs and hard fixes because these two regimes are very likely to lead to different degrees of overvaluation. Most early studies were based on the *de jure* classification of exchange rate regime; however, these announced regimes are often quite different from the *de facto* regimes, and hence there is a need to focus on these actual regimes and their effects on real appreciation.

This study presented here is closer to Frieden, Ghezzi, and Stein (2000) and Shambaugh (2004) since it focuses on real appreciation rather than overvaluation. However, these two studies omit economic fundamentals when they examine the relationship between real exchange rates and exchange rate regimes, in which they merely conduct a simple correlation. This study not only looks at the simple correlation, but also includes a number of relevant economic factors when examining the relationship.

5.2. Methodology and Variables

The sample, using annual data starting from 1990 until 2003, includes 63 countries, covering 27 emerging economies and 36 developing countries.[11] The start and the end year are chosen based on the availability of the main explanatory variable, the exchange rate regimes. The empirical approach used is Arellano and Bond's Generalized

[11] Country list is shown in Appendix 2. Emerging countries are those that are included in the Morgan Stanley Capital International (MSCI) index, but not identified as developed economies (Hong Kong and Singapore are the exceptions). Moreover, Taiwan, an emerging economy, is excluded from the sample because of its data unavailability.

Method of Moments (GMM). However, Fixed Effects (FE) and Ordinary Least Squares (OLS) are also used in some specifications for comparison. Arellano and Bond's methodology, described in Appendix 1, helps ameliorate the 'duration problem,' which refers to a possibility that the longer a country stays with the pegged exchange rate regime, the more appreciated its real exchange rate is. In other words, there might be an effect that the length of time a country holds a particular regime has on its real exchange rate. This persistence of real exchange rates requires us to include a lagged value as one of the explanatory variables. This usually leads to biased results if estimated by Ordinary Least Squares (OLS). GMM, however, specifically deals with this issue.

5.2.1. Dependent Variable

Since there are more than two countries in consideration in this study, it is more suitable to use real effective exchange rates than the bilateral rates. While the bilateral real exchange rate gives the real value of a country's currency against a single foreign currency, the real effective exchange rate is measured against a weighted basket of foreign currencies. Thus, the Real Effective Exchange Rate (REER) is used throughout this study.

The REER index data are mainly from JP Morgan.[12] In some cases, it is complemented by that of IFS when the former is not available. Please refer to Appendix 2

[12] Analyzing capital inflows and real exchange rates, Athukorala and Rajapatirana (2003) argue that JP Morgan's REER index is not a suitable measure of RER, "...the J.P. Morgan index, which uses wholesale non-food manufacturing prices for both world and domestic prices. This measure may thus be viewed as an indicator of the *international* competitiveness of manufacturing goods produced in the given country. It is not a measure of *internal* competitiveness (the relative profitability of domestic production of tradables compared with non-traded goods and services), the concept of real exchange rate, which is theoretically more appropriate for the present analysis. Wholesales prices of traded goods generally adjust to exchange rate changes and the dismantling of trade barriers and are thus likely to deviate from the price trends of

for further details. These indices are defined in such a way that a higher number indicates an appreciation of the real exchange rate, and a lower number indicates depreciation. I use both the log and level of the REER index in the regressions; the focus is, however, on the log form of REER index since its coefficients can be interpreted more easily as a percentage change of real exchange rate index. Unlike GMM, FE and OLS do not include a lagged dependent variable as one of the right-hand-side variables, which renders them vulnerable to the duration problem avoided by GMM case. Therefore, the actual percentage change of REER is used to mitigate this duration problem in the cases of FE and OLS; it also serves as a useful robustness check.

5.2.2. Exchange Rate Regimes:

This study uses *de facto* exchange rate regimes classified by Bubula and Ötker-Robe (2002), as modified by Angkinand, Chiu, and Willett (2005). Most studies use either *de jure* classification or coarse *de facto* classifications, in which they only classify exchange rate regimes into fixed, intermediate, or flexible. However, there are different degrees of flexibility in the intermediate regimes and they could lead to different degrees of real appreciation. In this study, the break down of the exchange rate regimes is the following.

1. Hard pegs (dollarization, currency board, currency union)
2. Soft pegs (conventional fixed to a single or basket of currencies)
3. Forward-looking crawls (pegs & bands)
4. Backward-looking crawls (pegs & bands)

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non-tradable goods" (p.635). In this study, however, more emphasis is placed on international competitiveness since an underlying interest of the study is in overvaluation as a cause of the crisis.

5. Managed floats (tightly managed floats)
6. Floats (other managed floats and independently floating regimes)

There is a need to distinguish between the crawls (3 and 4) because forward-looking crawls, especially crawling pegs, are often used as nominal anchors to stabilize inflation; they have the benefit of credibility as their main feature. Backward-looking crawls, on the other hand, tend toward the more flexible end of the exchange rate regime spectrum. Therefore, grouping forward-looking crawls and backward-looking crawls together might not be appropriate. Note that there are, however, some problems pertaining to Bubula and Ötker-Robe's classification of the forward-looking crawls category since some of their observations coincide with Reinhart and Rogoff's (2002) "free falling" category of exchange rate regime.[13]

5.2.3. Economic Control Variables

Most, if not all, of the studies mentioned previously fail to take into account the fundamentals affecting overvaluation. They merely provide the descriptive statistics to examine an average of overvaluation under different types of exchange rate regimes. However, there are many factors that affect overvaluation which, if omitted from the analysis, could lead to biased results. The following variables are included as economic

[13] Reinhart and Rogoff (2002) classify periods as free falling when the 12-month rate of inflation equals or exceeds 40 percent unless they have been identified as some form of pre-announced peg or pre-announced narrow band by the above criteria. This is because historically a majority of inflation stabilization efforts have used the exchange rate as the nominal anchor and in many of these episodes inflation rates at the outset of the peg were well above our 40 percent threshold. The second criterion to classify a free falling episode is during the six months immediately following a currency crisis—but only for those cases where the crisis marks a sudden transition from a fixed or quasi-fixed regime to a managed or independently floating regime, which are typically characterized by exchange rate overshooting.

control variables when the effects of exchange rate regimes on real appreciation are examined:

1. Terms of Trade
2. Government balance; government spending (*)
3. Openness
4. International interest rate (*)
5. Inflation (*)
6. GDP growth

(*) denotes the variables that are excluded in some specifications, and/or sometimes treated as 'endogenous explanatory variables.'[14] The sources of economic data include IMF's *International Financial Statistics* (IFS) and World Bank's *World Development Indicators* (WDI).

...and their justifications

As mentioned previously, the economic variables are included in the analysis to avoid omitted variable bias. Controlling for these variables allows us to also control for real exchange rate movements driven by economic conditions, thus affecting the equilibrium real exchange rate and not the misalignments created by the choice of exchange rate regimes. Most of the variables are taken from Goldfajn and Valdés (1996),

[14] Some argue that the fiscal variable and inflation rates might better be left out of the real exchange rate regression due to the potential endogeneity problem of the variables and real exchange rate. However, leaving these two out could possibly bias a result since government spending and inflation rate would likely contribute to real exchange rate overvaluation. Therefore, I include the variables in the regression specification, treating them instead as endogenous explanatory variables. By stating that a certain variable is endogenous, Stata would have them as Ti – prelags – 2; if the variable is set as predetermined, Stata would have them as Ti – prelags – 1. Note that I do not specify the other variables as predetermined.

who include a number of variables when constructing one of their equilibrium real exchange rate indices in an attempt to isolate the effects of non-traded goods on real exchange rates.[15] Although this study's set of economic control variables is based on the Goldfajn and Valdés (1996) set of variables, traded or non-traded components of real exchange rate indices are not of interest in this study.[16]

1. Terms of Trade (TOT):

TOT shocks affect the relative price of nontradables in small open economies.[17] The direction, however, depends on the relative impact of income versus substitution effects. Traditional analyses focus on the *income* effects:

> If there is a negative permanent shock, say through an increase in the price of imports, the demand for nontradables will decrease with the decrease in permanent income, and therefore the equilibrium relative price of nontradables will fall, and a real depreciation should be observed.

But there are also *substitution* effects:

> If the movements of production (or consumption) away from nontradables (importables) and toward importables (nontradables) are strong enough, the

[15] The other two variables, inflation and GDP growth are from Kent and Naja (1998)'s study. They do not include control variables *per se*; however they divide their country sample into subgroups by using inflation and GDP growth, focusing especially on a set of countries with low and stable inflation rate and stable GDP growth.

[16] Goldfajn and Valdés (1996, 1999) argue that nontraded prices do change with movements in fundamentals. And a decrease in prices of nontradables would lead to an increase in overall demand for nontradables, and thus an appreciation of real exchange rate, which is defined as the sum of departures from Law of One Price, relative price of nontradables, and Terms of Trade effect. Therefore, the predicted signs of the coefficients of economic control variables to be discussed below are mainly based on the effects of fundamentals on changing the demand of nontradables, and thus its prices.

[17] Large countries, however, face an endogeneity problem, making the analysis ambiguous.

substitution effect may dominate and drive up the price of nontradables, thus leading to a real appreciation.

2. Size of Government: the ratio of G expenditures to GDP

A permanent expansion in the size of the government (G) will induce an equilibrium RER appreciation if it increases the overall demand for nontradables. This will be the case if the G propensity to consume nontradables is larger than the private sectors. Otherwise one should expect an expansion in the size of government to depreciate the equilibrium RER. While an increase in the size of the G would imply a change in the equilibrium RER, an unsustainable increase in fiscal deficit, which is fairly common in developing countries, would not imply an equilibrium appreciation but rather an increase in the actual RER that will overvalue the currency.

According to Athukorala and Rajapatirana (2003), G expenditure is a superior indicator to budgetary balance – a more widely used measure – because in the context of an economic boom, a country could well experience a 'revenue surplus,' reflecting faster revenue growth relative to expenditure growth. The published data on budget deficits may also be problematic because different definitions of taxation and borrowing can skew the measured deficits.

3. Openness: the ratio of exports plus imports to GDP

Openness reflects how connected the economy is to the rest of the world. Goldfajn and Valdés (1996, 1999) refer to this variable as a measure for trade liberalization, and argue that trade liberalization generates an equilibrium RER

depreciation from a labor market general equilibrium perspective. The decrease in tariffs generates the necessity of a crowding-in to restore full employment. This, in turn, requires a reduction in the price of nontradables. The results depend on the assumption that the cross-price elasticities of excess demand for nontradables with respect to both exportables and importables are positive. However, the use of openness in this definition as a measure for trade liberalization is highly questionable; the variable does not necessarily represent the government's policy.[18]

4. International Interest Rate (not in GV '96 version)

A lower international interest rate (relative to domestic interest rates) affects the RER in two ways. In the short run, larger capital inflows generate higher expenditures, and the RER thus appreciates. In the long run, a lower international interest rate is associated with a lower stock of net foreign assets that is consistent with a smaller sustainable current account deficit. The latter should therefore generate an equilibrium RER depreciation.

Goldfajn and Valdés (1999) propose the use of "US Treasury Bill rate" as the international interest rate since the literature identifies US interest rates as one of the key determinants of capital flows in developing countries. Interest rate differentials are not suitable because a good part of their volatility is determined by domestic monetary policy.

[18] See Lane (2007).

5. GDP Growth

It has long been argued that a rise in the relative productivity of the tradable sector leads to an increase in the relative price of the nontradables, which then lead to real exchange rate appreciation. Because aggregate productivity growth is generally driven by productivity growth in tradables, it is often argued that productivity growth leads to real appreciation. This is usually known as the Balassa-Samuelson effect.

6. Inflation

Higher inflation rates would lead to real appreciation if the nominal exchange rate does not change fast enough, and thus deteriorates the price competitiveness of exports. Inflation maybe subjects to the endogeneity problem because of probable two-side causality between itself and the exchange rate regime, and hence is included as an endogenous explanatory variable. Moreover, the degree of stickiness of the exchange rate would play an important role in how inflation affects the real exchange rate: the stickier the exchange rate regime, the more appreciating the real exchange rate when there is a given increase in inflation. Therefore, it would be noteworthy to consider the interaction term between the two. This, however, will not be examined here but perhaps in a future study.

Goldfajn and Valdés (1996) argue that degree of capital mobility raises the likelihood of appreciations.[19] While degree of capital mobility is omitted from this study since there is still no clear measure, it is, in some effect, taken into account in this study by distinguishing between emerging-market and developing countries.

[19] Moreover, capital flows are one of the main factors generally used in a calculation of real exchange rate equilibrium.

5.3. Results

Before results are presented, it is important to note that because types of exchange rate regimes are dummy variables, when an exchange rate regime is found to be statistically significant, it means that the regime is statistically different from the default regime, which in this case is a *floating* regime.[20] In addition, it is important to be aware that there is a slight observation problem in the sample: hard peg observations in emerging-market sample group are only drawn from Argentina, and observations of floats in the developing country sample group are also very limited in number. The following results are mainly based on the regressions using the log of the real exchange rate. Comparing the same specifications, the log and level results of exchange rate regimes "ranking" are largely the same. This holds in both emerging-market and developing country sample groups, and in all three methodologies.[21]

5.3.1. A First Pass of the Real Exchange Rate

This study first looks at the average real appreciation under different exchange rate regimes; the first look can be seen from the descriptive tables provided *or* results from OLS specifications when only exchange rate regimes are included (Table 1 for emerging market sample and Table 2 for developing countries).[22] The results for emerging-market economies and developing countries are quite different from each other.

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[20] For robustness check, hard pegs are also used as a default regime. The results remain largely the same, regardless of a choice of exchange rate regime as a default regime.

[21] One exception is the specification with economic control variables for developing countries where the results are surprisingly different between the use of log and level REER.

[22] Even though the table also shows results from the same specifications using different methods, GMM and FE, they are not quite appropriate in looking at the *average* real appreciation and exchange rate regime relationship due to their technicalities. For example, both methods allow for fixed effects, and GMM has lagged dependent variable as one of the explanatory variables.

For example, while hard pegs are found to be most associated with real depreciation for emerging-market economies, they are most associated with real appreciation for developing countries.

Table A. Exchange Rate Regimes and Average Real Appreciation
(no economic control variables)

Log (RER)/OLS	**Emerging-Market Economies**	**Developing Countries**
Appreciation (+)	FW crawls 0.106***	Hard pegs 0.157***
	Managed floats 0.065***	Managed floats 0.088$^{\Diamond}$
	BW crawls 0.030	Adjustable pegs 0.062
	Adjustable pegs 0.019	FW crawls 0.032
	Floats 4.566***	*Floats* 4.520***
Depreciation (-)	Hard pegs -0.016	BW crawls -0.042

This basic OLS results for developing countries are as expected; forward-looking crawling pegs and bands are more associated with real appreciations than backward-looking crawling pegs and crawls, but less than adjustable pegs. This is, however, not the case for emerging-market economies where the adjustable pegs are found to be less associated with real appreciation than the forward-looking crawls. For developing countries, hard pegs are found to be more associated with real appreciation than the adjustable pegs. This result is rather puzzling: in general, adjustable pegs are expected to cause more appreciation than the hard pegs in a given duration. However, this general belief may not hold if there is a high frequency of changes in the adjustable pegs, which could be the case here.

Coefficient Equality Tests: when economic control variables are excluded.

Table A shows the results for developing countries are by and large very different from those of emerging-market economies. This reconfirms that findings from previous studies that group them together may be biased. The ranking of exchange rate regime performance as shown in Table A, however, could be misleading since the differences between regimes may not be significant. Applying tests for equality of means of real exchange rates would provide better insights to understanding the effects of exchange rate regimes on real exchange rate. First, the difference in real exchange rates of the regimes at each end of a spectrum is tested – the hard pegs and the floats. Interestingly, while it rejects the null hypothesis at 5 percent significance level, it fails to reject the null at the 1 percent significance level that these two regimes are the same in real exchange rates for emerging-market economies. This is not the case for developing countries where the tests reject the null hypothesis of mean equality of real exchange rate between hard pegged and floating regimes.

The next pair is hard pegs versus adjustable pegs. Since these two are often lumped together as one regime, it would be interesting to see if it is appropriate to do so. The test for equality of means of real exchange rates fails to reject the null hypotheses of equality for emerging-market economies at all significance level, while largely rejects the null for the developing country sample group.

Next are adjustable pegs and forward-looking crawling pegs and bands. These two are often grouped together as an intermediate regime in a three-way classification, but should they be? There is some supporting evidence in their real exchange rate performance. The tests for equality of means of real exchange rates in log form fail to

reject the null hypothesis at 1% and 5% significance level for emerging-market and developing country sample groups respectively. However, when looking at the real exchange rate level, the test rejects the null hypothesis of equality in the emerging-market economy sample group, but fails to reject the null hypothesis at 1% significance level in the developing country sample.

The last pair of exchange rate regimes that this study applies the equality tests pertains to forward-looking and backward-looking crawling pegs and bands. These two are usually grouped together in a "crawling pegs and crawling bands" category; however, as mentioned previously, they are different from each other. The tests for equality of means of real exchange rates confirm the hypothesis that these two regimes are different for both country groups.

As mentioned previously, the analysis of the effects of exchange rate regimes on RER may subject to duration problems, which are addressed by the use of GMM method when taking economic control variables into account. However, the duration problem may be less severe when looking at the percentage change of RER from the last period.

Table B. Exchange Rate Regimes and Average Percent Change in Real Appreciation (no economic control variables)

$\%\Delta RER_t$/OLS	**Emerging-Market Economies**	**Developing Countries**
Appreciation (+)	BW crawls 1.039	*Floats* 3.835
	Floats 0.986	BW crawls -1.205
	FW crawls -0.678	Hard pegs -2.988
	Adjustable pegs -0.730	FW crawls -3.113
	Managed floats -0.973	Adjustable pegs -3.402
Depreciation (-)	Hard pegs -1.887	Managed floats -4.259

The results of average percentage change are again very different between emerging-market and developing country sample. The exchange rate regimes are found to matter more in the latter group. Moreover, this percentage change results are by and large very different from the level or log results, shown in Table A. For example, in emerging-market economies, forward-looking crawls is found to be 10.6 percent *more* appreciated in real exchange rate than floating regime over the whole sample period of 1990-2003, while the last period's change of RER in forward-looking crawling regime is 0.68 percent *less* than floating regime. Similarly, in developing countries, hard pegs is found to be 15.7 percent *more* appreciated than the floating regime over the whole sample period, but its last period's change is 2.99 percent *less* than the floating regime's.[23] This analysis, nevertheless, may be inadequate since it ignores other economic variables that are likely to affect the real exchange rate changes.

5.3.2. A Closer Look

The above only shows the relationship between real exchange rate and exchange rate regime at first glance. However, this may not be enough. There are other factors that affect real exchange rate, and not including them could result in a false idea of the effect of an exchange rate regime in affecting the real appreciation. This study therefore addresses economic fundamentals that are theoretically and empirically proven to affect real exchange rate appreciation in the regressions.

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[23] In contrast to the previous results, the 'ranking' of exchange rate regime performance is somewhat different between the OLS results (Table B) and the descriptive statistics. For example, in developing countries, while floating regimes are found to be the most appreciating RER in the OLS results, it is, however, has the smallest average rate of appreciation. Also, in emerging-market economies, while OLS shows that hard pegs are associated with the least appreciating rate, its average percentage change in RER is the second most appreciating regime.

The main part of this set of results is based on the previous specifications with the change in dependent variable from level to log form. In Tables 1 and 2, for emerging-market and developing country sample groups respectively, degree of openness, terms of trade, real GDP growth, and the ratio of fiscal balance to GDP are included. There are two different specifications: with and without the fiscal variable, since it was suggested that this variable may subject to endogeneity problem.

Table 1A. Emerging Market Economies, economic variables w/o fiscal variable

Log (RER)	GMM#	**FE**	OLS
Appreciation (+)	BW crawls 0.067**	**Adjustable pegs** 0.056**	FW crawls 0.077**
	Adjustable pegs 0.042	**BW crawls** 0.044*	Managed floats 0.044^{0}
	FW crawls 0.012	**Managed floats** 0.029	BW crawls 0.040
	Floats *0.008****	***Floats*** *4.902****	Adjustable pegs 0.020
	Managed floats -0.005	**FW crawls** -0.013	*Floats* *4.276****
Depreciation (-)	Hard pegs -0.054	**Hard pegs** -0.104	Hard pegs -0.015

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Although the coefficients of different exchange rate regimes do not appear to be much different from each other within a methodology, the results from the three methodologies differ substantially. The OLS results, however, are believed to be biased as explained previously; the GMM's Sargan test shows that this specification could be inappropriate. The results from FE, the only method with this specification that passes econometric tests, suggest that adjustable pegs are most associated with real appreciation. Puzzlingly, backward-looking crawls are found to be more associated with real appreciation than forward-looking ones. Crawling pegs and bands are an exchange rate system where the central parity crawls over time. Backward-looking crawls determine the rate of crawl

using past inflation differentials, while forward-looking crawls use an expected or target rate of inflation. It is often argued that an inappropriate rate of inflation target used in forward-looking crawls can produce overvaluation and hence is subject to speculative pressures.

Table 1B. Emerging Market Economies, economic variables with fiscal variable

Log (RER)	GMM	FE	OLS
Appreciation (+)	BW crawls 0.102***	Adjustable pegs 0.097**	FW crawls 0.071*
	FW crawls 0.070 ◊	Managed floats 0.069*	BW crawls 0.036
	Adjustable pegs 0.060*	BW crawls 0.035	Managed floats 0.034
	Managed floats 0.019	*Floats* *4.082****	Adjustable pegs 0.007
	Floats *0.010****	FW crawls -0.031	*Floats* *4.267****
Depreciation (-)	Hard pegs -0.057	Hard pegs -0.115	Hard pegs -0.043

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

When the fiscal variable is included, the results of exchange rate regimes are slightly different as shown in Table 1B. Similar to previous specification, hard pegs are again found to be associated with real depreciations regardless of which econometric methods are used. While the GMM's Sargan test is not improved by the inclusion of a fiscal variable, the FE's F-test is, however, worsened. For emerging-market economy sample group, the focus therefore is on the FE specification where fiscal variable is not included (Table 1A, middle column).

For each specification, I run the coefficient equality tests of

i. all regimes

ii. hard pegs vs. adjustable pegs

iii. adjustable pegs vs. forward-looking crawls

iv. forward-looking crawls vs. backward-looking crawls

v. backward-looking crawls vs. managed floats

In this specification for emerging-market economies (with economic variables, excluding fiscal variable), the coefficient equality tests fail to reject the hypotheses that all exchange rate regimes are the same (although the p-value is 0.1096), that hard pegs and adjustable pegs are the same, and that backward-looking crawls and managed floats are the same. The tests, however, reject the hypotheses that forward-looking crawls and adjustable pegs are the same at 5% significance level, and that forward-looking crawls and backward-looking crawls are the same at 10% significance level.

When looking at the percentage change of RER, the 'ranking' results of exchange rate regime performance remain largely the same for GMM and FE. This is not case for OLS specification; for example, managed floats are now the least appreciating regime. Specification tests now pass both specifications (with and without fiscal balance variable) for GMM, while fail the FE. The regression results are shown in Table 1.1.

Table 1.1A. Emerging Market Economies, economic variables w/o fiscal variable

%ΔREER	**GMM#**	FE	OLS
Appreciation (+)	**BW crawls** 4.197	Adjustable pegs 0.973	BW crawls 1.455
	Adjustable pegs 1.867	BW crawls 0.870	Adjustable pegs 0.259
	Floats *0.395*	*Floats* *18.126*	*Floats* *9.474***
	FW crawls -0.488	Managed floats -0.042	FW crawls -0.561
	Managed floats -1.728	FW crawls -4.368	Hard pegs -0.986
Depreciation (-)	**Hard pegs** -17.193*	Hard pegs -136.287	Managed floats -1.241

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Comparing the two specifications, the results show that adjustable pegs lead to 4.2 percent more appreciated in RER than floating regimes over the whole sample period, its last period's change is 1.9 percent more. This result is not as notable as in the case of the hard pegs, where they are found to be associated with 5.4 percent less appreciated than the floating regime over the whole sample period, while its last period's change is 17.2 percent less. This hard peg result is puzzling because not only it should tend toward real appreciation than the floating regimes, but also its coefficient are substantially large in relative to other exchange rate regime coefficients.[24]

Table 1.1B. Emerging Market Economies, economic variables <u>with</u> fiscal variable

%ΔREER	**GMM#**	FE	OLS
Appreciation (+)	**BW crawls** 6.760***	BW crawls 0.719	BW crawls 1.567
	Adjustable pegs 4.690	Adjustable pegs 0.069	Adjustable pegs 0.018
	FW crawls 3.372	*Floats* *23.098*	*Floats* *9.218****
	Managed floats 0.629	Managed floats -0.950	FW crawls -0.428
	Floats *0.665****	FW crawls -4.649	Hard pegs -1.396
Depreciation (-)	**Hard pegs** -18.384*	Hard pegs -259.116	Managed floats -1.513

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables;
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Similar to the level result, fiscal balance is found to be statistically insignificant. Including the variable, however, affect the 'ranking' results. As an example, without fiscal variable, floats are found to be more appreciated than forward-looking crawls and managed floats. This is not the case when fiscal balance is included in the analysis. These emerging-market economies results, both the log and the percentage change, show that

[24] Within this specification, hard pegs observations include both the Argentine and Hong Kong's hard pegs (1998-2003). In other specifications that include fiscal variables, hard pegs only refer to Argentina's currency board.

backward-looking crawls and adjustable pegs are generally the regimes with the most appreciated real exchange rates. This backward-looking crawls result is, however, not as expected; backward-looking crawls are commonly expected to have less appreciated real exchange rates than forward-looking crawls.

Table 2A. Developing Countries, economic variables w/o fiscal variable

Log (RER)	**GMM**	**FE**	OLS
Appreciation (+)	***Floats*** *0.008**	***Floats*** *4.927****	Hard pegs 0.063
	Hard pegs -0.229◊	**Hard pegs** -0.105	Managed floats 0.045
	BW crawls -0.284**	**BW crawls** -0.279**	Adjustable pegs 0.031
	Adjustable pegs -0.388**	**Adjustable pegs** -0.376**	*Floats* *4.483****
	Managed floats -0.465**	**FW crawls** -0.458***	FW crawls -0.092
Depreciation (-)	**FW crawls** -0.470***	**Managed floats** -0.476***	BW crawls -0.266◊

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Table 2B. Developing Countries, economic variables with fiscal variable

Log (RER)	**GMM**	**FE**	OLS
Appreciation (+)	***Floats*** *0.014****	***Floats*** *4.331****	Hard pegs 0.094
	Hard pegs -0.198	**Hard pegs** -0.055	Managed floats 0.067
	BW crawls -0.283	**BW crawls** -0.222**	*Floats* *4.363****
	Managed floats -0.345*	**Managed floats** -0.245	Adjustable pegs -0.089
	Adjustable pegs -0.368***	**Adjustable pegs** -0.281*	FW crawls -0.091
Depreciation (-)	**FW crawls** -0.461***	**FW crawls** -0.325**	BW crawls -0.225

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Fiscal balance is found to be statistically significant with the expected sign: higher fiscal balance leads to real depreciation. Including the variable, however, lowers the statistical significance of exchange rate regimes in both GMM and FE regressions.

The results in terms of exchange rate regime performance from both specifications and both GMM and FE methodologies are largely similar to each other. Both specifications pass econometric tests for both methods. The sizes of the regime coefficients are not only much larger than those from the emerging-market economy sample group, but also seem to be different across different regimes. Contrary to conventional wisdom, these results show that all other regimes are relatively more associated with real depreciation than floating regimes; however, this finding may be due to the limited number of floating regime observations in developing countries.

Coefficient equality tests are applied for both specifications – economic control variables with and without fiscal balance variable – and for both GMM and FE regressions. The tests fail to reject all the hypotheses of equality of exchange rate regimes. (The closest one to rejection is the hypothesis that hard pegs and adjustable pegs are the same in a specification which includes fiscal balance variable in FE regression, where the p-value is 0.1004).

From the above, it can be concluded that for both emerging-market economy and developing country samples, there is no clear evidence that a fixed exchange rate regime is associated with real appreciation, or that flexible exchange rate regime can act as a cushion for real appreciation. Nevertheless, one interesting result is that in the developing country sample group the coefficients for exchange rate regimes become much larger when controlling for economic fundamentals. This is not the case with the emerging-

market economy group. Bad fundamentals, which are far from the mean, in developing countries could be the main factors driving this result.

Next, percentage changes of RER are examined in the developing country context. Interestingly, neither GMM nor FE passes the specification tests. Moreover, the 'ranking' results of the percentage change are relatively different from the logarithm results; the most noticeable change is the hard pegs. While hard pegs are found to have relatively more appreciated real exchange rates over the whole sample period, its last period's change shows that the regime has the smallest appreciation rate.

Table 2.1A. Developing countries, economic variables w/o fiscal variable

%ΔREER	GMM#	FE	OLS
Appreciation (+)	*Floats* *1.596****	*Floats* *7.120*	*Floats* *28.705***
	Adjustable pegs -9.978	FW crawls -25.985	BW crawls -28.767***
	FW crawls -11.076	Managed floats -26.121◊	Managed floats -30.568***
	Managed floats -13.469	BW crawls -27.664**	FW crawls -31.849***
	BW crawls -27.408*	Adjustable pegs -28.355*	Hard pegs -33/305***
Depreciation (-)	Hard pegs -48.381***	Hard pegs -37.448**	Adjustable pegs -35.242***

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

The fiscal balance results are similar to the previous specification; high fiscal balance lower the rate of appreciation.

Table 2.1B. Developing countries, economic variables <u>with</u> fiscal variable

%ΔREER	GMM#	FE	OLS
Appreciation (+)	*Floats* *1.457**	*Floats* *-19.674*	*Floats* *18.865*
	Adjustable pegs -1.025	Managed floats -1.100	Adjustable pegs -22.317◊
	FW crawls -10.594	FW crawls -12.480	BW crawls -25.388***
	Managed floats -11.566	Adjustable pegs -18.069	Managed floats -27.276**
	BW crawls -24.771◊	BW crawls -23.705◊	FW crawls -29.560**
Depreciation (-)	Hard pegs -43.224***	Hard pegs -34.140**	Hard pegs -29.595***

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

One result from developing country sample that is now similar to that of emerging country sample is on the hard pegs. In both sample, hard pegs are found to have the smallest appreciation rate. The exchange rate regime coefficients are relatively larger for developing countries. Also, developing countries are more likely to be subject to the duration problem, since the 'ranking' results for the logarithm and last period's percentage change are by and large different from each other. The question of why this is so is one worth examining in future research.

5.3.3. Endogeneity

Since the ratio of fiscal balance to GDP and inflation may be affected by choice of exchange rate regime, as illustrated in the chapter on discipline, they are considered endogenous in our real exchange rate equation. In other words, the ratio of fiscal balance to GDP and inflation, included as explanatory variables, may be jointly determined with the real exchange rate index, which is the dependent variable. Therefore, the ratio of

fiscal balance to GDP and inflation are included as *endogenous* explanatory variables.[25,26] The basic idea is that if a variable faces an endogeneity problem, it needs an instrumental variable. In time series data, a natural source of instruments are its own lagged values since they are likely to be correlated with the 'endogenous' variable, but they will not be correlated with the error term at time *t*, since they were generated at an earlier point in time.

Cyclically adjusted balance is also used in place of the nominal fiscal balance. Not only is its coefficient statistically insignificant, but it also has the wrong sign. Therefore, the focus is on Specification III and IV in Table 3, shown on page 39. The former includes lagged economic control variables, the latter does not.

In the developing country group, inflation is found to be significant, both statistically and perhaps economically.[27] Our results show that the higher the inflation level, the more likely is a real depreciation. Fiscal balance is found to be statistically significant across both sample groups, with the expected sign. The higher the fiscal balance, the more likely is a real depreciation. The size of the coefficients, nevertheless, appears to be relatively larger for the developing country group. This is also the case for exchange rate regime coefficients, which are relatively larger and generally more statistically significant in the developing country sample. This result of exchange rate regimes in developing countries may be due to the limited number of observations in floating exchange rate regimes.[28]

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[25] By stating that a certain variable is endogenous, Stata would treat it as T_i – prelags – 2.

[26] In this section, no emphasis is given to the last period's change. GMM are set to deal with the duration problem, therefore there is no need to examine the last period's change in RER.

[27] The coefficient sizes of inflation rate for the developing country group are relatively larger than those for the emerging-market sample group, which is also found to be statistically insignificant.

[28] As a robustness check, hard pegs are also used as a default regime. However, this does not solve the problem of a limited number of observations. There are only five REER observations for floating regime in

Table 3A. GMM - Emerging Market Economies,
with endogenous explanatory variables (Fiscal Balance & Inflation level)

Log (RER)	**w/o lagged economic variables (III)**	**with lagged economic variables (IV)**
Appreciation (+)	BW crawls 0.099***	BW crawls 0.099***
	FW crawls 0.071*	FW crawls 0.060
	Adjustable pegs 0.054*	Adjustable pegs 0.039
	Managed floats 0.012	Managed floats 0.002
	Floats *0.009***	*Floats* *0.013****
Depreciation (-)	Hard pegs -0.037	Hard pegs -0.080

Table 3B. GMM - Developing Countries,
with endogenous explanatory variables (Fiscal Balance & Inflation level)

Log (RER)	**w/o lagged economic variables (III)**	**with lagged economic variables (IV)**
Appreciation (+)	***Floats*** *0.003*	***Floats*** *0.001*
	Hard pegs -0.424***	**Hard pegs** -0.348***
	Adjustable pegs -0.553***	**BW crawls** -0.551***
	BW crawls -0.589***	**Adjustable pegs** -0.572***
	FW crawls -0.713***	**FW crawls** -0.745***
Depreciation (-)	**Managed floats** -0.790***	**Managed floats** -0.811***

While GMM's econometric tests approve the specifications for the developing country sample, the test results for the emerging-market economy sample are inconclusive. Thus, focusing on the developing country sample, coefficient equality tests largely reject all the hypotheses of regime equality (one exception where the test fails to reject the equality hypothesis is the hypothesis that hard pegs and adjustable pegs are the same in Specification III). This coefficient equality test result is very different from those from

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the developing country sample: Bulgaria in 1996, Ecuador in 1999, Macedonia in 1993, and Uruguay in 2002-03.

specifications where fiscal variable and inflation level are not included (as endogenous explanatory variables).

5.3.4. International Interest Rate and Government Expenditure

The following specifications differ from the previous with an addition of an international interest rate (US T-Bill rate) and a substitution of fiscal balance variable with government expenditure. This yields significantly improved econometric test results for the emerging-market economy sample group.

In Tables 4 and 5, there are two different specifications, one with and another without the government expenditure variable, using three different methodologies: GMM, FE, and OLS. The latter is included as a reference and should not be focused on since it is highly prone to bias.

Table 4A. Emerging-Market Economies, with US T-bill rate but without government expenditure

REER (*ln*)	**GMM**	**FE**	OLS
Appreciation (+)	**BW crawls** 0.044	**Adjustable pegs** 0.054*	FW crawls 0.081**
	Adjustable pegs 0.035	**BW crawls** 0.039◊	Managed floats 0.048*
	Floats *0.009***	**Managed floats** 0.028	BW crawls 0.045
	FW crawls -0.005	***Floats*** *4.924****	Adjustable pegs 0.023
	Managed floats -0.014	**FW crawls** -0.018	*Floats* *4.257****
Depreciation (-)	**Hard pegs** -0.079	**Hard pegs** -0.079	Hard pegs -0.013

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

The regime coefficients do not appear much different from each other. Most, if not all, are found to be statistically insignificant. The results for the economic control variables are generally the same across methodologies (GMM vs. FE), in which their respective

econometric tests pass both specifications. A greater degree of openness leads to a real depreciation. Terms of trade are not found to be either statistically or economically significant. An increase in real GDP growth as well as an increase in the US T-bill rate is found to lead to real appreciation. The latter is consistent with Goldfajn and Valdés (1999)'s argument of the *long-run* effect of international interest rate: a lower international interest rate would lead to a lower stock of net foreign asset, which is consistent with a smaller sustainable current account deficit. This, in turn, should generate an equilibrium real exchange rate appreciation.

Table 4B. Emerging-Market Economies, with US T-bill rate *and* government expenditure

REER (*ln*)	**GMM**	**FE**	OLS
Appreciation (+)	**BW crawls** 0.036	**Adjustable pegs** 0.058**	FW crawls 0.081**
	Adjustable pegs 0.036	**BW crawls** 0.034*	Managed floats 0.048*
	Floats *0.008****	**Managed floats** 0.029	BW crawls 0.039
	FW crawls -0.001	**Hard pegs** 0.023	Adjustable pegs 0.022
	Managed floats -0.014	***Floats*** *4.668****	*Floats* *4.247****
Depreciation (-)	**Hard pegs** -0.111	**FW crawls** -0.017	Hard pegs -0.017

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Adding government expenditure into the specifications does not change the results. Both exchange rate regimes and economic control variable coefficients stay nearly the same. Government expenditure is found to be statistically significant with expected sign; the higher the expenditure, the more likely is the real appreciation.

The coefficient equality tests for the two specifications give the same results, although the results across methodologies differ. Using GMM, the coefficient equality

tests reject only the hypotheses that all regimes are the same and that backward-looking crawls and managed floats are the same, both at 10 percent significance level. On the other hand, using FE, the tests reject only the hypotheses that forward-looking crawls and adjustable pegs are the same and that forward-looking crawls and backward-looking crawls are the same, at 5 and 10 percent significance level respectively.

Examining the last period's change, there is not much difference between the changes over the whole sample period and the last period's change. For example, in specification that includes government expenditure, adjustable pegs are found to be 3.5 percent more appreciated than the floating regimes over the whole sample period, and 2.5 percent more appreciated when examining the last period's change. Again, FE is no longer valid, that is it fails the F-test specification test.

Table 4.1A. Emerging-Market Economies, with US T-bill rate but without government expenditure

%ΔREER	**GMM**	FE	OLS
Appreciation (+)	**Adjustable pegs** 2.510	Adjustable pegs 0.183	BW crawls 0.421
	BW crawls 1.999	*Floats* *16.075*	*Floats* *11.583****
	Floats *0.612****	Managed floats -0.720	Adjustable pegs -0.387
	Managed floats -1.427	BW crawls -0.854	Hard pegs -1.585
	FW crawls -2.234	FW crawls -6.018*	FW crawls -1.601
Depreciation (-)	**Hard pegs** -17.119*	Hard pegs -83.762	Managed floats -2.079

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Table 4.1B. Emerging-Market Economies, with US T-bill rate *and* government expenditure

%ΔREER	GMM	FE	OLS
Appreciation (+)	Adjustable pegs 2.505	*Floats* *15.771*	BW crawls 0.217
	BW crawls 0.789	Adjustable pegs -0.363	*Floats* *12.412***
	Floats *0.722****	Managed floats -1.019	Adjustable pegs -0.603
	Managed floats -1.341	BW crawls -1.873	FW crawls -1.757
	FW crawls -2.009	FW crawls -5.929*	Managed floats -2.155
Depreciation (-)	Hard pegs -14.646◊	Hard pegs -64.555	Hard pegs -2.469

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

This strengthens the previous finding that adjustable pegs are associated with the highest appreciation rate. This is especially more likely when the adjustable pegs are not frequently adjusted. Moreover, US T-bill rate appears to be more statistically significant when examining the last period's change in RER.

Table 5A. Developing Countries, with US T-bill rate but without government expenditure

REER (*ln*)	**GMM**	**FE**	OLS
Appreciation (+)	***Floats*** *0.008****	***Floats*** *4.925****	Hard pegs 0.076
	Hard pegs -0.208	**Hard pegs** -0.096	Managed floats 0.062
	BW crawls -0.281**	**BW crawls** -0.277**	Adjustable pegs 0.040
	Adjustable pegs -0.392**	**Adjustable pegs** -0.370**	*Floats* *4.467****
	Managed floats -0.440**	**FW crawls** -0.448***	FW crawls -0.080
Depreciation (-)	**FW crawls** -0.453**	**Managed floats** -0.463***	BW crawls -0.260

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Unlike results for emerging-market economies, both GMM and FE methods give similar 'ranking' results. The regime coefficients are relatively larger compared to the results for

the emerging-market economy sample. There also seems to be larger differences among regimes. Coefficient equality tests, however, fail to reject all the hypotheses of equality, except the hypothesis that hard pegs and adjustable pegs are the same in the specification that excludes government expenditure using FE (at 10 percent significance level; Table 5A, middle column).

Table 5B. Developing Countries, with US T-Bill Rate *and* government expenditure

REER (*ln*)	**GMM**	**FE**	OLS
Appreciation (+)	***Floats*** *0.011***	***Floats*** *4.514****	Hard pegs 0.044
	Hard pegs -0.178	**Hard pegs** -0.068	Managed floats 0.039
	BW crawls -0.295**	**BW crawls** -0.278***	*Floats* *4.154****
	Adjustable pegs -0.356*	**Adjustable pegs** -0.314*	Adjustable pegs -0.017
	Managed floats -0.402**	**FW crawls** -0.388**	FW crawls -0.156
Depreciation (-)	**FW crawls** -0.425**	**Managed floats** -0.394**	BW crawls -0.309*

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Similar to the emerging-market economy sample, adding government expenditure into the specification does not change results, neither for exchange rate regimes nor economic control variables. An increase in the degree of openness is found to be associated with real depreciation. Last period's terms of trade are found to be statistically significant: the higher the terms of trade, the more likely is a real appreciation. The result on the US T-bill is rather ambiguous – there is a flip in signs from period t to *t*-1, which could wash out each other's effect; the variable, however, is not found to be statistically significant. An increase in government expenditure leads to real appreciation.

The above results largely differ from the results of last period's changes, though the latter fail to pass specification tests for both GMM and FE. Nevertheless, it is

interesting that the results now show that hard pegs have the smallest rate of appreciation, while previously this is not the case.

Table 5.1A. Developing Countries, with US T-bill rate but without Government Expenditure

%ΔREER	GMM	FE	OLS
Appreciate (+)	*Floats* *1.539***	*Floats* *7.634*	*Floats* *33.663****
	FW crawls -7.141	FW crawls -26.194	BW crawls -29.257**
	Adjustable pegs -8.079	Managed floats -26.584	Managed floats -30.561**
	Managed floats -9.555	BW crawls -27.721***	FW crawls -31.981***
	BW crawls -27.823*	Adjustable pegs -28.754*	Hard pegs -33.600***
Depreciate (-)	Hard pegs -45.161***	Hard pegs -38.011*	Adjustable pegs -35.825***

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

Table 5.1B. Developing Countries, with US T-bill rate *and* Government Expenditure

%ΔREER	GMM	FE	OLS
Appreciate (+)	*Floats* *1.696****	*Floats* *12.034*	*Floats* *36.179****
	FW crawls -2.319	Managed floats -22.807	BW crawls -28.912**
	Adjustable pegs -3.281	FW crawls -23.351	Managed floats -30.415**
	Managed floats -3.637	BW crawls -24.439*	FW crawls -31.405***
	BW crawls -26.779**	Adjustable pegs -25.266	Hard pegs -33.370***
Depreciate (-)	Hard pegs -43.972***	Hard pegs -36.479***	Adjustable pegs -35.395***

Note that the coefficient for 'floating' regime for GMM is different from those obtained from the other two methods because in GMM the lagged dependent variable is included as one of the explanatory variables.
The bold column(s) is(are) the one(s) that pass the econometric specification test(s).

It is important to note the contrast of the exchange rate regime results between the emerging-market economy and developing country sample groups. They are different in

their statistical significance, sizes, and directions (or signs) of coefficients. This is particularly true when looking at the level/logarithm results.

Government expenditure and change in inflation levels are treated as *endogenous* explanatory variables. There are two specifications – one with, the other without lagged economic control variables. The econometric tests, however, disregard the latter in the emerging-market economy sample, and hence the focus is on the former specification where lagged economic control variables are included.

Table 6A. Emerging-Market Economies, with *endogenous* explanatory variables (GMM)

REER (*ln*)	I	II
Appreciation (+)	**BW crawls** 0.048*	BW crawls 0.059**
	Adjustable pegs 0.038	Adjustable pegs 0.042
	FW crawls 0.014	FW crawls 0.020
	Floats *0.007***	Managed floats 0.005
	Managed floats -0.003	*Floats* *0.010****
Depreciation (-)	**Hard pegs** -0.142*	Hard pegs -0.159*

The coefficient equality tests for the above regression (I) fail to reject the hypotheses that all regimes are the same (at 5 percent significance level), that hard pegs and adjustable pegs are the same (5 percent), and that backward-looking crawls and managed floats are the same (10 percent).

Table 6B. Developing countries, with *endogenous* explanatory variables (GMM)

REER (*ln*)	I	II
Appreciate (+)	***Floats*** *0.009****	***Floats*** *0.008****
	BW crawls -0.442***	**FW crawls** -0.366***
	Hard pegs -0.455***	**Adjustable pegs** -0.370***
	Adjustable pegs -0.460***	**Managed floats** -0.405***
	FW crawls -0.487***	**BW crawls** -0.420***
Depreciate (-)	**Managed floats** -0.504***	**Hard pegs** -0.469***

For developing countries, even though the "ranking" results appear different between the two specifications, the differences in the size of coefficients of these exchange rate regimes are fairly small. These differences among exchange rate regimes are much smaller compared to when government expenditure and change in inflation level are not treated as *endogenous* explanatory variables. This can be said for both emerging-market and developing country samples. As a result, the coefficient equality tests fail to reject all hypotheses of equality.

Results for the economic control variables are generally the same among the two country groups. A greater openness leads to real depreciation. The effect of terms of trade on real exchange rate is small and somewhat ambiguous. A higher real GDP growth leads to real appreciation. An increase in government expenditure leads to a real appreciation. A change in inflation level is found to be statistically significant only in the developing country sample; a positive change in inflation level leads to real depreciation. This effect is barely present for the emerging-market economy sample. The difference in results between the two groups of countries may be due to more severe inflation problems in developing countries.

An increase in international interest rate leads to real appreciation, though the variable is found to be statistically significant only for emerging-market economies. This contradicts conventional wisdom, which believes that an increase in international interest rate should lead to capital outflows and thus a real depreciation. As mentioned previously, Goldfajn and Valdés (1999) argue that this conventional wisdom only reflects a short-run effect of a change in international interest rate on real exchange rate. In the long run, the higher international interest rate, which is associated with a higher stock of net foreign assets, would be associated with a higher current account deficit, and thus lead to a real appreciation.

The effects of exchange rate regimes on real appreciation have been examined in this chapter. While there are considerable variations in some of the results, there are areas where the empirical results are not as ambiguous. The next chapter presents concluding remarks, as well as future research plans, in the next chapter.

Descriptive Statistics

All Countries I

(Emerging and Developing Countries)

Real Exchange Rate (Level)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	105.25	100.11	98.26	100.81	95.47	103.83	96.07	100.94
Median	101.36	99.60	96.65	97.56	94.99	101.74	99.98	100.00
Maximum	156.76	173.74	154.28	154.28	145.11	173.54	134.88	173.74
Minimum	74.52	49.78	54.53	59.12	54.53	56.66	60.30	49.78
Std. Dev.	16.90	15.81	17.16	18.46	15.35	18.28	13.25	17.01
Skewness	1.53	0.81	0.83	0.93	0.46	0.40	-0.34	0.73
Kurtosis	4.97	7.25	4.88	4.44	4.77	5.33	3.98	5.59
Jarque-Bera	41.50	101.42	38.00	17.34	11.57	46.63	3.99	217.04
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00
Sum	7894.01	11812.43	14248.11	7560.57	6682.60	19105.29	6436.42	59655.98
Sum Sq. Dev.	21127.62	29247.71	42390.10	25215.74	16248.27	61125.09	11583.88	170746.90
Observations	75	118	145	75	70	184	67	591

Real Exchange Rate (natural log)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	4.645	4.594	4.573	4.597	4.546	4.627	4.555	4.601
Median	4.619	4.601	4.571	4.580	4.554	4.622	4.605	4.605
Maximum	5.055	5.158	5.039	5.039	4.977	5.156	4.904	5.158
Minimum	4.311	3.908	3.999	4.080	3.999	4.037	4.099	3.908
Std. Dev.	0.147	0.159	0.172	0.178	0.163	0.182	0.146	0.169
Skewness	1.133	-0.465	-0.077	0.090	-0.400	-0.676	-0.914	-0.304
Kurtosis	4.274	6.763	4.853	4.712	4.790	5.375	4.371	5.357
Jarque-Bera	21.121	73.884	20.898	9.260	11.214	57.259	14.587	145.915
Probability	0.000	0.000	0.000	0.010	0.004	0.000	0.001	0.000
Sum	348.383	542.084	663.079	344.808	318.214	851.344	305.184	2718.899
Sum Sq. Dev.	1.599	2.951	4.260	2.344	1.832	6.066	1.405	16.776
Observations	75	118	145	75	70	184	67	591

Descriptive Statistics (cont'd)

All Countries II

(Emerging and Developing Countries)

Percent Change in REER level (%Δ in REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	1.437	0.309	1.886	0.509	3.177	-0.594	-1.218	0.388
Median	2.502	0.466	1.692	-0.033	2.930	0.041	-2.684	0.704
Maximum	25.770	50.091	33.767	33.767	18.883	41.707	52.549	52.549
Minimum	-38.377	-56.228	-21.402	-21.402	-15.586	-59.427	-49.583	-59.427
Std. Dev.	8.989	10.976	7.488	8.829	5.529	11.010	14.546	10.495
Skewness	-1.720	-0.565	0.498	0.878	0.046	-0.990	0.339	-0.583
Kurtosis	10.723	13.280	6.816	6.583	4.782	10.255	6.283	10.744
Jarque-Bera	220.43	494.63	92.67	49.07	9.16	421.85	31.38	1472.08
Probability	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sum	106.32	34.30	269.63	37.66	219.19	-106.41	-81.60	223.27
Sum Sq. Dev.	5898.96	13253.00	7961.42	5689.97	2078.74	21575.20	13964.39	63329.14
Observations	74	111	143	74	69	179	67	576

First Approximation of %Δ REER
(A change in natural log of REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	0.978	-0.374	1.602	0.138	2.985	-1.308	-2.334	-0.224
Median	2.471	0.465	1.678	-0.033	2.888	0.041	-2.721	0.701
Maximum	22.929	40.607	29.093	29.093	17.297	34.859	42.232	42.232
Minimum	-48.413	-82.618	-24.082	-24.082	-16.944	-90.208	-68.484	-90.208
Std. Dev.	9.944	12.347	7.325	8.616	5.385	12.595	15.288	11.518
Skewness	-2.712	-2.876	-0.088	0.278	-0.274	-2.773	-0.906	-2.408
Kurtosis	14.971	22.521	6.253	5.664	5.252	19.527	7.791	18.910
Jarque-Bera	532.51	1915.47	63.25	22.84	15.45	2266.47	73.24	6632.07
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	72.37	-41.54	229.05	10.21	205.96	-234.22	-156.36	-129.28
Sum Sq. Dev.	7218.49	16768.74	7620.05	5418.71	1971.81	28236.09	15426.29	76281.13
Observations	74	111	143	74	69	179	67	576

Descriptive Statistics (cont'd)

Emerging-Market Economies I

Real Exchange Rate (Level)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	96.40	99.80	103.17	110.54	98.46	103.72	97.20	101.02
Median	95.97	99.65	98.10	106.66	95.64	101.80	100.00	99.99
Maximum	113.58	129.44	154.28	154.28	145.11	136.12	134.88	154.28
Minimum	86.35	62.46	59.12	59.12	68.15	56.66	63.94	56.66
Std. Dev.	6.76	13.32	19.65	24.24	14.47	15.27	11.51	15.13
Skewness	0.57	-0.09	0.80	0.13	1.15	-0.97	-0.26	0.25
Kurtosis	2.86	3.10	3.25	2.12	5.23	5.13	4.74	4.53
Jarque-Bera	1.37	0.12	8.46	1.05	20.09	37.06	8.50	36.87
Probability	0.50	0.94	0.01	0.59	0.00	0.00	0.01	0.00
Sum	2410.05	6586.54	7943.71	3316.13	4627.58	11097.78	6026.20	34347.95
Sum Sq. Dev.	1095.89	11525.80	29338.52	17037.17	9629.95	24721.90	8078.25	77588.27
Observations	25	66	77	30	47	107	62	340

Real Exchange Rate (natural log)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	4.566	4.594	4.619	4.681	4.580	4.629	4.569	4.604
Median	4.564	4.602	4.586	4.670	4.561	4.623	4.605	4.605
Maximum	4.733	4.863	5.039	5.039	4.977	4.914	4.904	5.039
Minimum	4.458	4.135	4.080	4.080	4.222	4.037	4.158	4.037
Std. Dev.	0.069	0.138	0.184	0.226	0.140	0.167	0.124	0.154
Skewness	0.420	-0.564	0.264	-0.346	0.525	-1.786	-0.879	-0.610
Kurtosis	2.601	3.812	3.375	2.866	4.374	7.482	5.026	5.395
Jarque-Bera	0.901	5.308	1.342	0.622	5.855	146.491	18.592	102.333
Probability	0.637	0.070	0.511	0.733	0.054	0.000	0.000	0.000
Sum	114.155	303.206	355.687	140.438	215.249	495.310	283.307	1565.310
Sum Sq. Dev.	0.115	1.232	2.578	1.486	0.904	2.963	0.933	8.036
Observations	25	66	77	30	47	107	62	340

Descriptive Statistics (cont'd)

Emerging-Market Economies II

Percent Change in REER level (%Δ in REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	1.655	0.695	2.033	1.043	2.656	-0.461	-0.190	0.498
Median	2.018	1.268	1.697	0.027	2.687	0.020	-0.619	0.615
Maximum	15.391	29.260	33.767	33.767	14.515	21.191	52.549	52.549
Minimum	-7.153	-17.611	-21.402	-21.402	-15.586	-45.587	-49.583	-49.583
Std. Dev.	5.248	6.725	8.181	11.490	5.185	9.061	14.515	9.546
Skewness	0.371	0.751	0.637	0.899	-0.509	-1.577	0.260	-0.203
Kurtosis	3.196	7.361	7.310	5.001	5.212	10.101	6.614	10.451
Jarque-Bera	0.61	54.96	63.11	8.74	11.36	266.63	34.44	772.57
Probability	0.74	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sum	41.36	43.08	152.44	30.26	122.18	-48.87	-11.79	165.78
Sum Sq. Dev.	661.02	2758.70	4952.65	3696.58	1209.81	8621.11	12851.97	30255.80
Observations	25	62	75	29	46	106	62	333

First Approximation of %Δ REER
(A change in natural log of REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	1.514	0.477	1.699	0.438	2.494	-0.936	-1.283	0.016
Median	1.998	1.260	1.683	0.027	2.651	0.020	-0.621	0.613
Maximum	14.316	25.665	29.093	29.093	13.553	19.220	42.232	42.232
Minimum	-7.422	-19.372	-24.082	-24.082	-16.944	-60.857	-68.484	-68.484
Std. Dev.	5.131	6.596	7.965	11.064	5.146	10.197	15.250	10.065
Skewness	0.223	0.228	-0.039	0.369	-0.829	-2.663	-1.085	-1.719
Kurtosis	2.949	6.087	6.574	4.424	6.073	15.699	8.634	15.011
Jarque-Bera	0.21	25.15	39.93	3.11	23.37	837.55	94.16	2165.71
Probability	0.90	0.00	0.00	0.21	0.00	0.00	0.00	0.00
Sum	37.86	29.58	127.42	12.71	114.71	-99.20	-79.56	5.34
Sum Sq. Dev.	631.80	2653.58	4694.37	3427.62	1191.61	10918.27	14186.85	33632.01
Observations	25	62	75	29	46	106	62	333

Descriptive Statistics (cont'd)

Developing Countries I

Real Exchange Rate (Level)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	109.68	100.50	92.71	94.32	89.35	103.99	82.04	100.83
Median	103.68	99.58	94.60	96.65	89.21	100.69	78.31	100.00
Maximum	156.76	173.74	115.90	104.53	115.90	173.54	123.96	173.74
Minimum	74.52	49.78	54.53	59.53	54.53	58.33	60.30	49.78
Std. Dev.	18.68	18.63	11.66	8.85	15.57	21.88	24.71	19.30
Skewness	1.12	1.15	-1.27	-2.23	-0.36	1.02	1.12	1.02
Kurtosis	3.53	7.57	4.98	9.10	2.66	4.55	2.80	5.67
Jarque-Bera	11.06	56.71	29.45	107.19	0.61	20.93	1.06	118.29
Probability	0.00	0.00	0.00	0.00	0.74	0.00	0.59	0.00
Sum	5483.96	5225.89	6304.41	4244.44	2055.01	8007.51	410.22	25308.03
Sum Sq. Dev.	17093.69	17707.58	9105.82	3444.95	5336.43	36399.78	2443.20	93153.19
Observations	50	52	68	45	23	77	5	251

Real Exchange Rate (natural log)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	4.685	4.594	4.520	4.542	4.477	4.624	4.375	4.596
Median	4.641	4.601	4.550	4.571	4.491	4.612	4.361	4.605
Maximum	5.055	5.158	4.753	4.650	4.753	5.156	4.820	5.158
Minimum	4.311	3.908	3.999	4.086	3.999	4.066	4.099	3.908
Std. Dev.	0.160	0.184	0.141	0.107	0.186	0.202	0.273	0.187
Skewness	0.756	-0.390	-1.764	-2.729	-0.804	0.233	0.868	-0.041
Kurtosis	3.345	7.242	6.472	11.529	3.348	3.763	2.561	5.050
Jarque-Bera	5.007	40.298	69.441	192.243	2.593	2.561	0.669	44.005
Probability	0.082	0.000	0.000	0.000	0.274	0.278	0.716	0.000
Sum	234.227	238.878	307.392	204.371	102.965	356.034	21.877	1153.590
Sum Sq. Dev.	1.251	1.719	1.329	0.507	0.764	3.102	0.298	8.732
Observations	50	52	68	45	23	77	5	251

Descriptive Statistics (cont'd)

Developing Countries II

Percent Change in REER level (%Δ in REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	1.326	-0.179	1.723	0.164	4.218	-0.788	-13.962	0.237
Median	2.563	-0.383	1.482	-0.092	3.368	0.389	-11.471	0.782
Maximum	25.770	50.091	20.436	20.436	18.883	41.707	-4.865	50.091
Minimum	-38.377	-56.228	-17.317	-17.317	-8.712	-59.427	-22.997	-59.427
Std. Dev.	10.444	14.771	6.697	6.708	6.148	13.411	7.662	11.689
Skewness	-1.673	-0.545	0.161	0.182	0.592	-0.625	-0.129	-0.839
Kurtosis	8.837	8.893	4.641	5.037	3.572	8.517	1.452	10.204
Jarque-Bera	92.43	73.33	7.92	8.03	1.66	97.34	0.51	553.98
Probability	0.00	0.00	0.02	0.02	0.44	0.00	0.77	0.00
Sum	64.96	-8.77	117.19	7.40	97.01	-57.55	-69.81	57.49
Sum Sq. Dev.	5236.15	10473.40	3005.36	1979.75	831.55	12949.46	234.83	33063.75
Observations	49	49	68	45	23	73	5	243

First Approximation of %Δ REER
(A change in natural log of REER)

	Hard pegs	Adjustable pegs	Crawls	Forward crawls	Backward crawls	Managed Floats	Floats	All regimes
Mean	0.704	-1.451	1.494	-0.056	3.968	-1.850	-15.359	-0.554
Median	2.531	-0.383	1.471	-0.092	3.312	0.388	-12.184	0.779
Maximum	22.929	40.607	18.595	18.595	17.297	34.859	-4.988	40.607
Minimum	-48.413	-82.618	-19.015	-19.015	-9.116	-90.208	-26.133	-90.208
Std. Dev.	11.705	17.086	6.606	6.720	5.827	15.493	8.982	13.268
Skewness	-2.490	-2.356	-0.203	-0.211	0.394	-2.528	-0.178	-2.686
Kurtosis	11.650	13.432	4.819	4.953	3.543	16.685	1.429	18.551
Jarque-Bera	203.393	267.517	9.846	7.487	0.877	647.458	0.541	2740.871
Probability	0.000	0.000	0.007	0.024	0.645	0.000	0.763	0.000
Sum	34.511	-71.117	101.624	-2.503	91.254	-135.020	-76.797	-134.614
Sum Sq. Dev.	6575.829	14013.390	2924.190	1986.785	746.895	17281.730	322.683	42603.480
Observations	49	49	68	45	23	73	5	243

Table 1. **EMERGING ECONOMIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (*ln*)	t-1	0.522*** (8.10)	-	-	0.655*** (9.69)	-	-	0.631*** (9.10)	-	-
Hard Pegs	t-1	-0.136◊ (-1.60)	0.073 (0.91)	-0.016 (-0.44)	-0.054 (-0.60)	-0.104 (-0.99)	-0.015 (-0.36)	-0.057 (-0.63)	-0.115 (-0.72)	-0.043 (-0.87)
Adjustable Pegs	t-1	0.041 (1.20)	0.057* (1.71)	0.019 (0.71)	0.042 (1.37)	0.056** (1.99)	0.020 (0.69)	0.060* (1.94)	0.097** (2.10)	0.007 (0.23)
Forward-looking Crawls	t-1	0.012 (0.32)	0.044 (1.24)	0.106*** (3.24)	0.012 (0.34)	-0.013 (-0.43)	0.077** (2.27)	0.070◊ (1.60)	-0.031 (-0.50)	0.071* (1.78)
Backward-looking Crawls	t-1	0.084*** (2.59)	0.103*** (3.42)	0.030 (1.04)	0.067** (2.41)	0.044* (1.76)	0.040 (1.37)	0.102*** (3.39)	0.035 (0.82)	0.036 (1.07)
Managed Floats	t-1	-0.002 (-0.07)	0.030 (1.14)	0.065*** (2.65)	-0.005 (-0.18)	0.029 (1.22)	0.044◊ (1.60)	0.019 (0.71)	0.069* (1.74)	0.034 (1.07)
Openness	t t-1	-	-	-	-0.634*** (-8.62) 0.378*** (5.15)	-0.586*** (-8.88) 0.113* (1.72)	-0.156 (-1.45) 0.164 (1.52)	-0.654*** (-8.63) 0.368*** (4.83)	-0.521*** (-5.00) 0.316*** (3.06)	-0.161 (-1.37) 0.177 (1.51)
Terms of Trade	t t-1	-	-	-	0.001 (0.63) -0.001 (-0.72)	0.001 (0.84) -0.0004 (-0.53)	0.004*** (3.15) -0.001 (-1.12)	-0.00003 (-0.04) -0.001 (-1.00)	0.004*** (3.50) 0.003*** (2.93)	0.004*** (2.77) -0.001 (-0.84)
Real GDP growth	t t-1	-	-	-	0.009*** (6.58) 0.001 (0.66)	0.008*** (6.90) 0.004*** (3.58)	0.004* (1.76) 0.001 (0.40)	0.009*** (6.37) 0.001 (0.61)	0.004** (2.43) 0.001 (0.78)	0.004◊ (1.62) 0.002 (0.66)
Fiscal balance/GDP	t t-1	-	-	-	-	-	-	-0.003 (-1.08) 0.0002 (0.06)	0.006* (1.89) 0.007** (1.98)	-0.002 (-0.39) -0.002 (-0.44)
Constant		-0.001 (-0.40)	4.564*** (505.41)	4.566*** (233.13)	0.008*** (3.54)	4.902*** (129.39)	4.276*** (59.05)	0.010*** (4.19)	4.082*** (73.28)	4.267*** (55.59)
Sargan Test or *F-test* (p-value)		0.00	0.03	0.00	0.03	0.00	0.00	0.02	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.65	0.00	-	0.93	0.01	-	0.83	1.00	-
No. of observation		288	294	320	243	247	271	220	225	248
No. of countries		26	26	-	24	24	-	23	23	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 1.1 **EMERGING ECONOMIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
% Δ REER	t-1	-0.121** (-1.97)	-	-	-0.198*** (-3.42)	-	-	-0.215*** (-3.44)	-	-
Hard Pegs	t-1	-26.458*** (-3.11)	-16.759◊ (-1.59)	-1.887 (-0.81)	-17.193* (-1.91)	-136.287 (-0.98)	-0.986 (-0.46)	-18.384** (-2.06)	-259.116 (-0.90)	-1.396 (-0.56)
Adjustable Pegs	t-1	-0.688 (-0.17)	-0.480 (-0.16)	-0.730 (-0.41)	1.867 (0.57)	0.973 (0.38)	0.259 (0.17)	4.690 (1.41)	0.069 (0.03)	0.018 (0.01)
Forward-looking Crawls	t-1	-4.782 (-1.15)	-3.632 (-1.09)	-0.678 (-0.31)	-0.488 (-0.14)	-4.368 (-1.44)	-0.561 (-0.32)	3.372 (0.73)	-4.649 (-1.12)	-0.428 (-0.22)
Backward-looking Crawls	t-1	4.765 (1.20)	1.276 (0.49)	1.039 (0.55)	4.197 (1.39)	0.870 (0.40)	1.455 (0.95)	6.760** (2.10)	0.719 (0.31)	1.567 (0.95)
Managed Floats	t-1	-2.940 (-0.96)	-1.947 (1.30)	-0.973 (-0.61)	-1.728 (-0.62)	-0.042 (-0.02)	-1.241 (-0.86)	0.629 (0.23)	-0.950* (-0.40)	-1.513 (-0.95)
Openness	t	-	-	-	-53.371*** (-6.89)	-53.444*** (-7.76)	-46.823*** (-8.40)	-54.996*** (-6.86)	-52.938*** (-7.43)	-47.248*** (-8.08)
	t-1				49.748*** (6.57)	51.720*** (7.88)	47.302*** (8.42)	46.052*** (5.76)	49.730*** (7.04)	47.946*** (8.18)
Terms of Trade	t	-	-	-	-0.056 (-0.67)	-0.095 (-1.26)	-0.068 (-1.01)	-0.099 (-1.17)	-0.109 (-1.39)	-0.085 (-1.25)
	t-1				-0.064 (-0.79)	-0.029 (-0.36)	-0.041 (0.64)	-0.052 (-0.61)	0.008 (0.09)	-0.020 (-0.31)
Real GDP growth	t	-	-	-	0.944*** (6.91)	0.918*** (7.22)	0.831*** (7.59)	0.874*** (5.92)	0.883** (6.31)	0.803*** (6.69)
	t-1				0.045 (0.31)	-0.263** (-2.05)	-0.295*** (-2.66)	-0.005 (-0.03)	-0.239* (-1.88)	-0.302** (-2.49)
Fiscal balance/GDP	t	-	-	-	-	-	-	-0.138 (-0.45)	-0.149 (-0.58)	-0.228 (-1.04)
	t-1							-0.039 (-0.13)	-0.148 (-0.54)	0.141 (0.61)
Constant		-0.291 (-1.16)	2.373 (1.30)	0.986 (0.77)	0.395 (1.53)	18.126 (1.56)	9.474** (2.51)	0.665** (2.48)	23.098 (1.32)	9.218** (2.40)
Sargan Test or *F-test* (p-value)		0.02	0.49	0.82	0.37	0.00	0.00	0.10	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.18	1.00	-	0.17	0.94	-	0.11	0.94	-
No. of observation		281	288	314	238	243	267	215	222	245
No. of countries		26	26	-	24	24	-	23	23	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 1. 2 **EMERGING ECONOMIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (level)	t-1	0.518*** (8.60)	-	-	0.649*** (10.41)	-	-	0.638*** (10.00)	-	-
Hard Pegs	t-1	-9.545 (-1.21)	6.230 (0.81)	-1.540 (-0.44)	-4.295 (-0.50)	-11.507 (-1.20)	-1.337 (-0.33)	-4.817 (-0.57)	-11.490 (-1.14)	-4.274 (-0.87)
Adjustable Pegs	t-1	4.873◊ (1.56)	5.543* (1.72)	2.006 (0.77)	4.186 (1.47)	5.284** (2.05)	2.145 (0.77)	5.867** (2.08)	7.049** (2.38)	1.202 (0.37)
Forward-looking Crawls	t-1	3.741 (1.02)	5.715* (1.67)	12.572*** (3.94)	1.153 (0.36)	-1.142 (-0.42)	8.985*** (2.72)	6.583* (1.65)	1.773 (0.44)	9.004** (2.30)
Backward-looking Crawls	t-1	8.062*** (2.61)	9.683*** (3.33)	2.949 (1.05)	5.361** (2.09)	3.754◊ (1.62)	3.680 (1.28)	8.094*** (2.88)	5.046* (1.84)	3.263 (1.00)
Managed Floats	t-1	1.555 (0.59)	2.572 (1.01)	6.819*** (2.83)	0.038 (0.02)	2.582 (1.18)	5.033* (1.86)	2.330 (0.94)	4.225* (1.65)	4.269 (1.36)
Openness	t t-1	-	-	-	-59.948*** (-8.78) 34.226*** (5.05)	-55.676*** (-9.10) 8.741 (1.44)	-12.916 (-1.23) 13.457 (1.27)	-62.131*** (-8.80) 33.995*** (4.87)	-54.333*** (-8.11) 14.459** (2.17)	-13.493 (-1.18) 14.306 (1.24)
Terms of Trade	t t-1	-	-	-	0.063 (0.82) -0.069 (-0.96)	0.068 (1.03) -0.033 (-0.51)	0.344*** (2.73) -0.136 (-1.14)	0.013 (0.17) -0.084 (-1.12)	0.142** (2.03) 0.053 (0.78)	0.318** (2.37) -0.108 (-0.84)
Real GDP growth	t t-1	-	-	-	0.869*** (6.90) 0.142 (1.15)	0.721*** (6.99) 0.407*** (3.90)	0.361* (1.75) 0.155 (0.74)	0.867*** (6.53) 0.121 (0.93)	0.629*** (5.32) 0.344*** (2.91)	0.356 (1.51) 0.210 (0.89)
Fiscal balance/GDP	t t-1	-	-	-	-	-	-	-0.182 (-0.69) 0.091 (0.35)	-0.025 (-0.12) 0.031 (0.14)	-0.100 (-0.23) -0.132 (-0.29)
Constant		-0.096 (0.566)	97.147*** (112.94)	96.869*** (50.21)	0.768*** (3.63)	129.383*** (38.34)	73.897*** (10.42)	0.970*** (4.35)	107.745*** (31.41)	73.556*** (9.77)
Sargan Test or *F-test* (p-value)		0.00	0.03	0.00	0.04	0.00	0.00	0.02	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.33	0.002	-	0.84	0.003	-	0.91	0.23	-
No. of observation		287	293	319	243	247	271	220	225	248
No. of countries		26	26	-	24	24	-	23	23	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 2. **DEVELOPING COUNTRIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (*ln*)	t-1	0.469*** (7.61)	-	-	0.312*** (3.02)	-	-	0.174 (1.46)	-	-
Hard Pegs	t-1	0.021 (0.22)	0.173** (2.06)	0.157** (2.02)	-0.229◊ (-1.58)	-0.105 (-0.82)	0.063 (0.38)	-0.198 (-1.38)	-0.055 (-0.45)	0.094 (0.57)
Adjustable Pegs	t-1	-0.038 (-0.50)	-0.095 (-1.34)	0.062 (0.81)	-0.388** (-2.20)	-0.376** (-2.35)	0.031 (0.18)	-0.368** (-2.19)	-0.281* (-1.95)	-0.089 (-0.46)
Forward-looking Crawls	t-1	-0.035 (-0.41)	-0.134* (-1.68)	0.032 (0.41)	-0.470*** (-2.59)	-0.458*** (-2.62)	-0.092 (-0.58)	-0.461*** (-2.62)	-0.325** (-2.03)	-0.091 (-0.55)
Backward-looking Crawls	t-1	0.052 (0.72)	-0.011 (-0.16)	-0.042 (-0.51)	-0.284** (-2.15)	-0.279** (-2.35)	-0.266◊ (-1.59)	-0.283 (-2.28)	-0.222** (-2.02)	-0.225 (-1.34)
Managed Floats	t-1	-0.072 (-0.98)	-0.155** (-2.41)	0.088 (1.15)	-0.465** (-2.56)	-0.476*** (-2.81)	0.045 (0.28)	-0.345* (1.87)	-0.245 (-1.51)	0.067 (0.41)
Openness	t t-1	-	-	-	-0.360*** (-2.71) -0.027 (-0.20)	-0.355*** (-2.71) 0.011 (0.09)	-0.219 (-1.27) 0.032 (0.19)	-0.262* (-1.81) 0.199 (1.37)	-0.210 (-1.47) 0.196 (1.41)	-0.213 (-1.16) 0.049 (0.28)
Terms of Trade	t t-1	-	-	-	0.0001 (0.10) 0.003*** (2.91)	-0.0001 (-0.07) 0.003*** (2.94)	0.0003 (0.27) 0.003** (2.35)	0.001 (0.69) 0.001 (0.75)	0.002 (1.57) 0.002 (1.53)	0.004** (2.00) 0.00001 (0.01)
Real GDP growth	t t-1	-	-	-	0.003*** (2.63) 0.001 (0.70)	0.002* (1.94) 0.001 (0.48)	-0.001 (0.63) 0.0003 (0.21)	0.002* (1.68) 0.002 (1.43)	0.002 (1.34) 0.0004 (0.34)	-0.002 (-1.12) 0.0002 (0.11)
Fiscal balance/GDP	t t-1	-	-	-	-	-	-	-0.014*** (-3.87) -0.006 (-1.38)	-0.016*** (-4.66) -0.011*** (-2.83)	-0.012** (-2.39) -0.003 (-0.68)
Constant		0.001 (0.31)	4.648*** (171.37)	4.520*** (61.39)	0.008* (1.94)	4.927*** (39.10)	4.483*** (24.76)	0.014** (2.30)	4.331*** (27.89)	4.363*** (23.30)
Sargan Test or *F-test* (p-value)		0.004	0.01	0.00	0.10	0.00	0.00	0.65	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.20	0.06	-	0.18	0.01	-	0.13	0.00	-
No. of observation		211	218	238	118	119	131	93	94	106
No. of countries		20	20	-	12	12	-	12	12	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 2.1 **DEVELOPING COUNTRIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
% Δ REER	t-1	-0.116* (-1.74)	-	-	-0.301*** (-2.96)	-	-	-0.381*** (-3.09)	-	-
Hard Pegs	t-1	-2.359 (-0.25)	0.167 (0.02)	-2.988 (-0.48)	-48.381*** (-3.16)	-37.448** (-2.50)	-33.305*** (-2.80)	-43.224*** (-2.57)	-34.140** (-2.07)	-29.595** (-2.52)
Adjustable Pegs	t-1	-9.556 (-1.08)	-2.633 (-0.36)	-3.402 (-0.55)	-9.978 (-0.52)	-28.355* (-1.74)	-35.242*** (-2.83)	-1.025 (-0.05)	-18.069 (0.94)	-22.317◊ (-1.62)
Forward-looking Crawls	t-1	-7.910 (-0.85)	-3.834 (-0.47)	-3.113 (-0.50)	-11.076 (-0.57)	-25.985 (-1.56)	-31.849*** (-2.68)	-10.594 (-0.52)	-12.480 (0.59)	-29.560** (-2.51)
Backward-looking Crawls	t-1	-2.431 (-0.33)	-2.779 (-0.41)	-1.205 (-0.19)	-27.408* (-1.86)	-27.664** (-2.06)	-28.767** (-2.37)	-24.771◊ (-1.64)	-23.705◊ (-1.60)	-25.388** (-2.11)
Managed Floats	t-1	-5.168 (-0.62)	-3.311 (-0.46)	-4.259 (-0.70)	-13.469 (-0.70)	-26.121◊ (-1.57)	-30.568*** (-2.60)	-11.566 (-0.54)	-1.100 (-0.05)	-27.276** (-2.36)
Openness	t t-1	-	-	-	-27.567* (-1.80) 0.591 (0.04)	-26.087* (-1.72) 16.496 (1.18)	-19.848◊ (-1.57) 19.926◊ (1.65)	-19.272 (-0.96) 16.111 (0.85)	-25.803 (-1.18) 23.329 (1.17)	-16.552 (-1.24) 17.450 (1.39)
Terms of Trade	t t-1	-	-	-	-0.029 (-0.26) 0.160◊ (1.54)	0.104 (0.90) 0.157 (1.50)	-0.070 (-0.83) 0.083 (1.02)	0.134 (0.69) -0.031 (-0.19)	0.528** (2.39) 0.028 (0.15)	0.224* (1.73) -0.148 (-1.20)
Real GDP growth	t t-1	-	-	-	0.633*** (4.97) 0.184 (1.25)	0.515*** (4.42) -0.068 (-0.58)	0.509*** (5.14) -0.052 (-0.50)	0.526*** (3.07) 0.228 (1.37)	0.430** (2.47) -0.009 (-0.06)	0.386*** (3.38) -0.054 (-0.47)
Fiscal balance/GDP	t t-1	-	-	-	-	-	-	-1.176*** (-2.76) 0.520 (1.14)	-1.455*** (-3.03) -0.235 (-0.44)	-1.208*** (-3.45) 0.726* (1.98)
Constant		-0.676** (-2.40)	3.159 (0.53)	3.835 (0.64)	1.596*** (2.91)	7.120 (0.41)	28.705** (2.19)	1.457* (1.91)	-19.674 (-0.92)	18.865 (1.41)
Sargan Test or *F-test* (p-value)		0.01	1.00	0.92	0.16	0.00	0.00	0.72	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.02	0.80	-	0.001	0.82	-	0.02	0.84	-
No. of observation		203	211	231	117	118	130	92	93	105
No. of countries		20	20	-	12	12	-	12	12	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 2.2 **DEVELOPING COUNTRIES** - Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		Only ER regimes			**With economic variables**			**With economic variables (Add nominal fiscal balance/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (level)	t-1	0.473*** (8.20)	-	-	0.379*** (4.22)	-	-	0.335*** (3.12)	-	-
Hard Pegs	t-1	5.409 (0.65)	7.143 (1.03)	17.560** (2.43)	-13.315 (-0.97)	-3.638 (-0.29)	8.313 (0.81)	-16.938 (-1.18)	-2.516 (-0.21)	11.012 (1.06)
Adjustable Pegs	t-1	-2.177 (-0.32)	-0.231 (-0.04)	7.489 (1.04)	0.637 (0.07)	0.287 (0.03)	7.325 (0.62)	-4.079 (-0.38)	-5.204 (-0.59)	-2.117 (-0.14)
Forward-looking Crawls	t-1	-1.873 (-0.27)	-2.854 (-0.49)	3.635 (0.51)	-6.245 (-0.76)	-1.339 (-0.18)	-9.346 (-0.94)	-14.142 (-1.54)	-8.131 (-0.99)	-9.618 (-0.97)
Backward-looking Crawls	t-1	5.931 (0.87)	1.414 (0.23)	-2.320 (-0.30)	-10.718 (-1.02)	-10.699 (-1.04)	-26.390** (-2.47)	-14.217 (-1.41)	-11.222 (-1.19)	-22.697** (-2.11)
Managed Floats	t-1	-4.462 (-0.70)	-6.491 (-1.31)	10.848 (1.55)	-6.364 (-0.75)	-9.426 (-1.33)	6.807 (0.70)	2.359 (0.24)	0.720 (0.09)	8.469 (0.87)
Openness	t t-1	-	-	-	-40.756*** (-2.96) -4.006 (-0.28)	-36.911*** (-2.66) -0.993 (-0.08)	-23.838 (-1.31) 1.455 (0.08)	-25.850* (-1.68) 24.872◊ (1.58)	-18.374 (-1.24) 20.984 (1.43)	-22.407 (-1.15) 2.331 (0.12)
Terms of Trade	t t-1	-	-	-	0.027 (0.26) 0.308*** (3.03)	-0.004 (-0.04) 0.318*** (3.06)	0.021 (0.17) 0.313*** (2.62)	0.127 (0.79) 0.096 (0.66)	0.262◊ (1.64) 0.292* (1.98)	0.343* (1.77) 0.044 (0.24)
Real GDP growth	t t-1	-	-	-	0.398*** (3.05) 0.073 (0.58)	0.253** (2.20) 0.061 (0.55)	-0.072 (0.49) 0.062 (0.42)	0.348** (2.20) 0.177 (0.30)	0.215◊ (1.59) 0.061 (0.51)	-0.165 (1.77) 0.051 (0.31)
Fiscal balance/GDP	t t-1	-	-	-	-	-	-	-1.286*** (-3.33) -0.669◊ (-1.55)	-1.571*** (-4.43) -1.469*** (-3.60)	-1.084** (-2.06) -0.459 (-0.84)
Constant		-0.074 (-0.34)	100.656*** (49.78)	91.371*** (13.42)	1.034** (2.30)	103.028*** (10.52)	86.895*** (6.55)	1.471** (2.41)	43.271*** (3.49)	76.529*** (5.28)
Sargan Test or *F-test* (p-value)		0.00	0.22	0.00	0.07	0.00	0.00	0.01	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.15	0.39	-	0.23	0.10	-	0.08	0.01	-
No. of observation		211	293	238	118	119	131	93	94	106
No. of countries		20	26	-	12	12	-	12	12	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 3. Real Exchange Rate (RER) – Fiscal variable and Inflation rate as 'Endogenous Explanatory Variables' *Arellano-Bond Dynamic Panel-Data Estimation* (z-stats are shown in parentheses)

		Emerging Economies				**Developing Countries**			
		I	II	III	IV	I	II	III	IV
Real Exchange Rate (*ln*)	t-1	0.624*** (10.44)	0.591*** (10.00)	0.616*** (9.58)	0.557*** (9.10)	0.147* (1.73)	0.160* (1.87)	-0.035 (-0.39)	-0.056 (-0.65)
Hard Pegs	t-1	-0.044 (-0.52)	-0.068 (-0.80)	-0.037 (-0.44)	-0.080 (-0.97)	-0.459*** (-3.58)	-0.444*** (-3.57)	-0.424*** (-3.68)	-0.348*** (-3.30)
Adjustable Pegs	t-1	0.032 (1.13)	0.017 (0.56)	0.054* (-1.87)	0.039 (1.30)	-0.571*** (-4.60)	-0.552*** (-4.47)	-0.553*** (-4.75)	-0.572*** (-4.84)
Forward-looking Crawls	t-1	0.009 (0.27)	-0.008 (-0.24)	0.071* (1.70)	0.060 (1.40)	-0.713*** (-5.64)	-0.687*** (-5.47)	-0.713*** (-6.18)	-0.745*** (-6.17)
Backward-looking Crawls	t-1	0.060** (2.36)	0.053** (2.05)	0.099*** (3.56)	0.099*** (3.50)	-0.587*** (-5.08)	-0.588*** (-5.22)	-0.589*** (-5.68)	-0.551*** (-5.70)
Managed Floats	t-1	-0.015 (-0.57)	-0.023 (-0.89)	0.012 (0.49)	0.002 (0.08)	-0.741*** (-5.52)	-0.720*** (-5.42)	-0.790*** (-5.82)	-0.811*** (-5.99)
Openness	t t-1	-0.635*** (-8.82) 0.352*** (5.04)	-0.520*** (-7.74) -	-0.631*** (-8.87) 0.331*** (4.62)	-0.508*** (-7.72) -	-0.320*** (-2.88) -0.019 (-0.16)	-0.308*** (-3.86) -	-0.150 (-1.36) 0.140 (1.23)	-0.106 (-1.15) -
Terms of Trade	t t-1	0.001 (0.94) -0.001 (-0.84)	0.0001 (0.10) -	0.0002 (0.28) -0.001 (-1.42)	-0.0005 (-0.59) -	0.0002 (0.28) 0.002** (2.49)	0.001 (0.84) -	0.001 (1.16) 0.000001 (0.00)	0.001 (1.44) -
Real GDP growth	t t-1	0.009*** (6.53) 0.001 (0.48)	0.010*** (6.89) -	0.009*** (6.20) 0.001 (0.39)	0.010*** (6.77) -	0.003** (2.51) 0.0005 (0.47)	0.003*** (2.81) -	0.002 (1.52) 0.001 (1.47)	0.002* (1.70) -
CAB in I, II; Fiscal/GDP in III (endo.)	t	0.004 (1.38)	0.005 (1.50)	-0.004* (-1.65)	-0.007*** (-2.64)	0.007* (1.84)	0.008** (2.06)	-0.015*** (-5.87)	-0.015*** (-5.95)
Inflation (endo.)	t	-0.00001 (-0.44)	-0.00001 (-0.30)	0.0001 (1.06)	0.00004 (0.61)	-0.005*** (-5.60)	-0.005*** (-5.87)	-0.005*** (-6.53)	-0.005*** (-6.92)
Constant		0.007*** (3.22)	0.011*** (5.26)	0.009*** (4.42)	0.013*** (5.99)	-0.003 (-0.75)	-0.005 (-1.34)	0.003 (0.72)	0.001 (0.14)
Sargan Test (p-value)		0.03	0.05	0.07	0.05	0.64	0.58	0.99	0.96
Second-order serial correlation test (p-value)		0.95	0.91	0.97	0.86	0.58	0.35	0.84	1.00
No. of observation		240	240	222	222	118	118	96	96
No. of countries		23	23	23	23	12	12	12	12

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 3.1 Real Exchange Rate (RER) – Fiscal variable and Inflation rate as 'Endogenous Explanatory Variables'
Arellano-Bond Dynamic Panel-Data Estimation (z-stats are shown in parentheses)

		Emerging Economies				**Developing Countries**			
		I	II	III	IV	I	II	III	IV
Real Exchange Rate (level)	t-1	0.628*** (11.33)	0.591*** (10.88)	0.633*** (10.63)	0.572*** (10.09)	0.222*** (2.79)	0.243*** (2.98)	0.106 (1.19)	0.105 (1.21)
Hard Pegs	t-1	-2.746 (-0.34)	-5.115 (-0.63)	-2.925 (-0.37)	-6.904 (-0.88)	-46.947*** (-3.51)	-46.240*** (-3.51)	-43.759*** (-3.48)	-36.238*** (-3.11)
Adjustable Pegs	t-1	2.601 (0.98)	1.517 (-0.56)	5.087* (1.91)	3.965 (1.44)	-52.089*** (-4.02)	-50.107*** (-3.87)	-48.581*** (-3.85)	-43.891*** (-3.61)
Forward-looking Crawls	t-1	0.384 (0.13)	-0.917 (-0.30)	6.561* (1.69)	5.732 (1.44)	-65.261*** (-5.01)	-62.504*** (-4.79)	-61.800*** (-5.01)	-56.506*** (-4.78)
Backward-looking Crawls	t-1	4.608* (1.92)	4.180* (1.72)	8.247*** (3.16)	8.466*** (3.17)	-55.949*** (-4.66)	-57.015*** (-4.79)	-54.245*** (-4.81)	-48.655*** (-4.58)
Managed Floats	t-1	-1.212 (-0.52)	-1.603 (-0.67)	1.891 (0.82)	0.002 (0.08)	-68.857*** (-4.97)	-66.403*** (-4.81)	-71.058*** (-4.90)	-66.557*** (-4.76)
Openness	t t-1	-60.796*** (-9.01) 31.431*** (4.86)	-49.859*** (-7.96) -	-59.906*** (-8.99) 30.621*** (4.62)	-47.882*** (-7.77) -	-36.484*** (-3.12) -3.372 (-0.28)	-35.734*** (-4.17) -	-18.660 (-1.55) 15.650 (1.26)	-10.956 (-1.08) -
Terms of Trade	t t-1	0.087 (1.18) -0.060 (-0.86)	0.029 (0.42) -	0.041 (0.53) -0.104 (-1.42)	-0.023 (-0.30) -	0.017 (0.19) 0.274*** (3.27)	0.077 (0.88) -	0.124 (1.06) 0.047 (0.46)	0.174◊ (1.60) -
Real GDP growth	t t-1	0.834*** (6.80) 0.110 (0.91)	0.900*** (7.03) -	0.812*** (6.31) 0.085 (0.69)	0.900*** (6.81) -	0.293*** (2.67) 0.044 (0.42)	0.332*** (3.05) -	0.247** (2.11) 0.168 (1.58)	0.277** (2.50) -
CAB in I, II; Fiscal/GDP in III (endo.)	t	0.308 (1.09)	0.357 (1.25)	-0.357 (-1.49)	-0.585** (-2.48)	0.277 (0.70)	0.385 (0.99)	-1.376*** (-4.86)	-1.353*** (-4.99)
Inflation (endo.)	t	-0.001 (-0.39)	-0.001 (-0.33)	0.006 (1.21)	0.004 (0.75)	-0.442*** (-5.09)	-0.484*** (-5.44)	-0.417*** (-5.19)	-0.440*** (-5.64)
Constant		0.707*** (3.36)	1.049*** (5.16)	0.707*** (3.36)	1.157*** (5.78)	-0.203 (-0.50)	-0.423 (-1.10)	0.277 (0.58)	0.105 (0.25)
Sargan Test (p-value)		0.04	0.07	0.11	0.08	0.37	0.33	0.98	0.93
Second-order serial correlation test (p-value)		0.99	0.85	1.00	0.82	0.51	0.23	0.88	0.91
No. of observation		240	240	214	222	118	118	92	96
No. of countries		23	23	23	23	12	12	11	12

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats), ◊ denotes statistical significance level *close to* 10% (10-12%)

Table 4. **EMERGING ECONOMIES** –
Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		With economic variables			**With economic variables (Add G Expenditure/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (*ln*)	t-1	0.719*** (10.91)	-	-	0.696*** (10.29)	-	-
Hard Pegs	t-1	-0.079 (-0.84)	-0.079 (-0.76)	-0.013 (-0.30)	-0.111 (-1.21)	0.023 (0.21)	-0.017 (-0.40)
Adjustable Pegs	t-1	0.035 (1.10)	0.054* (1.96)	0.023 (0.78)	0.036 (1.16)	0.058** (2.12)	0.022 (0.75)
Forward-looking Crawls	t-1	-0.005 (-0.14)	-0.018 (-0.59)	0.081** (2.35)	-0.001 (-0.02)	-0.017 (-0.57)	0.081** (2.33)
Backward-looking Crawls	t-1	0.044 (1.51)	0.039◊ (1.57)	0.045 (1.48)	0.036 (1.26)	0.034 (1.36)	0.039 (1.26)
Managed Floats	t-1	-0.014 (-0.49)	0.028 (1.20)	0.048* (1.70)	-0.014 (0.49)	0.029 (1.27)	0.048* (1.70)
Openness	t	-0.712*** (-9.16)	-0.614*** (-9.14)	-0.132 (-1.18)	-0.676*** (-8.71)	-0.585*** (-8.87)	-0.115 (-1.02)
	t-1	0.449*** (5.62)	0.114◊ (1.63)	0.140 (1.24)	0.399*** (4.97)	0.084 (1.21)	0.124 (1.08)
Terms of Trade	t	0.0001 (0.07)	0.0004 (0.60)	0.004*** (3.19)	-0.0001 (-0.11)	0.0004 (0.51)	0.004*** (3.18)
	t-1	-0.001 (-0.79)	-0.0005 (-0.64)	-0.001 (-1.15)	-0.001 (-1.11)	-0.001 (-1.04)	-0.001 (-1.13)
Real GDP growth	t	0.009*** (6.19)	0.007*** (6.30)	0.004* (1.87)	0.009*** (6.60)	0.008** (6.62)	0.004* (1.90)
	t-1	0.001 (0.57)	0.004*** (3.21)	0.001 (0.34)	0.001 (0.69)	0.004*** (3.24)	0.001 (0.26)
US T-Bill rate (*ln*)	t	0.045*** (2.88)	0.029* (1.72)	-0.020 (-0.70)	0.044*** (2.85)	0.030* (1.80)	-0.019 (-0.65)
	t-1	-0.032 (-1.48)	-0.002 (-0.07)	0.026 (0.76)	-0.028 (-1.30)	0.005 (0.20)	0.026 (0.64)
Ratio of G Expenditure/GDP	t	-	-	-	0.013** (2.51)	0.015*** (3.30)	0.007 (0.95)
	t-1				-0.006 (-1.25)	0.004 (1.01)	-0.007 (-0.89)
Constant		0.009*** (3.60)	4.924*** (132.68)	4.257*** (48.53)	0.008*** (3.19)	4.668*** (100.33)	4.247*** (46.00)
Sargan Test or *F-test* (p-value)		0.09	0.00	0.00	0.09	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.97	0.01	-	0.81	0.00	-
No. of observation		243	247	271	243	247	271
No. of countries		24	24	-	24	24	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 4.1 **EMERGING ECONOMIES** –
Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		With economic variables			**With economic variables (Add G Expenditure/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS
%ΔREER	t-1	-0.201*** (-3.56)	-	-	-0.201*** (-3.57)	-	-
Hard Pegs	t-1	-17.119* (-1.93)	-83.762 (-0.67)	-1.585 (-0.74)	-14.646◊ (-1.62)	-64.555 (-0.46)	-2.469 (-1.15)
Adjustable Pegs	t-1	2.510 (0.78)	0.183 (0.07)	-0.387 (-0.26)	2.505 (0.79)	-0.363 (-0.14)	-0.603 (-0.41)
Forward-looking Crawls	t-1	-2.234 (-0.65)	-6.018** (-1.99)	-1.601 (-0.90)	-2.009 (-0.59)	-5.929** (-1.98)	-1.757 (-1.00)
Backward-looking Crawls	t-1	1.999 (0.67)	-0.854 (-0.39)	0.421 (0.27)	0.789 (0.26)	-1.873 (-0.84)	0.217 (0.14)
Managed Floats	t-1	-1.427 (-0.52)	-0.720 (-0.34)	-2.079 (-1.45)	-1.341 (-0.49)	-1.019 (-0.49)	-2.155 (-1.51)
Openness	t	-62.626*** (-7.89)	-59.238*** (-8.51)	-52.064*** (-9.09)	-61.670*** (-7.80)	-57.634*** (-8.31)	-49.946*** (-8.66)
	t-1	54.816*** (7.08)	57.662*** (8.47)	52.747*** (9.12)	51.299*** (6.54)	54.827*** (7.96)	50.539*** (8.68)
Terms of Trade	t	-0.076 (-0.94)	-0.115◊ (-1.56)	-0.085 (-1.29)	-0.089 (-1.09)	-0.113 (-1.54)	-0.078 (-1.19)
	t-1	-0.066 (-0.83)	-0.033 (-0.43)	-0.031 (-0.49)	-0.074 (-0.93)	-0.027 (-0.34)	-0.029 (-0.46)
Real GDP growth	t	0.845*** (6.21)	0.824*** (6.39)	0.761*** (6.92)	0.847*** (6.14)	0.817*** (6.34)	0.748*** (6.79)
	t-1	0.073 (0.52)	-0.280** (-2.22)	-0.283*** (-2.58)	0.033 (0.24)	-0.323** (-2.54)	-0.320*** (-2.91)
US T-Bill rate (*ln*)	t	6.801*** (3.95)	5.474*** (3.36)	4.836*** (3.29)	7.243*** (4.22)	5.655*** (3.48)	4.806*** (3.29)
	t-1	-5.582** (-2.25)	-3.088 (-1.16)	-4.744** (-2.26)	-5.777** (-2.34)	-3.148 (-1.20)	-4.831** (-2.32)
Ratio of G Expenditure/GDP	t	-	-	-	0.653 (1.24)	0.941* (1.93)	0.824** (2.08)
	t-1				-1.012** (-2.13)	-0.969** (-2.23)	-0.922** (-2.35)
Constant		0.612** (2.33)	16.075 (1.46)	11.583*** (2.58)	0.722*** (2.62)	15.771 (1.25)	12.412*** (2.66)
Sargan Test or *F-test* (p-value)		0.65	0.00	0.00	0.55	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.11	0.87	-	0.08	0.87	-
No. of observation		238	243	267	238	243	267
No. of countries		24	24	-	24	24	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 5. **DEVELOPING COUNTRIES** –
Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		With economic variables			**With economic variables (Add G Expenditure/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS
Real Exchange Rate (*ln*)	t-1	0.354*** (3.36)	-	-	0.282*** (2.63)	-	-
Hard Pegs	t-1	-0.208 (-1.37)	-0.096 (-0.72)	0.076 (0.46)	-0.178 (-1.18)	-0.068 (-0.52)	0.044 (0.28)
Adjustable Pegs	t-1	-0.392** (-2.13)	-0.370** (-2.27)	0.040 (0.23)	-0.356* (-1.94)	-0.314* (-1.92)	-0.017 (-0.11)
Forward-looking Crawls	t-1	-0.453** (-2.40)	-0.448** (-2.51)	-0.080 (-0.48)	-0.425** (-2.27)	-0.388** (-2.19)	-0.156 (-0.99)
Backward-looking Crawls	t-1	-0.281** (-2.07)	-0.277** (-2.30)	-0.260 (-1.54)	-0.295** (-2.18)	-0.278** (-2.32)	-0.309* (-1.93)
Managed Floats	t-1	-0.440** (-2.30)	-0.463*** (-2.65)	0.062 (0.38)	-0.402** (-2.10)	-0.394** (-2.26)	0.039 (0.25)
Openness	t	-0.419*** (-2.90)	-0.365*** (-2.70)	-0.271 (-1.49)	-0.350** (-2.37)	-0.340*** (-2.48)	-0.243 (-1.39)
	t-1	0.003 (0.02)	0.023 (0.18)	0.074 (0.43)	0.003 (0.02)	0.076 (0.59)	0.036 (0.22)
Terms of Trade	t	0.0002 (0.14)	-0.0001 (-0.06)	0.0002 (0.21)	0.0003 (0.27)	0.0002 (0.17)	0.001 (0.84)
	t-1	0.003*** (3.06)	0.003*** (2.91)	0.003** (2.50)	0.003*** (3.03)	0.003*** (2.93)	0.003*** (2.85)
Real GDP growth	t	0.003** (2.42)	0.002* (1.89)	-0.001 (0.68)	0.003** (2.28)	0.002** (2.01)	-0.001 (-0.61)
	t-1	0.001 (0.47)	0.0005 (0.46)	0.0003 (0.20)	0.001 (0.85)	0.001 (0.72)	0.0003 (0.23)
US T-Bill rate (*ln*)	t	0.031 (0.87)	0.012 (0.31)	0.057 (1.23)	0.049 (1.38)	0.010 (0.27)	0.074◊ (1.65)
	t-1	-0.042 (-0.81)	-0.022 (-0.35)	-0.054 (-0.81)	-0.023 (-0.46)	0.004 (0.06)	-0.051 (-0.80)
Ratio of G Expenditure/GDP	t	-	-	-	0.017* (1.85)	0.003 (0.34)	0.019* (1.89)
	t-1				0.005 (0.63)	0.017* (1.89)	-0.0002 (-0.02)
Constant		0.008* (1.77)	4.925*** (38.02)	4.467*** (21.89)	0.011** (2.41)	4.514*** (26.70)	4.154*** (19.77)
Sargan Test or *F-test* (p-value)		0.12	0.00	0.00	0.17	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.15	0.02	-	0.26	0.03	-
No. of observation		118	119	131	118	119	131
No. of countries		12	12	-	12	12	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 5.1 **DEVELOPING COUNTRIES** –
Real Exchange Rate (RER) [Floats is a default regime, - Depreciation & + Appreciation]
Z-stats are shown in parenthesis for GMM; *t*-stats are shown in parenthesis for FE and OLS

		With economic variables			**With economic variables (Add G Expenditure/GDP)**		
		GMM	FE	OLS	GMM	FE	OLS
%ΔREER	t-1	-0.331*** (-3.23)	-	-	-0.338*** (-3.29)	-	-
Hard Pegs	t-1	-45.161*** (-2.93)	-38.011** (-2.45)	-33.600*** (-2.80)	-43.972*** (-2.84)	-36.479** (-2.34)	-33.370*** (-2.75)
Adjustable Pegs	t-1	-8.079 (-0.41)	-28.754* (-1.73)	-35.825*** (-2.85)	-3.281 (-0.16)	-25.266 (-1.49)	-35.395*** (-2.77)
Forward-looking Crawls	t-1	-7.141 (-0.37)	-26.194 (-1.54)	-31.981*** (-2.67)	-2.319 (-0.12)	-23.351 (-1.35)	-31.405** (-2.57)
Backward-looking Crawls	t-1	-27.823* (-1.90)	-27.721** (-2.04)	-29.257** (-2.39)	-26.779* (-1.81)	-24.439* (-1.77)	-28.912** (-2.32)
Managed Floats	t-1	-9.555 (-0.49)	-26.584 (-1.55)	-30.561** (-2.58)	-3.637 (-0.18)	-22.807 (-1.30)	-30.415** (-2.53)
Openness	t t-1	-38.061** (-2.39) 6.235 (0.42)	-25.864◊ (-1.65) 16.298 (1.11)	-23.449* (-1.76) 23.123* (1.84)	-35.838** (-2.11) 8.240 (0.55)	-33.025** (-1.99) 16.920 (1.14)	-23.676 (-1.73) 23.383 (1.81)
Terms of Trade	t t-1	0.003 (0.02) 0.233** (2.14)	0.106 (0.90) 0.517 (1.43)	-0.070 (-0.82) 0.094 (1.14)	0.003 (0.03) 0.234** (2.15)	0.099 (0.84) 0.192* (1.70)	-0.076 (-0.86) 0.092 (1.08)
Real GDP growth	t t-1	0.606*** (4.76) 0.182 (1.23)	0.517*** (4.34) -0.068 (-0.56)	0.512*** (5.14) -0.048 (-0.46)	0.614*** (4.81) 0.203 (1.37)	0.522*** (4.35) -0.077 (-0.63)	0.511*** (5.08) -0.049 (-0.46)
US T-Bill rate (*ln*)	t t-1	4.642 (1.42) -11.122** (-2.04)	-0.623 (-0.16) 0.236 (0.03)	1.137 (0.34) -4.647 (-0.95)	5.161 (1.34) -10.720** (-1.96)	-1.912 (-0.46) 0.429 (0.06)	1.013 (0.29) -4.647 (-0.94)
Ratio of G Expenditure/GDP	t t-1	-	-	-	0.220 (0.22) 0.763 (0.86)	-1.579 (-1.48) 1.106 (1.14)	-0.133 (-0.17) -0.020 (-0.03)
Constant		1.539*** (2.74)	7.634 (0.41)	33.663** (2.27)	1.696*** (2.97)	12.034 (0.53)	36.179** (2.22)
Sargan Test or *F-test* (p-value)		0.22	0.00	0.00	0.26	0.00	0.00
Second-order serial correlation test or *F-test II* (p-value)		0.00	0.84	-	0.001	0.78	-
No. of observation		117	118	130	117	118	130
No. of countries		12	12	-	12	12	-

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Table 6. Real Exchange Rate (RER) - *Arellano-Bond Dynamic Panel-Data Estimation*
(z-stats are shown in parentheses)

(Government Expenditure and Change in Inflation Level as 'Endogenous Explanatory Variables')

		Emerging Economies		Developing Countries	
		I	II	I	II
Real Exchange Rate (*ln*)	t-1	0.647*** (10.30)	0.544*** (9.44)	0.396*** (4.10)	0.463*** (4.94)
Hard Pegs	t-1	-0.142* (-1.67)	-0.159* (-1.89)	-0.455*** (-2.80)	-0.469*** (-2.87)
Adjustable Pegs	t-1	0.038 (-1.36)	0.042 (1.46)	-0.460*** (-3.18)	-0.370** (-2.37)
Forward-looking Crawls	t-1	0.014 (0.43)	0.020 (0.59)	-0.487*** (-3.49)	-0.366** (-2.42)
Backward-looking Crawls	t-1	0.048* (1.82)	0.059** (2.19)	-0.442*** (-3.51)	-0.420*** (-3.37)
Managed Floats	t-1	-0.003 (-0.10)	0.005 (0.19)	-0.504*** (-3.38)	-0.405*** (-2.58)
Openness	t t-1	-0.657*** (-8.77) 0.385*** (5.12)	-0.493*** (-7.47) -	-0.255* (-1.87) 0.021 (0.16)	-0.166* (-1.67) -
Terms of Trade	t t-1	0.0001 (0.12) -0.001 (-1.31)	-0.001 (-0.81) -	-0.0000004 (0.00) 0.002** (2.54)	0.001 (0.63) -
Real GDP growth	t t-1	0.009*** (7.01) 0.001 (0.93)	0.010*** (7.60) -	0.002* (1.80) 0.001 (0.65)	0.002** (2.00) -
US T-Bill rate (*ln*)	t t-1	0.039*** (2.61) -0.022 (-1.03)	0.022* (1.74) -	0.044 (1.28) -0.034 (-0.70)	0.033 (1.02) -
G expenditure/GDP (endo.)	t	0.012*** (2.58)	0.014*** (3.01)	0.018*** (2.72)	0.021*** (3.31)
Change in inflation level (endo.)	t	0.000004 (1.43)	0.000002 (0.19)	-0.003*** (-3.11)	-0.004*** (-3.71)
Constant		0.007*** (2.93)	0.010*** (4.25)	0.009** (1.99)	0.008** (2.08)
Sargan Test (p-value)		0.11	0.01	0.92	0.90
Second-order serial correlation test (p-value)		0.92	0.92	0.31	0.26
No. of observation		243	244	118	118
No. of countries		24	24	12	12

*, **, *** indicates the statistical significance level of 10%, 5%, and 1% (based on z-stats)
◊ denotes statistical significance level *close to* 10% (10-12%)

Appendix 1

The Methodology: Generalized Method of Moment

The empirical model can be summarized as:

$$Y_{it} = \alpha Y_{i,t-1} + \mathbf{X}_{it}'\beta + \nu_i + \varepsilon_{it} \qquad i=1,\ldots,N \qquad t=1,\ldots,T \qquad (1)$$

where Y_{it} is real effective exchange rate index of country i at time t, α is a parameter to be estimated, $\boldsymbol{\beta}$ is a vector (k x 1) of parameters to be estimated, $\boldsymbol{X_{it}}$ is a vector (k x 1) of variables that possibly affect the real appreciation, $v_i \sim$ i.i.d $(0, \sigma_v^2)$ are country-specific effects, and $\varepsilon_{it} \sim$ i.i.d $(0, \sigma_\varepsilon^2)$ are the error terms.

Since the lagged dependent variable is correlated with the error term, the OLS estimator, FE estimator, and the GLS estimator will be biased. This problem persists even if the error terms are not serially correlated.[29] GMM estimator for dynamic panel data models, developed by Arellano and Bond (1991), is found to successfully solve the problems presented above. The method starts with taking the first difference of equation (1), which will remove the fixed effects v_i:

$$\Delta Y_{it} = \alpha \cdot \Delta Y_{i,t-1} + \Delta \mathbf{X}_{it}'\beta + \Delta \varepsilon_{it}$$

where Δ is the first difference operator. However, by construction, the differenced lagged dependent variable is correlated with the differenced error term. Arellano and Bond (1991) therefore suggest the use of lagged levels of the explanatory variables and lagged levels of the dependent variables as instrumentals. The lags could be two or more period. Note that the GMM estimator will be consistent if and only if the lagged levels of explanatory variables are valid instrument for differenced explanatory variables, which

[29] See Vuletin (2003) for more details on why OLS, FE, and GLS estimators are biased. He also briefly discusses about First Difference Transformation method and why it is not superior to GMM.

hold when the error term is not serially correlated. This assumption, according to Vuletin (2003), can be tested using Arellano and Bond's (1991) proposed methods:

1. Sargan test of overidentifying restrictions, which tests the overall validity of the instruments, and
2. A test for serial correlation in the error term

Arellano and Bover (1995), cited in Aisen and Veiga (2005), show that when the explanatory variables are uncorrelated with the individual effects, lagged differences of both explanatory and dependent variables may also be valid instruments for the level equation. This estimation method is found to be preferable to that of Arellano and Bond (1991) when the dependent variable and/or the independent variables are persistent.[30] Therefore, this dissertation will apply GMM estimation in both variations: Arellano and Bond's (1991) and Arellano and Bover (1995). The other methods, nevertheless, will also be applied for comparison.

[30] See Blundell and Bond (1998).

Appendix 2

Data Sources for REER Index

27 Emerging Economies	Argentina	JP Morgan, 89-03	Malaysia	JP Morgan, 89-03
	Brazil	JP Morgan, 89-03	Mexico	JP Morgan, 89-03
	Chile	JP Morgan, 89-03	Morocco	JP Morgan, 89-03
	China	JP Morgan, 90-03	Pakistan	JP Morgan, 89-03
	Colombia	JP Morgan, 89-03	Peru	JP Morgan, 89-03
	Czech Republic	JP Morgan, 94-03	Philippines	JP Morgan, 89-03
	Egypt	JP Morgan, 94-03	Poland	JP Morgan, 94-03
	Hong Kong	JP Morgan, 89-03	Russia	JP Morgan, 94-03
	Hungary	JP Morgan, 94-03	Singapore	JP Morgan, 89-03
	India	JP Morgan, 89-03	South Africa	JP Morgan, 89-03
	Indonesia	JP Morgan, 89-03	Thailand	JP Morgan, 89-03
	Israel	JP Morgan, 94-03	Turkey	JP Morgan, 89-03
	Jordan	-	Venezuela	JP Morgan, 89-03
	Korea	JP Morgan, 89-03		
36 Developing Economies	Algeria	IFS, 89-04	Lithuania	-
	Bahrain	IFS, 89-04	*Macedonia, FYR*	IFS, 92-04
	Bangladesh	-	Nepal	-
	Belarus	-	Nigeria	JP Morgan, 89-03
	Bolivia	IFS, 89-04	Panama	JP Morgan, 94-03
	Botswana	-	Paraguay	IFS, 89-04
	Bulgaria	JP Morgan, 94-03	Romania°	IFS, 94-04
	Cameroon	IFS, 89-04	Slovakia	JP Morgan, 94-03
	Costa Rica	IFS, 89-04	*Slovenia*	JP Morgan, 94-03
	Côte d'Ivoire	IFS, 89-04	Sri Lanka	-
	Ecuador	JP Morgan, 89-03	Syria	-
	El Salvador	-	Tanzania	-
	Estonia	-	Tunisia	IFS, 89-04
	Ghana	IFS, 89-04	Ukraine	IFS, 92-04
	Kazakhstan	-	Uruguay	IFS, 89-04
	Kenya	-	Vietnam	-
	Latvia	Bank of Latvia, 95-04	*Yemen, Republic of*	-
	Lebanon	-	Zimbabwe	-

* Emerging countries are those that are included in the Morgan Stanley Capital International (MSCI) index, but not identified as developed economies (Hong Kong and Singapore are the exceptions). Moreover, Taiwan, an emerging economy, is excluded from the sample because of its data unavailability.

Italics – countries that are not included in the Husian, Mody, and Rogoff (2004) study.

° Both sources have the data, however, IFS has a more completed series.

Appendix 3 Literature Review Table

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Frieden, Ghezzi and Stein (2000) Latin American and Caribbean countries, 1960 – 1994	- RER overvaluation - Inflation Measure of REER: The indices calculated by Goldfajn and Valdés (1999)	- (Apply simple correlation)	▪ The fixed and forward-looking regimes, have produced, on average, both appreciated and appreciating real exchange rates. ▪ The forward-looking pegs and bands are the regimes associated w/ the most appreciated rate, followed by the fixed regimes ▪ The fixed regime, in turn, is associated w/ the lowest average inflation. This should not be surprising, as the forward-looking is usually implemented only when inflation is high enough that a peg would not be sustained.	▪ Use info provided in IMF's *Exchange Arrangements and Exchange Rate Restrictions* to classify regimes into 9 cats, which are regrouped into 4 main cat: fixed, forward-looking crawls/bands, floating, and backward-looking crawls/bands. ▪ Only conduct simple correlation between exchange rate regimes and variables of interest; (the paper actually studies what determine the choice of exchange rate regimes).
Goldfajn and Valdés (1996; 1999) 93 countries, 1960 – 1994, monthly data	Real appreciations: - the episodes of PPP departure in the SR or MR	The set of fundamentals used to construct the RER: o TOTs (small vs. large countries, the latter face the endogeneity problem) o Ratio of G exp/GDP o Openness	▪ Overvaluations have been much less likely to occur in regimes with *de jure* flexible exchange rates ▪ Large asymmetry between the duration of appreciation build-up and the return-to-normality phase ▪ The episodes are notably shorter when fundamentals are considered.	▪ Only study fixed, flexible, and floating exchange rate regimes ▪ Flexible regimes include crawling pegs, adjustable bands, adjustable pegs to baskets, and managed floating. ▪ Although the authors do not include economic factors when studying the effects of ER regimes on overvaluation, they include a number of variables when they construct one of their RER indices. ▪ The variables are included in the construction of the RER index to isolate the effects of non-traded goods on RERs

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Husain, Mody, and Rogoff (2004) and Rogoff et al. (2003) * distinguishing b/t developing, emerging, and advanced countries All IMF-reporting countries, 1970 - 1999	inflation (scaled CPI inflation; p/(1+p)) - (RER volatility) - growth - growth volatility Measure of RER: REER, *IFS*	○ Four ER regime dummies 1. limited flexibility (5-9) 2. managed floating (10-12) 3. free floating (13) 4. free falling (14) Pegs (1-4) is the base regime ○ money growth ○ real GDP growth ○ Trade openness ○ Terms of Trade growth ○ Government balance (% of GDP) ○ Central bank turnover rate (Governor turnover rate per 5 yrs)	▪ *Developing countries* w/ little exposure to int'l K mkts, pegs are notable for their durability & their relatively LOW inflation rate ▪ *Advanced economy* – floats are distinctly more durable & also appear to be associated w/ higher growth and somewhat lower inflation rate ▪ *Emerging mkts*: the Baxter & Stockham classic ER neutrality result. Inflation tends to be lower in regimes with harder commitment to ER stability relative to floating, though pegs are the least durable and expose countries to higher risk of crisis RER are more variable, the greater the flexibility of the regime	▪ Use *de jure* classification from Ghosh et al. (2003) – three categories, and *de facto* classification from Reinhart and Rogoff (2004): pegged, limited flexibility, managed floating, intermediate, free floating, & free falling. ▪ OLS (?) – Compare country fixed and no country fixed effects ▪ 'Endogeneity': The possibility of economic performance affecting the choice of exchange rate regimes (p.24-5) ➔ Include two-year lagged regime variable in one regression and conclude that the results do not change.
Kent and Naja (1998) 90 countries, 1978 – 1994, monthly data	Variation of real exchange rates Measure of REER: Goldfajn and Valdés (1996)	They do not include control variables *per se*; They however divide their country sample into subgroup by using inflation and GDP growth, focusing especially on a set of countries with low and stable inflation rate and stable GDP growth.	▪ Differentiating between 'bilateral' and 'effective' RER, they find that the former tends to overstate the effects of exchange rate regimes on the variance of RERs. - Using 'bilateral', the short-term volatility is 12 times higher under floating regimes than fixed regimes - Using 'effective' RER, the volatility only twice as volatile under floating regimes compared to fixed regimes ▪ However, results *within countries* suggest there was no significance increase in the variance of REER when the countries moved to more flexible exchange rate regimes.	▪ Study the relationship between the short-term *volatility* of the REER and the degree of flexibility of the nominal ER ▪ Use RER data from Goldfajn and Valdés (1996) ▪ Use *de jure* classification of ER regimes from IMF: fixed, adjustable, and freely floating ERs ▪ Use F-test ▪ Deal with 'Regime Switching" by deleting the last three mo. at the end of an old regime & the first 3 mo. at the beginning of a new regime

Studies	Variables of Interest	Explanatory Variables	Results	Notes
Shambaugh (2004) All developing countries where data are available from World Bank and IMF, 1973 – 2000	Real Exchange Rates Measure: REER from World Bank's WDI		▪ Countries with fixed ER regimes, on average, have the RER 13% higher than those with flexible ER regimes.	▪ Study the reliance on different types of capitals, i.e. commercial bank lendings, FDI, and portfolio investments, lead to specific policy preference, i.e. choice of ER regime ▪ Just compare the average RERs of countries pursuing fixed ER regimes to those pursuing flexible regimes ▪ Treat RER appreciation as a proxy for inflation [???] ▪ Use *de jure* ER classification as the main measure, but cross check with Ghosh et al. (1997) classification. ▪ Endogeneity: 'reverse causality' → Estimate the impact of a fixed ER regime at time *t-1* on the country's K flows at time *t*.
Terra and Valladares (2004) 85 countries, 1960 - 1998	Real appreciation Measure: own calculation, followed GV methodology	The set of fundamentals used to construct the equilibrium RER: o TOTs (-) o Ratio of G exp/GDP (-) o Openness (+) o Int'l Int. Rate (-), *not in GV ('96)	▪ NO evidence of different regimes for overvaluation ▪ GV methodology does not indicate the occurrence of appre/depre incidents, while the MSM appoints some episodes ▪ TV argues that the different results from the two methodologies suggest that a common threshold for all countries might be avoided. ▪ Most overvaluation is rather due to "regime switching"	▪ The equilibrium RER series are constructed using Goldfajn and Valdés (1996) methodology (cointegration w/ fundamentals) ▪ Use both GV ('96) and Markov Switching Model (MSM) ▪ MSM deals w/ situations in which discrete shifts in regime are possible, that is, the existence of episodes across which the dynamic behavior of the series is markedly different. (Hamilton, 1989) ▪ 'Regime Switching': when a country changes from one exchange rate regime to another ▪ Very econometric oriented paper

Appendix 4. Real Exchange Rate in Crises Models

Studies are from Kaminsky, Lizondo, and Reinhart (1998) Appendix, unless indicate otherwise. Definitions of RER used are from each study.

STUDY (Sample, Frequency, and Country Coverage)	Real Exchange Rate as the Indicator of Crises (**"Misalignment"**)	**Definition of Real Exchange Rates:** (Sources, if available)
Berg and Pattillo (1999a,b) (1. same as Kaminsky, Lizondo, and Reinhart (1998) with less 5 European countries and 8 more emerging economies, 2. same as Frankel and Rose (1996), and 3. same as Sachs, Tornell and Velasco (1995)) Not from KLS Appendix	1. same as Kaminsky, Lizondo, and Reinhart (1998) 2. same as Frankel and Rose (1996) 3. same as Sachs, Tornell and Velasco (1995)	1. same as Kaminsky, Lizondo, and Reinhart (1998) 2. same as Frankel and Rose (1996) 3. same as Sachs, Tornell and Velasco (1995)

Collins (1995)
 	
(1979 – 1991, annual, 18 countries w/ pegged ERs at the beginning of 1979)
 	
We use Collins (1996) assuming she uses the same measure of real exchange rate index
	Percentage change in the real exchange rate during the previous year	- Ideally, should use real effective exchange rate index (JP Morgan) but it's only available for a subset of countries
		- Use **bilateral** real exchange rate of each country **relative to USA**
		  - Nominal exchange rate (local currency per US $)
		  - US CPI, and
		  - local currency CPI

Dornbusch, Goldfajn, and Valdés (1995) (1975 – 1995, A & Q, Argentina, Brazil, Chile, Finland, and Mexico; other currency crashes are also discussed)	Real exchange rate appreciation - Accumulated movements of the exchange of at least 15% that lasted more than 1 yr. and less than 5.	Use two measures of real exchange rate 1. Bilateral exchange rate index with respect to US (**WPI**) 2. **Multilateral** effective exchange rate index based on **nonfood wholesale prices** *** (JP Morgan Currency Index Database)

STUDY (Sample, Frequency, and Country Coverage)	Real Exchange Rate as the Indicator of Crises (**"Misalignment"**)	**Definition of Real Exchange Rates:** (Sources, if available)
Edin and Vredin (1993) (1978 – 1989, M, Denmark, Finland, Sweden, and Norway)	(Log) Real exchange rate	$q = s + p^* - p$ where s is a (log) nominal exchange rate, p^* is (log) foreign price level in terms of **CPI**, and p is (log) domestic price level in terms of **CPI**.
Edwards (1989) (1962 – 1982, pooled Q & A, 24 developing countries w/ a fixed ER)	Bilateral real exchange rate	
Eichengreen, Rose and Wyplosz (1995) (1959 – 1993, Q, 20 industrial countries)	Real effective exchange rate	REER – Normalized relative to **unit labor costs** (IFS, line reu)
Flood and Marion (1995) (1957 – 1991, M, 17 Latin American countries)	1. Drift of the real exchange rate (obtained by regressing the first difference of RER index on a constant and using the estimated value of constant) 2. Variance of the real exchange rate (the variance of the residuals from the above regression)	To construct RER, F&M use **bilateral RER index** based on end-of-month nominal ER (home/$) & monthly average **CPI** for the home country and the USA. (At the end of month = 100, in which the ER is initially fixed)
Frankel and Rose (1996) (1971 – 1992, A, 105 developing countries)	Deviations from PPP in the bilateral real exchange rate where PPP is measured as the country-specific average bilateral real exchange rate over the period in question	**Bilateral** real exchange rate (World Bank's *World Data,* and IFS)

STUDY (Sample, Frequency, and Country Coverage)	Real Exchange Rate as the Indicator of Crises (**"Misalignment"**)	**Definition of Real Exchange Rates:** (Sources, if available)
Furman and Stiglitz (1998) Not from KLS Appendix	Real appreciation The base period is varied depending on which models they are trying to replicate. Four different ways to calculate misalignments. i. An estimate based on PPP, using the average RER over 1989 – 91 as the base period ii. Alternative measure of PPP misalignment calculated by Chinn, which essentially uses the average from the period 1975 – 96 as the equilibrium real rate iii. RER (in this case, the PPP adjustment factors used by the World Bank, which capture the relative price of tradables and nontradbales) in 1996 with the value that would have been predicted by a regression on the level of per capital GDP, a measure that is based on the Balassa-Samuelson effect iv. Chinn's estimate of real misalignment derived from fitting a sticky price monetary mode	Real exchange rate is measured using **multilateral** traded-weighted real exchange rate from *unpublished* estimates by World Bank staff, based on IMF data.
Goldfajn and Valdés (1998) (May 1985 – May 1997, M, 26 countries)	Real exchange rate misalignment	Six alternative REER measures: First division "RER": **WPI** (JP Morgan) vs. **CPI** (IFS) Second division "Overvaluation": Trends, H-P filters & Fundamentals
Goldstein (1996) (A & M, Argentina, Brazil, Chile, and Mexico; other crises countries are also discussed)	Real exchange rate	

STUDY (Sample, Frequency, and Country Coverage)	Real Exchange Rate as the Indicator of Crises (**"Misalignment"**)	**Definition of Real Exchange Rates:** (Sources, if available)
Kamin (1988) (1953 – 1983, A, 107 devaluations with at least 15% wrt to US dollars)	Real exchange rate	Real exchange rate at time t: $= \frac{ER_t / CPI_t}{ER_{'75} / CPI_{'75}}$ → change in period average from previous period (IFS for nominal exchange rate and price index)
Kaminsky, Lizondo, and Reinhart (1998) (not from KLR appendix ☺)	Real exchange rate (deviation from deterministic trend in percentage term)	Real exchange rate is defined on a **bilateral** basis wrt to the deutsche mark for the European countries in the sample, and wrt the US $ for all other countries
Kaminsky and Reinhart (1996) (1970 – 1995, M, 15 developing countries & 5 industrial countries)	Real exchange rate* (deviation from trend) The trend is specified as alternatively, log, linear, and exponential. * KLR says it's bilateral but the definition of nominal ER seems to be for effective exchange rate (multilateral)	RER index is derived from a nominal exchange rate index, adjusted for relative **consumer prices.** Nominal ER index is a weighted average of the ERs of the 19 OECD countries w/ weights equal to the country trade shares w/ the OECD countries
Klein and Marion (1994) (1957 – 1991, M, 87 peg episodes)	Real exchange rate	K&M use the end-of-the-month **bilateral** nominal $ exchange rate and the **CPIs** in the domestic country and in the U.S. K&M also tests the multilateral RER (=REER)
Milesi-Ferretti and Razin (1996) (1970 – 1994, Chile, Mexico, Ireland, Israel, South Korea, and Australia)	Real exchange rate versus historical norm	Real exchange rate: **CPI**-based real **effective** exchange rate (IFS)

STUDY (Sample, Frequency, and Country Coverage)	Real Exchange Rate as the Indicator of Crises ("**Misalignment**")	**Definition of Real Exchange Rates:** (Sources, if available)
Ötker and Pazarbaşıoğlu (1994, 1996) (1979 – 1993, M, Denmark, Ireland, Norway, Spain, and Sweden; 1982 – 1994, M, Mexico)	(Log) Real effective exchange rate	Real **effective** exchange rate index based on relative **consumer** prices (IFS)
Radalet and Sachs (1998) Not from KLS Appendix	Real exchange rate * Percentage change in real exchange in the previous three years (t-4 to t-1)	Real exchange rate is a ratio of traded-weighted average of foreign **WPI** (in local currency) to local **CPI**
Sachs, Tornell, and Velasco (1995) (1985 – 1995, M & A, 20 emerging market countries)	Real exchange rate overvaluation * The degree of change from 1986 – 1989 to 1990 – 1994 (focusing on Tequila crisis); a 30- 60% change is justified as misalignment.	Real exchange rate is weighted sum of bilateral real exchange rates (using domestic and foreign **CPIs**) in relation to dollar, the deutsche mark, and the yen (IFS and *Direction of Trade Statistics*)

Appendix 5. Price Indices for RER

Ideally (LOS, 1998)

- » The price indices should cover a representative basket of traded goods and services that are comparable across countries
- » Moreover, price measures should try to reflect underlying trends rather than temporary movements associated w/ "pricing to market" or other ST influences

	Pros	Cons
CPI	• C: it's a better measure because of the belief that the price of tradables may be tied to that of nontradables in the SR, so that CPI deviations from trend may constitute a better measure of disequilibrium • C': best expediency and data availability • LOS: broadly comparable across countries	• GV: the indices may contain a large proportion of nontraded final gods that have little effect on competitiveness • C': even when one is interested in nontradables – CPI is still an imperfect measure of nontradable prices • LOS: cover only consumer goods • LOS: may incorporate a large component of imported goods, thereby understating an improvement in competitiveness following a depreciation of the currency
GDP Deflator	• LOS: Basically comparable across countries	• C': Includes weight in proportion to their importance in the aggregate economy expenditures on nontradable • LOS: e.g. construction & G sector
WPI	• GV: Minimize the effects of movements in nontradable prices • GV: Easier to reject random walk hypo in PPP test • C uses as "tradable" price deflators	• GV: some WPI's may have a large component of an imported intermediate goods that is not produced at home • C': there is considerably more variation in how this price series are constructed across countries than CPIs
PPI	• C': Exclude retail sales services that are likely to be nontraded.	• C': may include a large component of imported intermediate goods, ∴ resulting RERs are not a good measure of competitiveness • LOS: their coverage, method of construction, & weighting vary substantially from country to country • LOS: may reflect to a large extent past movements in ER
Export Price Index		• C': there is considerably way more variation in how this price series are constructed across countries than CPIs, PPIs, & WPIs
Exports & Imports Unit Values	• LOS: the most direct measure of prices of goods actually traded	• LOS: may not comparable across countries • LOS: may be heavily influenced by SR pricing to mkt as firms may be setting prices to preserve mkt share in the SR • LOS: may aLOS be heavily weighted w/ prices of primary products whose prices are determined in world market • LOS: not available for many countries ***
Unit Labor Costs (UCL) Particularly if restricted to the manufacturing sector)	• LOS: Provide a broad indication of domestic costs of production • LOS: labor costs are likely to diverge much more across countries than do other costs of production and ∴ play a disproportionately important role in competitiveness ***	• LOS: labor costs are, however, only one element of the production process and they do not take account of the cost of K or material inputs • LOS: limited data availability & quality of the measures for emerging market (∴ one might need to rely on indices, such as CPI, that appear to be highly correlated w/ UCLs**)

LOS: Lafrance, Osakwe, and St-Amant (1998)
C: Chinn (1998)
C': Chinn (2002)
GV: Goldfajn and Valdés (1996)

Chapter 6 Concluding Remarks

While it is clear that hard pegs are an effective source of monetary discipline for both developing countries and perhaps emerging markets, this is not the case for fiscal discipline. The empirical evidence here shows that soft pegs are clearly worse than hard pegs in delivering monetary discipline, and that hard fixes best serve as an effective constraint over monetary policy. However, the results on fiscal discipline are fairly mixed, though it can be concluded that there is no clear evidence that exchange rate regimes would affect a country's fiscal discipline. The empirical results of this study also provide evidence that emerging and developing countries can behave quite differently from each other and thus should be analyzed separately.

Political considerations tend to play a bigger role in developing countries than in emerging-market economies. Despite that, hard pegs are still the most effective regime to provide monetary discipline in developing countries. Backward-looking crawls are found to be a good alternative source of monetary discipline. This is similar to emerging-market economies. While hard pegs are the most effective source of monetary discipline under environments of high political stability, backward-looking crawling pegs and bands are most effective under unified governments. As for fiscal discipline, the results again vary. For example, while a unified government strengthens the fiscal discipline effects of forward-looking crawls in emerging-market economies, it worsens the effects in developing countries.

The study shows that while hard pegs are a good source of monetary discipline, they or other exchange rate regimes are incapable of delivering fiscal discipline. This

finding is of no surprise since there are several different theories suggesting that fiscal discipline of exchange rate regimes can go either way. Because constraint effects of fixed exchange rate regimes move in different direction from the incentive effects, the finding that there are no strong consistent effects of a fixed exchange rate regime is not contradictory to the existing fiscal discipline models.

In emerging-market economies, backward-looking crawls and adjustable pegs are generally found to be associated with the greatest appreciation of real exchange rates. This holds for both level and last period's change analyses. This contradicts the belief that forward-looking crawls should generate more appreciated rates than the backward-looking crawls. For developing countries, floats are found to be associated with the most appreciated rates. However, the results for level and last period's percentage change are somewhat different for this country group, which may imply that the duration problems are more severe in developing countries. When examining the real exchange rate index, a backward-crawling regime is found to tend toward appreciation; however, the regime is found to tend toward depreciation when last period's change is examined. In developing countries, hard pegs are generally found to associated more with real appreciation than the adjustable pegs. Moreover, there is no clear evidence that adjustable pegs should be more appreciated than forward-looking crawls, which in turn should be more appreciated than backward-looking crawls.

Although there are considerable variations in some of the results of the effects of exchange rate regimes on real exchange rates, there are areas where the empirical results are unambiguous. First, the results support that there is a need to distinguish between emerging-market economies and developing countries when examining the relationship

between exchange rate regimes and economic performance, including real appreciation. The behaviors of the real exchange rates in these two country groups are significantly different from each other, and thus grouping them together could very well result in biased analyses and misleading conclusions.

Second, the results reveals the importance of selecting the categories of exchange rate regimes. Most studies lump some exchange rate regimes together, such as hard and soft pegs, or forward-looking and backward-looking crawls. The coefficient-equality test results show that this may not be appropriate since these exchange rate regimes do not affect real appreciations to the same degree; once again, grouping them together could give biased results.

Third, it can be concluded that the variations in the empirical results imply that there is no clear evidence of any major differences in real exchange rate behavior under different exchange rate regimes. This result helps support Angkinand and Willett's (2006) study of currency crises in which they implicitly argue that overvaluation may not be a crucial factor in contributing to a currency crisis.

Future research possibilities include incorporating interaction terms between exchange rate regimes and some other variables, for example, degree of capital mobility. Willett (2001) argues that pegged rates and substantial capital mobility make it easier for a country to finance its deficits in the short-run if the market is not far-sighted. This is likely due to the domestic economic and political costs being lower for these countries. The interaction terms between exchange rate regimes and openness are also of interest. It is often argued that a country with a more open economy is more likely to have a lower inflation rate. However, one would expect that the effects would be stronger in either

direction; that is, while a more open economy is expected to strengthen the constraint and positive incentive components of discipline effects, it is also expected to strengthen the perverse incentive effects. Thus, it is interesting to see how openness interacts with different exchange rate regimes in delivering discipline.

Another possibilities of interaction terms are between exchange rate regimes and inflation rate. The problems associated with data may be solved in the future as more become available. There is also a need to better deal with observations that Reinhart and Rogoff consider "free falling." In their classification, Reinhart and Rogoff (2004) separate episodes of floating regime with high inflation as freely falling regime. Therefore, their float regime tends to show high association with low inflation. This, in turn, weakens the link between floating regime and real appreciation. However, there is a great discrepancy between Reinhart and Rogoff's and Bubula and Ötker-Robe's classifications: some of Reinhart and Rogoff's freely falling episodes are classified as forward-looking crawls by Bubula and Ötker-Robe, which may not be accurate. Once this issue is addressed, it may be worthwhile to reexamine the effect of floating regimes on real appreciation.

Moreover, there is a limited capability of the panel data structure. The panel structure here only reveals, more or less, the immediate discipline effects of exchange rate regimes. Therefore, future research could examine the cumulative discipline effects of exchange rate regimes over time, for example, how the exchange rate regime affects a country's discipline after three to five years. This is in line with a number of studies of exchange-rate based stabilization (ERBS), which is closely related to this study since one of the causes of failures of ERBS's is a lack of fiscal discipline, which in turn lead to an

overvaluation of the currency. ERBS generally work well in the first year or two, successfully bringing down high inflation rates, and then they flop, shooting the inflation back up.

Lastly, since exchange rate regimes are not found to play an important role in affecting a country's fiscal discipline, there is a need to find other factors or instruments to help deliver a country's fiscal discipline, in which they must be able to limit the governments' political incentives to exploit. Good governance is a good candidate. Countries with good governance are expected to have a better fiscal discipline. Having good governance may enhance the effectiveness of exchange rate regimes in affecting a country's discipline.

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