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When to Hit the Panic Button?  
Impact of Currency Crisis  
on Consumer Behaviors

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# **When to Hit the Panic Button? Impact of Currency Crisis on Consumer Behaviors**

March 2008

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# When to Hit the Panic Button? Impact of Currency Crisis On Consumer Behaviors

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## Abstract

The promise of emerging and developing economies has created unprecedented interest from businesses in recent times. Yet, the reality of these economies are levels of volatility unheard of in developed markets. For example, there have been 348 currency crises across 164 countries in the past 40 years of which 95% have been in developing economies. Managers acknowledge that the impact of a crisis on their business can far exceed those of competitive interactions. Yet, there is little by way of frameworks and guidelines to help them grapple with the implications of such events. We attempt in this research to develop a better understanding of (i) the determinants of an economic crisis, (ii) the impact of a crisis on economic and business indicators such as consumer and retail expenditures and product category sales, and (iii) the recovery process of these parameters subsequent to the crisis. A series of robustness tests reinforce the key findings on the impact of a crisis on business indicators and their recovery post crisis. While managers have little ability to influence the likelihood of a crisis, we believe that this work by establishing a set of stylized facts about the phenomenon can help them become proactive in managing such an event and thereby potentially turn an adverse event into a marketing opportunity.

JEL Classification: F31; M31; M38; F34

Key Words: Currency Crisis, Economic Recovery, Consumer Expenditure, Retail Sales.

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# 1 Introduction

The attention invested on emerging and developing economies in recent times is unparalleled. High growth rates, increasing consumption, large populations are some of the factors fuelling the attraction of these markets to businesses and investors alike. However, the reality of developing economies are levels of volatility unheard of in developed countries. Figure 1 illustrates this using one of the widely used indicators of volatility in the academic literature, namely currency crisis. It shows that there have been 348 currency crisis events across 164 countries since 1960. The overwhelming majority of these crises (close to 95%) have been in developing economies. The impact of a crisis on a firm's business in the vast majority of cases is dramatic as well as painful. For instance, data provided to us by one of the largest packaged goods manufacturer in the world reveals that average category sales dropped by 3% in the year of the crisis with the worst impact being a 37% drop in category sales. Managers recognize that there is very little that they can do to influence the likelihood of a crisis in a country. They also realize that they have to accept these business risks if they want to participate in the business opportunities of developing economies and strive for leadership positions in their categories. Their real challenge is how to get better at managing these risks in developing economies. Anecdotal evidence showing that firms that cope better with a crisis can generate significant and sustainable competitive advantage and long term market leadership (e.g., Nokia in Indonesia, Syngenta in Russia) further reinforces the need for better understanding of the impact of a crisis on a firm's business and its implications for decision making in the crisis and post-crisis periods.

Our conversations with managers in multinational companies operating across Asia, Latin America and Eastern Europe reveals that these firms have a rich library of country studies documenting the various crises and its impact. Most of these firms also routinely track economic indicators that they believe correlate significantly with the likelihood a crisis. However, their attempts at understanding the likelihood of a crisis and its impact are rarely coordinated across countries and regions with the consequence that their findings remain at the level of anecdotal evidence. Research that establishes some of the key facts about the determinants of a crisis and its impact through a comprehensive examination of these events across countries and over time would greatly improve their ability to develop a formalized process for dealing with these issues. From an academic perspective, there is a substantial literature in macroeconomics on

the determinants of a currency crisis and we use that as the stepping stone for this research. There has been some work on the impact of a crisis on aggregate economic indicators such as GDP/capita. However, managers are more interested in understanding the impact of a crisis on indicators that matter to them such as consumer expenditures, retail sales, and category sales. How does a crisis impact these variables? How do these evolve in the aftermath of a crisis? What are the managerial implications of these insights? To the best of our knowledge, there is nothing in the marketing and macroeconomics literature that helps answer these questions. We see this research as a first step in addressing these questions.

Developing a comprehensive framework for managing the risks of economic volatility in developing economies from a management perspective starts with establishing some of the key stylized facts about the likelihood of a crisis, its impact and the recovery thereafter. We attempt in this paper through an examination of crises across countries and over time to highlight some of the key descriptive facts. Our results show that a dashboard comprising of key institutional, macroeconomic and debt indicators suffice to predict the likelihood of a currency crisis in an economy. Interestingly, institutional and macroeconomic variables play a far more significant role in predicting the probability of a crisis than debt indicators. More importantly, the results highlight:

- The impact of a crisis on variables such as consumer expenditures, retail sales and category sales is significant across both developing and developed economies. However, the nature of the impact varies significantly across developing and developed economies. Also, the magnitude of the impact of a crisis on these indicators varies systematically as well, with the magnitude being larger for retail and category sales than for consumption expenditures.
- The duration of the impact on economic and business indicators post-crisis differs systematically. Business indicators such as retail sales and category sales are affected for a shorter duration as compared to aggregate economic indicators such as consumer expenditures.
- A series of robustness tests including control variables, Heckman omitted variable bias, lagged dependent variable and SURE (seemingly unrelated regression estimates) reinforce the strength of the findings on the impact of a crisis on business indicators.

- Institutional variables and macroeconomic indicators along with pre-crisis economic indicators strongly influence the pace of recovery following a crisis. The more severe a crisis the faster is the recovery.

We previewed these results with senior executives of MNC's active in developing economies across sectors ranging from financial services to packaged goods to agrochemicals to understand their assessments of the findings and its implications for their managerial actions. A common reaction was happiness that their intuitions about factors germane to the likelihood of a crisis withstood the scrutiny of a comprehensive empirical evaluation. Several of them remarked that they would now elaborate their dashboard of indicators to track variables that they did not routinely track previously (e.g., institutional variables). More importantly, they see serious implications for decision making from both a revenue and cost perspective. For instance, executives in the financial services sector would incorporate the riskiness (due to changes in likelihood of a crisis in a country) into their pricing decisions. Said differently, they wanted a closer correlation of the prices of their products and services to the business risks of the country. Executives in the agrochemicals business remarked that they would incorporate our estimates of likelihood of a crisis in a country into their channel management policies. For example, an increase in the likelihood of a crisis event would translate to shorter credit terms (or only cash transactions), lower channel inventories and so on. Executives in the packaged goods sector remarked that the results on variations of the impact of a crisis across categories and recovery post crisis meant that they needed to develop a category based structure for dealing with these risks in a country as opposed to a one-size-fits-all approach. It also meant that their forward looking business plans needed to incorporate the contemporaneous as well as long term impact of a crisis into capital budgeting and resource allocation decisions.

The rest of the paper is organized as follows. We provide a review of the related marketing and economics literature in Section 2. Section 3 focuses on the definition of the crisis, the model of determinants of a crisis and the estimation results. We move in Section 4 to highlighting the impact of the crisis on consumer expenditures, retail expenditures and product categories. We also elaborate here on a series of robustness tests we conducted. Section 5 develops the model of recovery from crisis and the results of estimation. We conclude in Section 6 with a summary, caveats and future research directions.

## 2 Literature Review

Our work is related to the economics and marketing literatures. We begin with a review of the economics literature. Currency crisis are becoming an increasingly common macroeconomic phenomenon, with the 1990s characterized by a sharp increase in the frequency of such crisis (See Flood and Marion, 1999 for a survey).<sup>1</sup> These episodes have generated a considerable literature in economics, documenting the frequency and impact of currency crisis but more fundamentally, has triggered a big debate over their underlying causes. Broadly, the debate comes down to whether currency crisis can be attributed to arbitrary shifts in market expectations and confidence, or to weakness in economic fundamentals. Starting with Krugman (1979) and Flood and Garber (1984), the so-called first-generation models, showed that a currency crisis is the unavoidable outcome of weak economic fundamentals such as excessively expansionary fiscal and monetary policies. The unsustainable policy stances resulted in persistent losses of foreign exchange reserves culminating in a currency crisis where the country is forced to abandon its currency peg. This view stresses that the exchange rate regime is a component of a broader policy package, and the regime can be sustained only if it does not conflict with other monetary and fiscal objectives.

Following the crisis in Europe in 1992-93 and in Mexico in 1994, where fundamentals were relatively sound, economists were forced to rethink the so-called first-generation models. Although excessively expansionist monetary or fiscal policies may have been an issue in some countries, such as Italy or Spain, they were clearly not significant in others, such as France and the United Kingdom. This led to the second-generation models of currency crisis (Obstfeld, 1986; 1994; 1996) which emphasize that the contingent nature of policies (that policies respond to fundamentals) may give rise to multiple equilibria and self-fulfilling crisis. A currency crisis, from this perspective, is a situation in which private agents, given the prevailing conditions and their beliefs about the policymaker's objectives, perceive that the policymaker is on the brink of reneging on the exchange rate arrangement (Jeanne, 2000). The shift in perceptions on the part of economic agents may trigger a crisis and this the interaction between investors' expectations and actual policy outcomes can lead to self-fulfilling crises. While some argued that sheer speculation can be the only trigger for a crisis,

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<sup>1</sup> Bordo et al (2000) document that while currency crises have become somewhat more frequent since the breakdown of the Bretton Woods System in 1971, their duration and severity show substantial consistency over the past two centuries.

these second-generation models showed that for a currency to be vulnerable to self-fulfilling speculation, the fundamentals must first put it in a state of fragility (Jeanne, 2000). However, the notion of fundamentals in these models are much more encompassing than in the first-generation models and, potentially include any variable that influences the policymakers' decision whether or not to abandon the exchange rate arrangement.

The empirical work on currency crisis can be broadly classified into three categories. First, are papers that simply establish a set of stylized facts by examining how various macroeconomic variables behaved prior to and immediately following a crisis (Hutchison and Noy, 2005; Bordo et al 2001; Eichengreen, Rose and Wyplosz, 1995). Second, some papers estimate the probability of a currency crisis (in terms of a large devaluation) as a function of various macroeconomic indicators (Frankel and Rose, 1996; Sachs, Tornell and Velasco, 1996). A third set of papers use a non-parametric approach to evaluate the usefulness of several variables in signaling an impending crisis (Kaminsky and Reinhart, 1999; Kaminsky et al, 1998). The focus of this empirical literature has been on broad macroeconomic aggregates such as GDP, current account, and GDP growth. Surprisingly, it is silent on the impact of a crisis on consumption expenditure and more disaggregate variables such as retail and product sales. The lack of research on the impact of crisis on consumption expenditure is puzzling since consumption expenditure is by far the biggest component of GDP and the fall in consumption expenditure has direct welfare implications. Theoretically, it may be argued that a crisis is a temporary event, and has no impact on consumption expenditures. This follows from the permanent income hypothesis theory of consumption (Friedman, 1957) according to which consumers are forward-looking and base their consumption decisions not on current income, but on the expected discounted value of lifetime resources or their permanent income. Only changes to permanent income triggers changes in consumption. However, this is inconsistent with data which shows marked shifts in consumer expenditures following a crisis. A second major omission in this literature is the role that institutions play in both triggering crisis and impeding (or hastening) the recovery from a crisis. Given the prevailing consensus amongst economists that institutions trump the role of policies (see Rodrik et al 2004; Acemoglu, et al, 2003; Acemoglu, Johnson and Robinson, 2001) in explaining economic growth across countries, the lack of attention to institutions in the currency crisis literature seems surprising. We address these gaps in the economic literature and by broadening the scope of investigation from probability of crisis to impact of crisis



on consumer expenditures, retail expenditures, category sales and their recovery, make a contribution to this literature.

Moving to the marketing arena, repeated calls for research into marketing issues in the developed/emerging economy contexts (e.g., Dekimpe and Lehmann 2004, Burgess and Steenkamp 2006) has led to a small but growing literature on this domain. One stream in this area has focused on identifying the similarities and differences in the diffusion patterns for products across developed and developing economies. Talukdar, Sudhir and Ainslie (2002) show that developing countries experience a slower adoption rate relative to developed countries. They also highlight the impact of macro-economic variables on penetration potential and speed. Dekimpe, Parker & Sarvary (2000) show that countries where a product is introduced later have faster diffusion rates. Desiraju, Nair and Chintagunta (2004) confirm these findings in the pharmaceutical context. Our work is related to this stream in terms of the developing economies context, but is very different in that our focus is on the impact of a crisis on the diffusion of existing products in a market. The categories we consider are established and mature categories. More closely related from the topic perspective is the literature in marketing on the impact of business cycles on sales evolution. Deleersnyder, Dekimpe, Sarvary and Parker (2004) show that consumer durables are more sensitive to business cycle fluctuations than general economic indicators. Additionally, they find that sales fall more quickly during contractions whereas they adjust upwards more slowly during expansions. Lamey, Deleersnyder, Dekimpe and Steenkamp (2007) examine the impact of business cycles on private labels (a fast moving consumer good versus the consumer durable context of their earlier work) and report largely similar results. Our focus in this paper is on economic crisis and not business cycles. Economic crisis impacts the periodicity of the business cycle and in that sense there is a relation to this stream of work. However, our work is very different in terms of its focus in the developing economies context (which have experienced the majority of crisis) whereas the business cycle work has focused exclusively on developed markets. Additionally, we look at the impact of crisis on economic and business indicators across a variety of consumer packaged goods. Finally, our work is related to Heerde, Helsen and Dekimpe (2007) and Rubel, Naik and Srinivasan (2007) work on the impact of a crisis on management decisions. However, their focus is on product harm crisis whereas we focus on currency crisis.

## 3 Currency Crisis

### 3.1 Definition and Measurement

A canonical currency crisis is one where investors flee a currency (sell the local currency in exchange for safer currencies such as US dollars or Euros) because they expect it to be devalued, and much of the pressure on the currency comes precisely because of this lack of confidence. This sort of circular logic is the defining feature of a currency crisis. While this is the broad and general feature of a currency crisis, it can manifest itself in various ways - a sharp depreciation of the exchange rate, a depletion of foreign exchange reserves, an increase in interest rates to shore up the currency, etc.

For purposes of this paper, we use the commonly accepted definition of currency crisis (Frankel and Rose, 1996; Hong and Tornell, 2003) - a country is said to experience a currency crisis if there is:

- at least a 25% nominal depreciation of its currency, and,
- there is also at least a 10% increase in the rate of depreciation of the exchange rate.<sup>2</sup>

Currency depreciation refers to change in the natural logarithm of the nominal bilateral dollar exchange rate (multiplied by 100) and all changes are expressed in annual rates of change. Since many countries, such as Argentina in the 1980s with high inflation rates experienced changes in the exchange rate of 25 per cent or more – year after year, we require that the change in the exchange rate, not only exceed 25 per cent, but exceed the previous year’s change in the exchange rate by a margin of at least 10 per cent. This is a conservative specification and avoids counting the same crisis event multiple times. Finally, following Frankel and Rose (1996), we also exclude any observations within 3 years of each crisis in order to avoid counting the same crisis episode more than once.

Our data on exchange rates is from International Financial Statistics. It spans 164 countries over the period 1960-2004. Using the above definition of currency crisis, we obtain 348 episodes of currency crisis which is about 4.6% of the entire sample. However, 114 of these 164 countries have experienced at least one

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<sup>2</sup> Eichengreen et. al. (1995) define a currency crisis to include both the large depreciations that we consider here, and also speculative attacks that are successfully warded off by the authorities. Unsuccessful speculative attack are difficult to identify even ex-post and they use sharp falls in foreign exchange reserves and/or increases in interest rates to do this. But since the majority of the crises have historically been in developing countries, the sparse data on interest rates and foreign exchange reserves makes it difficult to use these variables to identify successful defences against speculative attacks. Reserve movements are notoriously noisy measures of exchange market intervention for almost all countries. And, few developing countries have market-determined short-term interest rates with long histories.

crisis testifying to the ubiquitous nature of currency crisis. Once we window out observations within 3 years of each crisis, the percentage of crisis falls to 3.75% of the sample.

### 3.2 Modeling the Probability of A Crisis

Our focus in this paper is on understanding the impact of a crisis on consumer expenditures, retail sales, and category sales, in terms of the magnitude of the impact, the average duration of the impact, and the pace of recovery. To estimate the impact of a crisis, the obvious option would be to simply use a dummy variable that takes the value 1 in the event of a crisis. However, such a specification runs the risk that there may be too little variation in the crisis variable - as mentioned previously crisis episodes constitute only 3.75% of the sample. Second, unsuccessful speculative attacks on the currency which may trigger a near-crisis but which may fail to cross the 25% nominal depreciation threshold in the definition of a crisis, would be treated equivalently to a tranquil episode where there was no pressure on the exchange rate which is clearly not the case. Using the predicted probability of a crisis in lieu of the dummy variable classification of a crisis is better since it captures the riskiness of the economic environment. Therefore, as a first step, we estimate a probit model with the crisis event as a discrete dependent variable:

$$crisis_{it}^* = \mathbf{W}_{it}\gamma + u_{it} \quad (1)$$

where  $crisis_{it} = 1$  if  $crisis_{it}^* > 0$ , 0 otherwise

where  $i$  is an index for country and  $t$  for time,  $crisis^*$  is the underlying latent variable,  $u_{it} \sim N(0, 1)$  is the error term with  $\Phi$  as its standard normal cumulative distribution function and  $\mathbf{W}$  is a vector of explanatory variables that are potential predictors of a currency crisis.<sup>3</sup> Therefore, the predicted probability of a crisis conditional on  $\mathbf{W}$  may be written as  $\hat{p}_{it} = P(crisis_{it} = 1 | \mathbf{W}_{it}) = \Phi(\mathbf{W}_{it}\gamma)$ .

The conceptual framework in Figure-2 highlights our choice of covariates that impact the probability of a crisis (see Appendix-1 for the definition of the variables and the measures). We group variables in  $\mathbf{W}_i$  into three categories: macroeconomic variables that capture internal domestic factors; debt variables measured in terms of external debt and the composition of the debt; and institutional variables that capture the checks

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<sup>3</sup> It may be argued that rather than using big discrete jumps in exchange rates to define crisis events, we could simply use the exchange rate itself and capture all changes in exchange rates, big or small. However, much research has underscored the inadequacy of models linking macroeconomic variables to the exchange rate (Meese and Rogoff, 1983 is the classic reference).

and balances on governments and policymakers and the quality of the legal and regulatory environment. We follow Frankel and Rose (1996) in our choice of macroeconomic and debt variables. To the best of our knowledge, none of the prior work on currency crisis has examined the role of institutions in mitigating the risk of a currency crisis.

### 3.2.1 Macroeconomic Variables

The very early models of currency crisis (Krugman, 1979; Flood and Garber, 1984) emphasize loose fiscal and monetary policies as key triggers of a currency crisis. While these models analyzed fixed exchange rates, subsequent analyses has extended it to more flexible exchange rate arrangements such as crawling pegs (Connolly, 1986) and currency bands (Krugman and Rotemberg, 1992). So our first two macroeconomic variables are the rate of growth of domestic credit (a measure of monetary policy) and the government fiscal balance as a fraction of GDP (a measure of fiscal policy).<sup>4</sup> However, as we discussed in section 2, not all currency crisis have been triggered by loose fiscal and monetary policies, most notably the ERM crisis of 1992. These crisis came about through speculative attacks.<sup>5</sup> To capture the vulnerability of countries to such self-fulfilling speculative attacks we include as explanatory variables the ratio of reserves to imports, the current account as a percentage of GDP, the degree of over-valuation of the exchange rate and the growth rate of real output. Data on these variables are from the International Finance Statistics and the World Development Indicators.

### 3.2.2 External Debt Variables

Following the Asian crisis of 1997, models of currency crisis stressed how large currency depreciation in the presence of foreign currency liabilities increases the real debt-service burden, leading to investment and output contraction (Krugman, 1999; Céspedes, Chang, and Velasco, 2004). While the initial currency depreciation is triggered by fundamental shocks, the expected depreciation leads to a currency crisis with the resulting real depreciation having severe adverse consequences for both the public and the private sector's balance sheets who are exposed to debts and loans in the foreign currency. Therefore, we have a self-fulfilling aspect

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<sup>4</sup> Positive numbers imply the government is running a surplus, while negative numbers indicate a fiscal deficit.

<sup>5</sup> In these models, crisis can be triggered by an endogenous policy response as the authorities decide whether to devalue the currency based on trade-offs, for example, between the benefits of a strong currency and the costs of higher unemployment. Fundamental weaknesses (such as an overvalued currency, an unsustainable current account deficit, low growth rates), make such a scenario more plausible.

to the crisis - the initial loss of confidence and currency depreciation triggers insolvency and bankruptcies, ex-post validating the confidence loss and the currency crash. Again both the level of international debt and the composition of debt may be key in making countries vulnerable to such self-fulfilling attacks. We use the ratio of debt to GNP to measure the level of international debt. Next we decompose debt first into foreign direct investment versus portfolio investment by including the ratio of FDI to GNP,<sup>6</sup> and second into public versus private by including public debt as a proportion of total debt. We also capture the term structure of debt by including short term debt as a proportion of total debt. Within portfolio capital inflows, concessional debt and the fraction of debt that comes from multilateral development banks are easier to service and far less likely to depart quickly in times of trouble. We include both these measures as explanatory variables. Since the debt crisis that erupted in 1982 in Mexico and elsewhere in Latin America was clearly exacerbated by the fact that so much international debt was tied to short-term nominal interest rates, we also include variable rate debt as a proportion of total debt as an explanatory variable. Finally, to capture the distinction between securities sales and commercial bank borrowing, we include the proportion of debt lent by commercial banks. All variables are from the Global Development Finance database of the World Bank.

One constraint we face when including these debt variables is that these data are available only for developing countries - the Global Development Finance database excludes all developed countries. Therefore, any specification that includes these debt variables automatically excludes 28 developed countries from the sample and our sample size declines by nearly 33%. However, there is a sound theoretical and empirical basis for believing that debt variables matter mainly for developing countries. The recent literature on debt intolerance (see Reinhart, Rogoff and Savastano, 2003) shows that developing countries historically have run into problems at much lower debt-to-output ratios than advanced countries. In developing countries, a weak revenue base and lack of expenditure control are critical reasons for the emergence of adverse debt characteristics and it is precisely in these countries that debt variables are drivers of currency crisis. Moreover, as Eichengreen, Hausmann, and Panizza (2003) emphasize developing countries are unable to borrow abroad in its own currency when it accumulates a net debt, as developing countries are expected to do, which will have an aggregate currency mismatch on its balance sheet, making it vulnerable to speculative attacks.

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<sup>6</sup> FDI is a source of stability since multinationals cannot easily roll up their investments in plants and machinery.

Developed countries are either lenders on international debt markets or financially autarkic. Therefore, debt factors are likely to play a bigger role for crisis in developing countries. Consequently, we have chosen to keep the debt variables and accept the trade-off of a smaller dataset.<sup>7</sup>

### 3.2.3 Institutions

In the analysis of the significant and persistent cross-country differences in growth rates and economic development, institutions have been accorded a special role. This view starting with Douglas North (1990) emphasizes the importance of institutions in providing the right economic incentives for innovation and capital accumulation. Very broadly, institutions are the rules of the game that govern economic and social interactions between firms, individuals and governments. Countries with good institutions are those where investors feel secure about their property rights, the rule of law prevails, governance is good, monetary and fiscal policies are grounded in solid macroeconomic institutions, idiosyncratic risks are mediated through the existence of social nets, and citizens have recourse to civil and political rights. Rich countries have good institutions and research shows that the arrow of causality points from institutions to income and growth. Countries where these arrangements are absent or ill-formed fail to grow fast and remain poor. We examine whether countries with good institutional arrangements are less vulnerable to currency crisis.

We include two variables as measure of institutions in our model. The first is the Political Constraints measure of Henisz (2000). Political constraints takes into account information on the number of veto points among various branches of government (executive, legislature, judiciary) as well as the heterogeneity of preferences within any institutional actor. While the preference alignment can change with every election or every new appointment, the fundamental source of variation comes from changes in the number of institutionally embedded veto powers. It therefore captures the checks and balances on executive decision making and on policy formulation.<sup>8</sup> Persson, Roland, and Tabellini (1997) show that separation of powers combined with appropriate agenda-setting rules can lead to significant improvement in macroeconomic outcomes by

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<sup>7</sup> Frankel and Rose (1996) explicitly recognize that only in developing countries, debt variables are an indicator of vulnerability to currency crisis .

<sup>8</sup> The political constraint measure is closely related to the “Constraints on the executive measure” which also captures the extent of institutionalized constraints on the decision-making of chief executives. This measure obtained from the Polity IV project is by far the most popular measure used in the literature relating institutions to economic performance. (see a number of influential papers such as Acemoglu et al, 2003; Acemoglu, Johnson, and Robinson, 2001). However, this is a somewhat “contaminated” variable, as it often codes systems in terms of outcomes. That is, a system is coded as having more constraints on the executive if we see policy outcomes consistent with this. The Henisz political constraints measure, on the other hand, more accurately captures the fundamental institutionalized restraints on decision making.

detering malfeasance and rent-seeking by politicians. On the other hand, the absence of political constraints, by failing to constrain arbitrary behavior by political actors, enhance the perceived riskiness for providers of capital (to both the public and private sector.) This in turn, is likely to lead to more severe reactions in the face of a crisis threat by deterring and reversing portfolio flows.

A second consistent finding in the economics and finance literature is the important of sound regulatory institutions especially legal protection afforded to investors, both domestic and foreign. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998, 1999) show that countries differ in their regulatory and governance indicators and that this variation in the quality of regulation, the prevalence of corruption and red tape, and bureaucratic delays can in turn, be traced back to the legal origins of countries. Very broadly legal origins can be divided into countries following a common law tradition and countries following a civil law tradition. In common law legal systems, the law is created and/or refined by judges: a decision in the case currently pending depends on decisions in previous cases and affects the law to be applied in future cases. When there is no authoritative statement of the law, common law judges have the authority and duty to ‘make’ law thereby creating precedent. In short, cases themselves rather than statutes and legal codes are the primary source of law. By contrast, in civil law countries, the law is based on codes and statutes with legislation as the primary source of law. By default, courts base their judgments on the provisions of codes and statutes, from which solutions in particular cases are to be derived.<sup>9</sup> They find that common law countries have the strongest legal and regulatory protection of investors, whereas civil law countries exhibit heavier regulation, less secure property rights, smaller and narrower capital markets and more corrupt and less efficient governments. So our second measure of institutions is the legal tradition in a country - we use a dummy variable that equals one for countries based on a common law tradition. To the best of our knowledge, the literature on currency crisis has not examined whether legal origins matter for the probability of a crisis.

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<sup>9</sup> The common law tradition originates in the laws of England, and through conquest and colonization spread to England’s colonies, including the United States, Australia, Canada, and many countries in Africa and Asia. The civil law tradition has its roots in the Roman law, and was adopted by several continental states, including France. See Glaeser and Shleifer (2002) for a historical perspective.

### 3.3 Results

We present the estimates of a probit model relating the currency crises events to the institutional, macroeconomic and debt variables in Table-1. The first column uses as explanatory variables only the institutional and macroeconomic variables, lagged by one year.<sup>10</sup> It covers 82 countries over the period 1972-2004. We see that countries with greater political constraints are significantly less likely to experience a currency crisis. We obtain a significant negative sign on the common law dummy, indicating that legal origins matter and that common law countries are less likely to experience a currency crisis. In terms of the marginal effects, evaluated at the mean of all variables, a 1% increase in this political constraint indicator lowers the probability of a currency crisis by 0.8%. Moreover, the probability of a crisis in common law countries is lower by 0.03. Almost all the macroeconomic variables are statistically significant with the expected signs. An improvement in the fiscal balance (tighter fiscal policy), and slower growth of domestic credit (tighter monetary policy) reduce the probability of a crisis. At the same time the probability of a crisis decreases with the build up of foreign exchange reserves and increases with an overvalued exchange rate. Rapidly growing economies are less vulnerable to a crisis. The variable current account balance has the right sign but fails to be significant. Overall as the last row in table 1 show  $\chi^2$  tests find that the institutional variable and the macroeconomic variables are jointly significant at the 1% level. In terms of magnitude of impact, foreign exchange reserves and GDP growth have the biggest effect on the probability of a crisis - a 1% increase in foreign reserves reduces the probability of crisis by 0.7% while a 1% increase in GDP growth rate reduces it by 0.45%. Comparing it to the magnitude of the institutional variable, we see that the impact of good institutions dominates the impact of good macroeconomic policies.<sup>11</sup>

Column 2 in table 1 restricts the sample to only developing countries. Our results remain unaffected as compared to table 1 - both the institutional variables, political constraints and legal origin, strongly impact the probability of crisis as do the macroeconomic variables. This suggests that it is not simply the difference in developed and developing countries (who tend to have very different institutions) that is

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<sup>10</sup> By windowing out crisis events within a three year time horizon, and by lagging all variables by a year, we minimize the potential for reverse causality.

<sup>11</sup> Since we present estimates from a pooled probit regression, we cannot identify whether the main source of variation is across countries or within-countries. Unfortunately, adding country fixed effects in probit models yields inconsistent estimates. As a robustness check, we checked our results with a random-effects probit estimator which yields nearly identical results. A test for poolability suggests that the data may be pooled across countries.



driving our results. Column 3 in table 1 adds the debt variables. The sample size is now restricted to 55 developing countries. As in Frankel and Rose (1996) we find that the debt variables are jointly significant but only two are individually significant. However, one of these (short-term debt as a proportion of total debt) has the wrong sign and if we drop this variable, the debt variables are no longer jointly significant.<sup>12</sup> A likelihood ratio test now shows that adding the debt variables to the macroeconomic and institutional variables does not significantly improve model fit. The macroeconomic and institutional variables continue to be strongly significant across all these specifications. For these reasons, for the purpose of quantifying the impact of the crisis, we will use the predicted probabilities from column 1 which includes the macroeconomic and institutional variables. More importantly, such a strategy also allows us to include both developed and developing countries in our sample.

### 3.4 Managerial Implications

Our conversations with executives suggest that most firms focus their attention on an ad-hoc set of variables to track the likelihood of a crisis event in a country. What they would like is a set of unified metrics that would enable them to assess the risk of such an event across their global operations. We identify in column-1 of Table-1 such a minimal set of institutional and macroeconomic indicators that they can now use to assess the likelihood of such an event for each of their country operations. These can serve as an early warning indicator to be used as an input into their annual and multi-year business planning exercises across countries and regions. Our results also demonstrate that there is really no need for these executives to think that the dashboard of indicators need to be very different for developing countries as compared to developed countries.

More importantly, the results also serve to demonstrate that institutional variables (which are not routinely tracked by many of the firms we have spoken to) are in fact very important. Most executives rely on country reports from brokerage houses that typically report only macroeconomic indicators. While countries with good institutions are also likely to adopt sound macroeconomic practices, we find that institutions play a powerful role over and above their impact on macroeconomic fundamentals. To emphasize the importance

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<sup>12</sup> One potential explanation is that anticipating a crisis in a country, creditors simply stop extending short-term debt so that a *fall* in short-term debt precedes a crisis.

of institutions consider two countries - Indonesia and Malaysia - both of whom were affected by the Asian crisis in 1997, with the crisis having a deeper and much more severe impact on Indonesia as compared to Malaysia. If we use macroeconomic variables to evaluate the likelihood of a crisis, we obtain that the predicted probabilities of crisis at 0.45 in Indonesia and 0.13 in Malaysia in 1997. However, when we explicitly add the institutional variables, the predicted probability rises to 0.79 for Indonesia and falls to 0.07 for Malaysia. Malaysia has a common law legal tradition and scores 0.7 on the political constraints measure (the US scores 0.85 on this measure). Indonesia, on the other hand has a civil law legal tradition and scores 0 on the political constraints measure. Not only do better institutions entail lower volatility by reducing the likelihood of a crisis, but the presence of good institutions permit firms in developing economies to better manage these risks. In countries with sound institutional infrastructure, firms are more protected from the risk of contract repudiation, from the risk of outright expropriation, and can rely on bankruptcy regulations to implement a swift restructuring of operations.

## 4 Impact of Crisis on Consumer Expenditure, Retail and Category Sales

As discussed earlier, much of the existing work on the impact of a crisis has focused on GDP/capita as the variable of interest. However, from a business perspective the more pressing concern is understanding the impact of a crisis on indicators that impact them more directly. Hence, we focus in this section on highlighting the magnitude of impact of a crisis as well as the duration of the impact on consumer expenditure, retail sales and category sales.

The business cycle literature clearly shows that consumption indicators have a trend effect over time as well as a cyclical component. Our data shows that a crisis impacts both of these components. The graphs in Figure-3 show the reaction of consumer expenditure to four major crisis: a) the debt crisis in Brazil in 1984; b) the ERM crisis in Sweden in 1992; c) the Tequila crisis in Mexico in 1994; and d) the Asian crisis in South Korea in 1997.<sup>13</sup> In all cases we see a significant drop in level of per capita consumption expenditure. Within these four cases we also see interesting variations. First, for both South Korea and Sweden, the impact of the currency crisis is moderate and short lived. Moreover the growth rate of per capita consumption (as

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<sup>13</sup> The graphs present an index of log of per capita consumption expenditure with base year 2000 set to 100.

shown by the slope of the lines) does not seem to have been affected by the crisis - for Korea the trend in the growth rate resumes shortly after the crisis, while in Sweden it accelerates about two years after the crisis. For Brazil and Mexico, both of whom fell prey to the Latin American debt crisis in 1984, the impact is more pronounced and recovery takes nearly a decade. The upward trend turns into a downward trend post-crisis. In the longer run, there seems to be a fall in the trend component of per capita expenditure (slope of the line is flatter once it resumes its upward trajectory). The Mexican tequila crisis leads to a sharp drop in consumption expenditure but recovery seems to have been quite quick, and the trend unaffected. Consequently, we (i) estimate not just the contemporaneous impact of a crisis but also the time horizon over which the impact persists, and (ii) disaggregate the indicators into a trend and cyclical component and highlight the impact of a crisis on both of these components.<sup>14</sup>

Finally, we perform a variety of robustness checks to assure ourselves of the reliability of our estimates. We perform four different tests to assess robustness - adding control variables, Heckman 2-step estimation, adding lagged dependent variables as regressors and seemingly unrelated regression estimates (SURE) to improve the efficiency of our estimates for category sales (where the available data is quite sparse).

#### 4.1 Impact of a Crisis on Consumer Expenditure

Our first variable of interest is per capita consumption expenditure (it excludes government consumption expenditure). Data are from the World Development Indicators and forms an unbalanced panel covering 130 countries over the period 1960-2002. For all countries, this variable is converted to constant 2000 US dollars on a purchasing power parity (PPP) basis.<sup>15</sup>

Our econometric strategy consists of using the log of per capita consumption expenditure ( $C_{it}$ ) as the dependent variable while our independent variable of interest is the predicted probability of a crisis (at various lags) from column-1 of Table-1 (this includes the institutional and macroeconomic variables). We

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<sup>14</sup> An interesting question to ask is to compare the drop in consumption expenditure from crises with the drops during recessions in which no crises occurred. Comparing the behavior of consumption expenditure around crises with its behavior around recessions requires dates for the recessions. While these dates are available for the U.S. from the NBER which dates recessions, similar dates are not available for other countries.

<sup>15</sup> Purchasing power parity conversion factor is the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as a U.S. dollar would buy in the United States. It assumes a constant real exchange rate, which facilitates comparisons across countries and over time.

estimate

$$C_{it} = \delta_1 \hat{p}_{it} + \dots \delta_k \hat{p}_{it-k} + \epsilon_{it} \quad (2)$$

where  $\hat{p}_{it} = \Phi(\mathbf{W}_{it}\gamma)$  from (1)

All lags that were significant and resulted in improvement of model fit are included - in general no lags higher than three years turn out to be significant.

Table-2 presents these results. All estimates are within-estimates and include country-specific fixed effects. These country specific effects should control for unobserved and time-invariant country-specific effects. The first column regresses per capita consumption expenditure on the contemporaneous probability of a crisis as well three lags of this variable. We see that all four of the crisis probability variables significantly reduce per capita consumption expenditure.<sup>16</sup> Our results suggest that on average, the impact of a currency crisis last for at least three years - there is not only an immediate and significant contemporaneous decline in consumption expenditure, but the impact lasts three years into the future. Column-2 adds time fixed effects to column 1 to capture worldwide trends in consumption growth rates as well as common worldwide shocks (e.g., oil and commodity prices). While the magnitude of the effects decline somewhat, nevertheless, they remain strongly significant. In terms of magnitude of the effects, the results in column-2 of Table-2 imply that a one standard deviation increase in the crisis probability reduces contemporaneous per capital consumption expenditure by about 1.4%.

To highlight the disaggregate impact of a crisis on consumer expenditure, we decompose per capita consumption expenditure into a trend and a detrended component using the Hodrick-Prescott filter (Hodrick and Prescott, 1980; 1997). This is a flexible detrending method, widely used in empirical macro research to decompose any time series into a trend and a detrended component (also referred to as the cyclical component). Let's suppose that the original series  $C_{it}$  (per capita consumption expenditure at time  $t$  in country  $i$ ) is composed of a trend component ( $\tau_{it}$ ) and a detrended cyclical component ( $d_{it}$ ). Hodrick and Prescott (1997) suggest a way to isolate  $d_{it}$  from  $c_{it}$  by the following minimization problem: For each country

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<sup>16</sup> We get very similar results if we use a currency event dummy variable instead of the probability of crisis as the independent variables. The advantage of using the predicted probabilities is that some significant exchange rates depreciations that fail to cross the 25% threshold of the Frankel-Rose methodology will be treated at par with a 0% exchange rate depreciation. The predicted probabilities do a better job of capturing such events.

$i$ , choose  $\tau_t$  for  $t = 1, \dots, T$  to minimize

$$\left[ \sum_{t=1}^T (C_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} ((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2 \right] \quad (3)$$

The first term is a measure of the fitness of the time series (which penalizes the cyclical component) while the second term is a measure of smoothness (which penalizes variations in the growth rate of the trend component.) There is a conflict between “goodness of fit” and “smoothness.” To keep track of this problem  $\lambda$  is the “trade-off” parameter. Note that if  $\lambda = 0$ , the trend component becomes equivalent to the original series while as  $\lambda \rightarrow \infty$ , the trend component approaches a linear trend. While Hodrick and Prescott (1980) recommended choosing  $\lambda = 100$  for annual data, a recent paper by Ravn and Uhlig (2002) shows that the smoothing parameter should vary by the fourth power of the frequency observation ratios, so that for annual data a smoothing parameter of 6.25 is recommended.<sup>17</sup> Columns 3 and 4 show how the two decomposed terms are affected by the probability of a crisis. First, we see that in response to a crisis, there is a contemporaneous fall in both the trend and detrended components. However, the impact of the crisis on the detrended component persists for only one more year (probability of crisis lagged one year is significant, while bigger lags are not) while its impact on the trend component lasts 4 years. In other words, a crisis tends to trigger or deepen a cyclical downturn and it induces a break in the trend growth.

## 4.2 Impact of a Crisis on Retail Sales

Next, we examine the impact of a crisis on retail sales. For retail sales, we use data from two sources: one is the OECD database “Main Economic Indicators” which provides data on a volume based retail sales index for 24 countries over the period 1972-2004. The second is the Euro Monitor database that provides data on retail sales in constant US dollars for 34 countries over the period 1999-2003. Neither dataset is comprehensive - the OECD data covers only OECD countries (rich and middle income countries) who have had fewer crisis incidents while the Euro monitor spans only 5 years with 9 crisis events. However, using the predicted probability of the crisis should give us more flexibility and variability rather than a dummy variable for the crisis event. The retail sales index from OECD has a common base year (the year 2000) data. Our dependent variable is the log of this index and we include country fixed effects in all our estimates. Since

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<sup>17</sup> We present results with  $\lambda = 6.25$ . However, our results remain qualitatively unaffected when we tried  $\lambda = 100$  as recommended by Hodrick and Prescott (1997) or  $\lambda = 10$  as recommended by Baxter and King (1999).

this is equivalent to demeaning all the variables in the data, the base value of retail sales for each country is eliminated, making the estimates comparable across countries. Euro Monitor reports retail sales in constant US dollars and we calculated per capita retail sales by simply dividing this variable by population. Data on population is from the World Development Indicators. Figure-4 shows how retail sales index responded in 4 OECD countries (Mexico, Finland, South Korea and Sweden) after a crisis.<sup>18</sup>

The data shows that a crisis event reduces retail sales by 20.5% for the Euro Monitor data and the retail sales index by 5.4% for the OECD data, in the year of the crisis. Since different methodologies are used in the construction of the two retail sales series, we present separate estimates of the impact of the crisis in table 3. The first two columns of table 3 show how the predicted probability of a crisis at various lags affects the retail sales index in the OECD countries. Column 1 uses country fixed effects while column 2 adds time fixed effects as well. Lags higher than 2 years failed to be significant and were dropped for the sake of parsimony. Again, we find a big impact of crisis on retail sales - the impact lasts for at least 3 years and a one standard deviation increase in the probability of a crisis in a particular country reduces the contemporaneous retail index by 2.3%. Therefore, the impact of a crisis on retail sales, while shorter lived, exceeds that on consumer expenditure.

Since we have data for at least 20 years for each of the 24 OECD countries, we again decompose the retail sales index into a trend component and a detrended cyclical component by applying country-specific Hodrick-Prescott filters. The impact of the probability of a crisis on these two sub-components is shown in columns 3 and 4. We see that a crisis event affects both components - the impact on the trend component is only for the crisis year and one year after that while on the detrended component, the predicted probability of a crisis at all lags (0, 1 and 2) are significant. So for OECD countries at least, a crisis has a stronger impact on the cyclical component as compared to the trend component.

Columns 5 and 6 show a similar response of per capita retail sales based on the Euro Monitor data - column 5 uses only country fixed effects while column 6 adds time effects to the country effects.<sup>19</sup> Within each country, a one standard deviation increase in the probability of a crisis reduces per capita retail sales by

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<sup>18</sup> The OECD data does not cover Brazil while the data for Mexico shows only the Tequila crisis of 1994. Finland experienced a crisis in 1974 and 1991.

<sup>19</sup> Since the Euro Monitor data spans only 5 years (1999-2003) decomposition using the Hodrick-Prescott filter is not feasible.

8.1%. This impact is bigger in magnitude than that obtained for retail sales in OECD countries. A potential explanation for this is that the crisis episodes in the Euro Monitor data are confined to developing countries where the retail sector tends to be underdeveloped and where official statistics often fail to comprehensively measure sales in the rural areas or informal sector in urban areas. Therefore our estimates in columns 5 and 6 may tend to overstate the true impact of a crisis, with sales shifting from the formal to the informal sector in the event of a crisis. Retail sales data in OECD countries on the other hand, are much more reliable.<sup>20</sup> A second potential explanation is that many countries such as Bolivia and Indonesia experienced a sharp increase in barter trade following the currency crises. This would entail a bigger impact on retail sales.

### 4.3 Impact of a Crisis on Category Sales

So far we have been estimating the impact of a crisis on broad aggregates such as consumption expenditure or retail sales. Of particular interest to companies, would be the differential impact of a crisis on sales by product category. To examine this, we use volume data on 6 product categories for 49 countries over the period 1995-2004. For this sample of country-years where we have data by product category, we observe 10 crisis events. These categories are Hair Conditioner, Shampoo, Pads, Laundry Detergent, Fabric Enhancers and Diapers. Table-4a shows these results for each product category where we again use the predicted probability of the crisis. All estimates include country and time fixed effects. Our results show that the negative impact of the crisis is most pronounced on Hair Conditioners and Shampoos and the impact lasts approximately three years. For Diapers, Pads and Laundry Detergent the impact of the crisis shows up only in the year of the crisis while the crisis seems to have no significant influence on sales of Fabric Enhancers. In terms of magnitude of impact, a one standard deviation increase in the probability of a crisis reduced sales of Hair Conditioners by 5%, of Shampoos by 2.6%, of Diapers by 3.6%, of Pads by 3.2% and Laundry detergent by 2%.

For category sales, we have slightly more than 200 observations for each country. Therefore, we also present estimates with Zellner's SURE (Seemingly Unrelated Regression Estimates) method. Here we take a system approach and estimate the impact of a crisis on all category sales instead of a category-by-category

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<sup>20</sup> Currency crisis in developing countries tend to put the banking sector under great strain (e.g., Indonesia and Thailand in 1997). This may close off lines of credit to consumers and lead to a bigger impact on consumer spending and retail sales.

approach. Zellner (1962) shows that the regression coefficients obtained by a joint estimation approach are asymptotically more efficient than by the equation-by-equation least squares approach. The gain in efficiency by the joint estimation method as compared to the single equation least squares approach can be quite high if the disturbances in each of the estimates in the columns of table 4a are highly correlated. Table-4b shows that with the SURE method, the impact of the crisis lasts for three years for sales of not only Hair Conditioners and Shampoos, but also for sales of Pads. As before, Diapers and Laundry Detergent exhibit only a contemporaneous effect and there is no effect on the sales of Fabric Enhancers.

The differential impact on category sales suggests why a crisis has a longer impact on consumer expenditure as compared to overall retail sales. Our results suggest a composition affect - that some categories are less affected than others. If firms and managers actively change the product mix in favor of products where the impact of the crisis is the least, then overall retail sales are less likely to be impacted for as long a duration as is consumer expenditure. It should be noted that our estimates of the impact of a crisis on category sales are an average impact across countries. Managers need to be aware that the actual impact in a country could be very different. For instance, there was little impact of a crisis on diaper sales in Sweden whereas the impact of a crisis on diaper sales in Indonesia was dramatic. Unfortunately, the relatively short time-series of observations precludes a more comprehensive examination of the drivers of this variation within category across countries.

Figure-5 summarizes the duration of the impact of a crisis on consumer expenditure, retail sales index from OECD, retail sales from Euro Monitor and diaper sales. Each of the sub-graphs plots the coefficient of the probability of the crisis at various lags as well as the 90% confidence interval, against the number of years elapsed since the crisis event (time 0). Lag  $k$  corresponds to the fact that  $k$  year have passed since the crisis. If zero lies within the 90% interval for a particular lag, then the affect of the crisis at that lag is insignificantly different from zero. So for instance, we see that consumer expenditure is affected contemporaneously and then up to three years after the crisis. Retail sales from the OECD is affected contemporaneously and then up to 2 years after the crisis. Diaper sales are affected only in the year of the crisis (0 lies in the 90% confidence interval for all other years).<sup>21</sup>

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<sup>21</sup> As in table 4a, the crisis affects shampoo and hair conditioner sales for three periods, pads and laundry detergents for one period and has no impact on sales of fabric enhancers.



## 4.4 Robustness Checks

In this subsection, we perform a series of robustness checks to assure ourselves of the validity of our results. In tables 2 and 3, we controlled for all time-invariant country specific variables as well as time-specific variables that pick up world wide booms and recessions. However, it may be plausibly argued that we continue to have an omitted variable problem - an omitted variable is driving both the probability of a crisis and the magnitude of fall in consumption expenditures. In this sub-section we present various robustness checks to address this issue.

### 4.4.1 Controls for per capita GDP and interest rate

To mitigate the potential omitted variable bias, we add two controls that could affect both probability and the impact of a crisis. First, is the real interest rate, defined as the nominal interest rate less inflation. Countries usually respond to a crisis by increasing their interest rates in an attempt to defend the currency peg or to mitigate the ongoing depreciation in the exchange rate. The subsequent rise in the interest rate is likely to deter borrowing for consumption spending. Data on real interest rates are from the International Finance Statistics. Second, is per capita GDP since the onset of a recession may trigger a crisis as well as reduce consumer expenditures and retail sales. Data on per capita GDP is from the World Development Indicators. Table-5 shows that our results are not affected by the additional of these two controls. The coefficients on the predicted probability of a crisis continues to be significant at various lags and the magnitude does not change by much as compared to Table-2. In terms of controls, we find that consumption expenditure is positively related to per capita GDP and negatively related to the real interest rate. Per capita GDP is also a determinant of retail sales for both OECD and Euro Monitor data.

### 4.4.2 Heckman Two Step Estimates

While our results are robust to the inclusion of interest rates and per capita GDP, the omitted variable bias critique can continue to be made. For this purpose, think of a currency crisis as a treatment administered to some countries and not to others. Here, it may be argued that the treatment or currency crisis is not randomly assigned. Countries that are most likely to experience a crisis are also likely to suffer a sharp decline in consumption expenditure and an omitted variable may be driving both the probability of a crisis

and the magnitude of its impact on consumption expenditure.<sup>22</sup> So as a second robustness check, we present the maximum likelihood estimator from Heckman (1978) where the crisis is event is treated as an endogenous dummy variable.<sup>23</sup> We simultaneously estimated by maximum likelihood methods the following two equations - one for consumption expenditure/retail sales and one for the probability of a crisis

$$C_{it} = \mathbf{X}_i\beta + \delta crisis_{it} + \epsilon_{it} \quad (4)$$

$$crisis_{it}^* = \mathbf{W}_i\gamma + u_{it} \quad (5)$$

where  $crisis_{it} = 1$  if  $crisis_{it}^* > 0$ , 0 otherwise

where  $\epsilon$  and  $u$  are assumed to be bivariate normal with covariance  $\rho$  and standard deviation  $\sigma$ . If  $\rho = 0$ , then we do not have an endogeneity problem and  $C_{it}$  can simply be estimated by standard estimation techniques. The coefficient  $\delta$  shows the contemporaneous impact of the crisis on  $C_{it}$ . Table 6 presents these estimates: column 1 shows the results for per capita consumption expenditure, column 2 for the detrended component, column 3 for OECD retail index and column 4 for Euro Monitor retail sales. As before, after controlling for the potential endogeneity of a crisis event, we find that a crisis event exercises a strong contemporaneous effect on consumption expenditure and retail sales (both the index for OECD countries and per capita retail sales from Euro Monitor). The table also reports a the value of  $\lambda = \rho\sigma$  and its standard error. This provides an indirect test of whether endogeneity is a concern due to the correlation between the two error terms. Columns 1-3 show that  $\lambda$  is significantly different from zero for the estimates using consumption expenditure (total and detrended) and the OECD retail sales variables. The positive values of  $\rho$  indicate that an OLS estimate of equation (4) would have yielded estimates of  $\delta$  that are biased away from zero.<sup>24</sup>

The estimating technique in table 6 allows us to model the correlation between the error terms in equations (4) and (5), thereby eliminating any potential omitted-variable bias. However, the trade-off is that we cannot include lags of the crisis event dummy. Implicit in this formulation is the assumption that the crisis

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<sup>22</sup> Note that this is less of a concern when we use the predicted probability of a crisis rather than a dummy variable that captures whether a currency crisis happened or not. The currency crisis dummy would end up proxying for these omitted variables, making it difficult to interpret its estimated coefficient as the effect of that regressor per se, since it also captures part of the effect of the omitted variables.

<sup>23</sup> Note that this is not the Heckman correction for selection bias, where the dependent variable is observed only for a restricted, nonrandom sample. The two-step procedure is a correction for the endogeneity bias arising out of omitted variables.

<sup>24</sup> The positive estimates of  $\rho$  indicate that the unobserved/unmeasured component that positively impact the probability of a crisis also tends to increase per capita expenditure. If consumers are forward-looking then anticipating a crisis (which is usually accompanied by high inflation and devaluation) substitute future consumption with current consumption. This is plausible since inflation and devaluation tends to erode the purchasing power of income over both domestic and foreign goods.

is accompanied immediately by a change in  $C$ , and that the effect is temporary and lasts for exactly one period. Laportea and Windmeijer (2005) argue that in many cases we need to recognize that there is a more flexible response to a particular treatment and its effect may not be constant over time. Our estimates in tables 2 and 3 on the other hand, while open to the endogeneity critique permits a richer specification of the crisis treatment effects and shows that a crisis can have an impact that lasts up to 4 periods.

#### 4.4.3 Lagged Dependent Variables as Regressor

The permanent income hypothesis implies that consumption should evolve over time as a martingale (Hall, 1978). While the literature rejects this contention (see Campbell and Mankiw 1990), it is plausible that per capita consumption expenditure depends on its past values.<sup>25</sup> Therefore, we examine how our estimates are affected when we add lagged values of per capita consumption as regressors. In doing so, the first question we address is the number of lags of the dependent variable to include on the right hand side. GMM estimates suggest that only one lag of the dependent variable should be included. Therefore, we estimate the following dynamic specification:

$$C_{it} = \alpha_1 C_{it-1} + \delta_1 \hat{p}_{it} + \dots \delta_k \hat{p}_{it-k} + (\eta_i + v_{it}); \quad i = 1, 2, \dots, N; \quad t = 2, 4, \dots, T \quad (6)$$

where  $C_{it}$  is per capita consumption in country  $i$  at time  $t$ ;  $C_{it-1}$  is per capita consumption in country  $i$  in the previous two periods;  $\hat{p}_{it-k}$  is the predicted crisis probability at lags  $k$ );  $\eta_i$  is a time invariant country-specific effect possibly correlated with the explanatory variables and  $v_{it}$  is an error term.<sup>26</sup>

In the presence of lagged dependent variables as regressors, the fixed-effects estimator is consistent only in panels where  $T$  is large - the transformed lagged dependent variables are correlated with the transformed error term but this correlation goes to zero as  $T$  gets large. Since  $T = 20$  for the majority of countries when we use per capita consumption, and even lower for the retail sales data, this correlation does not vanish and the fixed-effects estimator is likely to be inconsistent. Therefore, we employ a generalized method of moments (GMM) procedure developed by Arellano and Bond (1991) to generate consistent estimates of the parameters of interest and their asymptotic variance-covariance. Estimation proceeds by first differencing

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<sup>25</sup> Theories of habit-persistence in consumption for example, can also generate such lagged dependence. See Fuhrer (2000).

<sup>26</sup> Measurement error in per capita consumption is a serious concern with the presence of the lagged dependent variables on the right hand side. However, if this error is driven by country-specific characteristics and vary little over time, they will be subsumed within the country specific effect  $\eta_i$ .

the data - this eliminates the country-specific effects  $\eta_i$  from the model - and instrumenting the lagged dependent variable by appropriately lagged levels of  $C_{it}$ . We can use the following moment conditions:

$$E [C_{it-s}\Delta v_{it}] = 0 \text{ for } s \geq 2; t = 3, 4, \dots, T$$

The GMM estimator is consistent provided the error term  $v_{it}$  is not serially correlated and provided the lagged values of the explanatory variables are valid instruments. We perform two specification tests suggested by Arellano and Bond (1991). The first examines serial correlation in the error term. It tests whether the differenced error term (the residuals from the regression in differences) is first- and second-order serially correlated. First order serial correlation of the differenced error term is expected even if the original error term (in levels) is uncorrelated, unless the latter follows a random walk. Second-order serial correlation of the differenced residual indicates that the original error term is serially correlated, which means that the moment conditions are invalid. On the other hand, if the test fails to reject the null hypothesis of no second-order serial correlation, we conclude that the original error term is serially uncorrelated and the moment conditions are well specified. The second specification test is a Hansen test of over-identifying restrictions, which tests the null hypothesis of overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. Failure to reject this null hypothesis gives support to the validity of instruments.  $p$ -values for these tests are reported in the last three rows of table 7. Finally, to control for heteroskedasticity we report results using the two-step GMM estimator and employ the finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005).

Table-7 presents the GMM-difference estimates for per capita consumption expenditure (aggregate and detrended), retail sales index from OECD (aggregate and detrended) and per capita retail sales from Euro Monitor. First, the lagged dependent variable in each column is strongly significant and has a coefficient close to 1 (except for the detrended variables.) In column 1, we see that the predicted probability of a crisis at time of crisis and lagged 2 and 3 years respectively, negatively affect per capita consumption expenditure. The probability of a crisis at lag 1 is no longer significant - this is not surprising since the lagged dependent variable ( $C_{it-1}$ ) is positively correlated with  $C_{it}$  and negatively correlated with  $\hat{p}_{it-1}$ .<sup>27</sup> Column 2 uses the detrended component of per capita consumption and shows that the crisis probability only at lag 0 is significant once

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<sup>27</sup> In other words, omission of the lagged dependent variable in table 3 led to a downward bias in the estimate for  $\hat{p}_{it-1}$ .

we include the lagged dependent variable as a regressor, However, the magnitude of the coefficient is higher as compared to table 2. Columns 3 and 4 show that the OECD retail sales index (aggregate and detrended), is affected contemporaneously as well as one year after the crisis. For the countries in the Euro Monitor data, we find that the crisis probability is significant at lags 0 and 1 and only marginally significant at lag 2 ( $p - value = 0.101$ .) Finally, the last few rows in Table-7 show that our results are supported by the specification tests - our instruments are valid and there is no evidence for serial correlation in  $v_{it}$ .

#### 4.4.4 Managerial Implications

Our conversations with managers reveal that most firms have a catalog of the consequences of a crisis on their businesses. What has been lacking is an understanding of the key patterns that emerge from a comprehensive examination of the impact of a crisis across countries and over time. Our results help set out some of the key stylized facts on the impact of a crisis. Our results show that the impact of a crisis varies systematically across economic and business indicators. Aggregate consumer expenditures show the smallest impact of a crisis. Retail expenditures which track expenditures at a more disaggregate level show a much higher impact of a crisis. Importantly, the duration of the impact is in the opposite direction. Retail expenditures recover faster from a crisis relative to aggregate consumer expenditures. This suggests that aggregate consumer expenditures which are a combination of consumer and business expenditures in a country are more sticky in their response to a crisis. Managers should avoid over-reacting to a crisis since their business indicators recover faster following a crisis and the longer term impacts may be muted. Moving to product categories, our results formalize what has been known anecdotally that product categories that are more essentials type suffer less from a crisis whereas non-essentials are more severely impacted.

Delving deeper into the impact of a crisis, our results show that a crisis impacts both the trend component as well as the cyclical component of expenditures. Managers need to internalize that the impact of a crisis has a short-term and long-term component. Managers typically recognize the former immediately but our results show that they need to absorb the impact of a crisis on the trend component of consumption as well. A trend break clearly has longer term implications in terms of planning production, managing inventories and adjusting pricing and advertising expenditures. Finally, our results highlight some important differences in the impact of a crisis on developed and developing economies. The impact of a crisis in developing countries

on retail sales is nearly four times that in developed countries. Moreover, a crisis in a developed economy has a stronger impact on the cyclical component of retail sales. In contrast, a crisis in a developing economy is likely to impact both the trend and cyclical components. Managers in developed economies should be mindful of the impact of a crisis on the cyclical component of their business which will deepen a cyclical downturn. In developing countries on the other hand, managers need to plan for a slower rate of trend growth in the post-crisis period.

## 5 Recovery from a Crisis

We now turn our attention to understanding the speed of recovery of per capita consumer expenditure after a crisis and what drives the variation in recovery across economies. Prior literature has mainly focused on the causes of a crisis and very few papers have looked more directly at the post-crisis adjustment, especially of consumption expenditure. Bordo et al. (2000) examine the variation in the recovery process over time (between the pre-1973 and the post-1973 periods) but do not examine the variation between countries. Hong and Tornell (2005) examine recovery from a crisis across countries but focus only on GDP growth rates.

Our methodology is closely related to that of Hong and Tornell (2005) and Eichengreen et al., 1995. As a first step, we provide an overview of the recovery process, by computing the sample means of the growth of per capita consumption expenditure for the crisis year ( $t_C$ ) and each of the three following years ( $t+1, t+2, t+3$ ). We compare these growth rates to that in the tranquil period. We define the tranquil period as all years exclusive of the crisis year and the 3 years before and after the crisis. Further, countries that have never been under a speculative attack during the sample period may be inherently different from the rest as discussed in the previous section. In order to prevent the bias that this might cause, we exclude from the sample those economies with no crisis experience. These countries will also be automatically excluded when we present regression results for recovery from a crisis since by definition they would have never experienced one. The tranquil period comprises the control group for purposes of comparison.

Table-8 reports the sample means and performs a  $t$ -test comparing the average growth of per capita expenditure for the tranquil period to the annual growth rate in the crisis period, and one, two and three years after the crisis. A star signifies that the growth rate differs significantly from that in tranquil period

at the 5% level of significance. For per capita consumption expenditure, we see that the biggest impact is in the period of the crisis and one year after that. While the year on year change in per capita consumption expenditure remains negative two years after the crisis, it is no longer significantly different from that in the tranquil period. In the third year after the crisis, the growth rate becomes positive (per capita consumption expenditure starts increasing again) and is in fact, higher than that of average growth rate of consumption in the tranquil period. This suggests that recovery takes on average 3 years. For per capita retail sales, we see that the biggest impact is in the year of the crisis. One year later, growth rebounds and there is no significant difference in growth rates thereafter when compared to the tranquil period.

Next, we go beyond simple summary statistics and *t*-tests and examine why recovery from a crisis varies across economies. We operationalize recovery from the crisis in terms of the percentage change in the variable of interest (consumption expenditure, retail sales etc.) in the post-crisis period. Such an analysis, of course, will be restricted to countries that actually experienced one or more crises. While we have a total of 348 crisis events, for per capita consumption expenditures, missing data in the explanatory variables restricts our sample to 300 crisis episodes. For retail and category sales, the number of crisis episodes is significantly smaller - we have only 6 crisis events for the OECD data, 9 crisis events for the Euro Monitor retail sales and only 10 for the category sales data. The small number of crisis episodes in the retail and category sales databases imply that we do not have sufficient observations to run any meaningful regressions. Therefore we restrict our regression estimates to per capita consumption expenditure. We calculate the growth rate in per capita consumption expenditure one, two and three years after the crisis event, treating the year of the crisis as the base period to calculate these growth rates.

## 5.1 Estimating the Recovery From a Crisis

The conceptual framework in Figure-6 highlights our model for recovery of consumer expenditures following a crisis. We use three sets of variables that are potential determinants of the speed of recovery: institutional variables prior to the crisis; macroeconomic variables in the post-crisis period - these can be thought of as policy responses to mitigate the impact of the crisis; and initial conditions measured as the impact on per capita consumption expenditure in the year of the crisis.

### 5.1.1 Pre-Crisis Institutional Variables

For institutional variables, we include the political constraints variable used earlier to predict the probability of a crisis. While it may be argued that greater constraints on executive decision-making makes policymakers less flexible in terms of changing policies and reacting to a currency crisis, Dutt and Mobarak (2007) show that greater separation of powers and participation by a larger number of political actors reduces not just the probability of bad policies but also the likelihood that bad policies will be persisted with. In other words, these countries are likely to be the ones that quickly and effectively mitigate the impact of a crisis and engender a recovery. Second, currency crisis have an element of self-fulfilling prophecy to it. In countries with more robust political institutions, policymakers response to a crisis is likely to be more credible and may be instrumental in shifting expectations about the recovery. Third, since countries with better institutions experience faster long-run growth rates (see Acemoglu, Johnson and Robinson, 2001), forward-looking consumers are likely to be more optimistic about the future prospects of the economy and consumption expenditure is likely to recover and return quickly to its original steady state growth rate. Since, a crisis may itself trigger a change in political institutions, we use this measure for the pre-crisis period. We also include the legal origin measure that we used earlier to examine if common law countries tend to recover faster from a crisis.

### 5.1.2 Contemporaneous Macroeconomic Variables

The pace and magnitude of recovery is also likely to be determined by how key macroeconomic variables evolve in the post-crisis period. First, if foreign exchange reserves recover quickly in the post-crisis period, pressure on the exchange rate will ease facilitating a quick return of consumption to its original steady state path. So we include a contemporaneous measure of foreign exchange reserves measured in months of imports. Countries with a current account surplus are likely to rebuild foreign exchange reserves and recover faster. So we include contemporaneous values of the current account as a fraction of GDP. A popular claim regarding post-crisis growth is that the export sector plays a key role. Mexico's fast recovery from the Tequila crisis in 1994, vis-a'-vis Latin America's lost decade following the debt crisis in the early 1980s, is often attributed to the sharp increase in the country's exports to the U.S. Asia's recent recovery and the region's traditionally high export share also seem to be consistent with this view. Hong and Tornell (2005) argue that a high



export share of GDP also may contribute to greater foreign liquidity acquired through exports, thereby stabilizing the foreign exchange market. So we include contemporaneous values of exports as a fraction of GDP in the post-crisis period.

Very often currency crises are preceded by expansionary fiscal policies and by booms in lending and credit. The Latin American debt crisis for instance was triggered by expansionary fiscal policies that were monetized or paid for with international borrowing. The IMF's standard recipe (rightly or wrongly,) following a crisis is a requirement that fiscal deficits be reined in. To capture this, we include contemporaneous values of governments fiscal balance (the excess of government revenues over government expenditures) as a proportion of GDP. Next, where credit expand at an abnormally high rate, the possibility of bad lending and over-investment increases, gradually weakening the financial sector's balance sheets. Corsetti et al, 2001 and Perry and Lederman (1999) concluded that one of the key drivers behind the Asian currency crisis was the high incidence of leverage and high rates of investment in the pre-crisis period. However, investment/lending booms can affect not only the likelihood of a crisis, but also the pace of post-crisis growth. To the extent that a lending boom increases inefficiency in investment decisions and the debt burden of the corporate sector, persistent growth in credit may result in more nonperforming loans and a postponement of recovery. So we include measures of growth in domestic credit to capture this effect.<sup>28</sup>

### 5.1.3 Initial Conditions

Finally, we need to control for the magnitude of impact of a crisis on consumption expenditure. First, countries that experience a steep and sharp fall in per capita consumption expenditure, may exhibit faster recovery in consumption expenditures in the post-crisis period. Second, countries with low per capita consumption expenditure, by definition will exhibit a greater percentage increase in consumption in the post-crisis period. In other words, we need to condition the recovery on the initial magnitude of the impact of the crisis, as well as the level of consumption in the base period (the year of the crisis). We do this by including as two regressors, the magnitude of the impact of the crisis (termed impact) and per capita consumption in the year of the crisis (termed initial per capita consumption expenditure). The former is measured as the percentage change in per capita consumption expenditure between the year prior to the

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<sup>28</sup> We also experimented with current account balance, inflation, and real interest rates in the post-crisis period. None of these were significant.

crisis and the year of the crisis and is always negative since per capita expenditure falls in the year of the crisis.

## 5.2 Results

Table-9 shows the OLS estimates of recovery of consumption following a crisis. Our data spans 300 crisis episodes in 94 countries (in the specification without the macro variables.) The first three columns exclude the post-crisis macro variables, while columns 4-6 adds the macroeconomic variables. In column 1, the dependent variable is the growth of per capita consumption expenditure one year after the crisis period (between  $t_C$  and  $t_{C+1}$ ); in column 2 it is the growth between the year of the crisis and two years after the crisis (between  $t_C$  and  $t_{C+2}$ ); and in column 3 it is the growth in per capita consumption 3 years after the crisis (between  $t_C$  and  $t_{C+3}$ ). The first three columns, show that recovery over all three time horizons is strongly impacted by both initial conditions and the pre-crisis institutional variables. Controlling for the initial impact of the crisis, the magnitude of recovery is bigger in countries with greater political constraints on executive decision making. Legal origin does not seem to play a role in recovery with the coefficient on the common law dummy insignificant across all columns. Column 1 also shows that countries that experience a more severe crisis (in terms of impact) recover faster one year after the crisis. The magnitude of the impact is insignificant in the subsequent years.

Columns 4-6 show that the influence of political constraints is robust to the inclusion of the post-crisis macroeconomic variables. Political constraints continues to be a significant predictor of post-crisis consumption growth while the common law dummy remains insignificant in facilitating recovery. In terms of the macroeconomic variables, reining in growth of credit and building up of the depleted foreign exchange reserves play an important role in facilitating recovery. Share of exports in GDP is significant in facilitating recovery three periods after the crisis while positive fiscal balances only has a small impact on recovery. Once we add the macroeconomic variables, the magnitude of the impact does not play a role in the recovery.

## 5.3 Managerial Implications

The results above highlight several important aspects of the recovery in consumer expenditures following a crisis. First, these results further reinforce the need for managers to include institutional variables in their

dash-board of indicators for assessing the prospects of economies (beyond the traditional macroeconomic indicators). Countries with greater constraints on executive decision making (i.e., countries with more checks and balances or greater separation of powers) recover faster following a crisis. We find for instance, that consumption expenditure in Malaysia, which has greater political constraints, grew by 5.2% a year after the crisis, while in Indonesia it grew by only 1.7%. Second, managers whose business results are severely impacted immediately should also be aware that their results are also likely to recover faster. Our estimates in column 1 of table 9, imply that countries with a 10% fall in consumer expenditure in the crisis year will grow at the rate of 2% one year after the crisis, while those that experienced a 20% drop will grow at the rate of 4%. Over-reacting by cutting costs severely can backfire since it will limit their ability to respond to the rebound. Third, countries with relatively low levels of consumer expenditures to begin with, will exhibit a faster recovery process following a crisis. Fourth, managers need to track domestic credit growth because countries that rein in credit growth tend to recover faster.

## 6 Summary

The amount of attention focused on developing economies in recent times is unparalleled and the expectation is that this will only increase further in the future. Yet, the reality of developing economies is much higher levels of economic volatility relative to developed economies. Managing the business risks of economic volatility in developing economies is therefore one of the key challenges for firms in these markets. Managers have little control on the likelihood of these events and this further heightens the need for development of a grounded framework for decision making in these circumstances. We see this research as a beginning in the development of a comprehensive understanding of the phenomenon and its implications for managerial action. Our results help identify a series of stylized descriptive facts about (i) the determinants of a currency crisis, (ii) its impact on consumer behaviors and business indicators, (iii) the variations in impact across countries as well as indicators, and (iv) recovery path of these indicators post-crisis. We have highlighted the key findings of these analysis in the introduction and their managerial implications in sections 3, 4, and 5 and do not repeat them here in the interests of brevity. It is our hope that these findings serve as an impetus for a more vigorous research effort that solidifies our understanding of the idiosyncrasies of

developing economies and its implications for business decisions. As noted by several researchers (Winer 1998, Dekimpe and Lehmann 2004, Burgess and Steenkamp 2006), there is a striking disconnect between the attention devoted by firms to developing economies and attention devoted by academia to developing economies. We hope that this paper serves a role in heightening the interest of academics to the richness of problems in these countries.

## **6.1 Limitations and Future Research**

As with any research effort, there are several limitations to this paper that suggest fruitful directions for future research. From a data perspective, at the disaggregate level we had data for six product categories across for 49 countries across 1995-2004. The role of these categories varies across countries. For instance, diapers are an essential in developed economies but are discretionary in many of the developing economies. These differences translate into the penetration of these categories across countries. Additional data on penetration, category characteristics and prices could enable testing of refined hypotheses of the impact of crises on consumer behaviors across categories and countries and highlight the causal mechanisms that underpin these effects and moderators thereof. Combining this with income covariates would permit assessment of the impact of crisis on re-allocation of consumer expenditures, shifts in consumer demand and changes in income elasticities. Elaboration of the data to encompass a broader set of consumer goods, durables and services would also be very beneficial. From a broader perspective, economic and business indicators post crisis aggregate firm-level responses to the events as well as consumer responses. Disentangling these effects through the use of controls and instruments would be extremely useful as well. Finally, much of the work on crisis follows a bottom-down approach in the sense that the focus is on understanding the impact of a crisis on metrics such as GDP/capita or consumer expenditures. It would be very interesting to build a bottom-up theory that starts with an understanding of consumer behavior and related micro-forces and then highlight their impact on economic crisis and firm behaviors.

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Table 1: Probit Estimates of a Currency Crisis<sup>+</sup>

	All countries	Developing countries	Developing countries
<i>Political constraints</i>	-0.722*** (0.195)	-0.366* (0.202)	-0.037 (0.277)
<i>Common law dummy</i>	-0.438*** (0.150)	-0.431** (0.189)	-0.579*** (0.194)
<i>Fiscal balance/GDP</i>	-0.024*** (0.009)	-0.024** (0.010)	-0.024** (0.009)
<i>Domestic credit growth</i>	0.009*** (0.003)	0.010*** (0.004)	0.010** (0.004)
<i>Reserves/imports</i>	-0.083** (0.034)	-0.123*** (0.043)	-0.116*** (0.043)
<i>Current account/GDP</i>	0.015 (0.017)	0.023 (0.021)	0.028 (0.021)
<i>Overvaluation of exchange rate</i>	0.003*** (0.001)	0.001 (0.001)	0.000 (0.001)
<i>Growth rate of GDP per capita</i>	-0.066*** (0.021)	-0.058*** (0.022)	-0.057** (0.024)
<i>Debt/GDP</i>			0.015 (0.020)
<i>Foreign direct investment/GDP</i>			-0.015 (0.022)
<i>Public debt/Total debt</i>			0.033 (0.029)
<i>Short-term debt/Total debt</i>			-0.027** (0.011)
<i>Concessional debt/Total debt</i>			0.006 (0.007)
<i>Multilateral debt/Total debt</i>			-0.013* (0.007)
<i>Variable rate debt/Total debt</i>			0.002 (0.009)
<i>Commercial Debt/Total debt</i>			0.029 (0.028)
<i>Constant</i>	-0.826*** (0.172)	-0.611*** (0.228)	-3.481 (3.072)
<i>Observations</i>	1337	658	658
<i>Number of countries</i>	82	55	55
<i>Overall model test</i>	65.53***	35.03***	93.31***
<i>Macro effects = 0; <math>\chi^2(6)</math></i>	37.9***	26.62***	25.15***
<i>Institution effects = 0; <math>\chi^2(2)</math></i>	24.83***	10.62***	9.08**
<i>Debt effects = 0; <math>\chi^2(8)</math></i>			14.23*
<i>McFadden Pseudo R<sup>2</sup></i>	0.17	0.15	0.19

Standard errors adjusted for clustering on country; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

+A “currency crisis” is defined as a nominal depreciation of the currency of at least 25 per cent that is also at least a 10 per cent increase in the rate of depreciation. We exclude crashes which occurred within three years of each other to avoid counting the same crash twice. All regressors are lagged by one year.



Table 2: Impact of Currency Crisis on Per Capita Consumption Expenditure<sup>+</sup>

	per capita consumption expenditure	per capita consumption expenditure	per capita consumption expenditure (trend component)	per capita consumption expenditure (detrended component)
<i>Probability of a crisis (t)</i>	-0.207*** (0.057)	-0.126*** (0.045)	-0.134** (0.055)	-0.075*** (0.013)
<i>Probability of a crisis (t – 1)</i>	-0.138** (0.059)	-0.110** (0.046)	-0.105* (0.057)	-0.030** (0.013)
<i>Probability of a crisis (t – 2)</i>	-0.107* (0.059)	-0.080* (0.046)	-0.106* (0.057)	0.001 (0.013)
<i>Probability of a crisis (t – 3)</i>	-0.200*** (0.054)	-0.159*** (0.042)	-0.213*** (0.052)	0.015 (0.012)
<i>Constant</i>	7.703*** (0.007)	7.355*** (0.055)	7.696*** (0.007)	-0.002 (0.016)
<i>Observations</i>	1386	1386	1386	1386
<i>Number of countries</i>	73	73	73	73
<i>R-squared (within)</i>	0.06	0.45	0.48	0.07
<i>Country fixed effects</i>	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	No	Yes	Yes	Yes
<i>Overall model test</i>	21.72***	33.32***	36.76***	2.95***

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). In columns 3 and 4, per capita consumption expenditure is detrended with a country-by-country Hodrick Prescott filter. All columns include country specific fixed effects. Columns 2-4 also include year fixed effects.

Table 3: Impact of Currency Crisis on Per Capita Retail Sales<sup>+</sup>

	OECD data	OECD data	OECD data (trend component)	OECD data (detrended component)	Euro Monitor data	Euro Monitor data
<i>Probability of a crisis (t)</i>	-0.800** (0.388)	-0.747*** (0.288)	-0.670*** (0.220)	-0.079* (0.047)	-1.336*** (0.275)	-1.390*** (0.286)
<i>Probability of a crisis (t – 1)</i>	-0.741* (0.398)	-0.751*** (0.228)	-0.427* (0.227)	-0.319*** (0.049)	-0.782*** (0.246)	-0.739*** (0.257)
<i>Probability of a crisis (t – 2)</i>	-0.555 (0.390)	-0.335* (0.192)	-0.210 (0.223)	-0.119** (0.048)	-0.443* (0.258)	-0.484* (0.269)
<i>Constant</i>	4.468*** (0.020)	4.180*** (0.078)	4.175*** (0.047)	0.017*** (0.002)	7.981*** (0.018)	7.996*** (0.025)
<i>Observations</i>	476	476	476	476	144	144
<i>Number of countries</i>	24	24	24	24	33	33
<i>R-squared (within)</i>	0.03	0.81	0.72	0.28	0.14	0.30
<i>Country fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	No	Yes	Yes	Yes	No	Yes
<i>Overall model test</i>	5.11***	22.84***	32.69***	24.35***	15.02***	6.46***

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). All columns include country fixed effects; Columns 2 and 4 also include year fixed effects.

Table 4a: Impact of Currency Crisis on Category Sales<sup>+</sup>

	Hair Conditioner	Shampoo	Diapers	Pads	Laundry Detergent	Fabric Enhancers
<i>Probability of a crisis</i> <i>(t)</i>	-1.065*** (0.318)	-0.513*** (0.171)	-0.691** (0.308)	-0.667*** (0.223)	-0.483*** (0.146)	-0.426 (0.442)
<i>Probability of a crisis</i> <i>(t - 1)</i>	-0.322 (0.253)	-0.184 (0.187)	0.016 (0.339)	-0.266 (0.217)	0.002 (0.160)	0.040 (0.376)
<i>Probability of a crisis</i> <i>(t - 2)</i>	-0.584*** (0.222)	-0.453*** (0.121)	-0.406 (0.257)	-0.153 (0.191)	-0.151 (0.125)	-0.344 (0.254)
<i>Constant</i>	8.061*** (0.038)	9.156*** (0.019)	8.505*** (0.056)	8.092*** (0.026)	10.079*** (0.027)	7.311*** (0.062)
<i>Observations</i>	225	233	258	258	258	235
<i>Number of countries</i>	31	33	33	33	31	31
<i>R-squared</i>	0.67	0.53	0.48	0.10	0.48	0.47
<i>Overall model test</i>	26.05***	14.94***	15.23***	3.21***	14.31***	26.05***

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). All columns include country specific and time fixed effects.

Table 4b: Impact of Currency Crisis on Category Sales:  
Seemingly Unrelated Regression Estimates<sup>+</sup>

	Hair Conditioners	Pads	Shampoo	Diapers	Laundry Detergent	Fabric Enhancers
<i>Probability of a crisis</i> <i>(t)</i>	-0.938*** (0.319)	-0.704*** (0.177)	-0.476*** (0.165)	-0.684* (0.390)	-0.408** (0.163)	-0.517 (0.590)
<i>Probability of a crisis</i> <i>(t - 1)</i>	-0.285 (0.346)	0.081 (0.192)	-0.125 (0.179)	0.317 (0.424)	-0.141 (0.177)	0.171 (0.641)
<i>Probability of a crisis</i> <i>(t - 2)</i>	-0.778*** (0.253)	-0.355** (0.140)	-0.436*** (0.131)	-0.262 (0.310)	-0.007 (0.129)	-0.402 (0.469)
<i>Constant</i>	8.964*** (0.044)	7.662*** (0.024)	9.077*** (0.023)	9.086*** (0.054)	9.557*** (0.022)	7.420*** (0.081)
<i>Observations</i>	216	216	216	216	216	216

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). All columns include country specific and time fixed effects.

Table 5: Impact of Currency Crisis With Controls<sup>+</sup>

	per capita consumption expenditure	per capita consumption expenditure (detrended component)	OECD retail sales data	OECD retail sales data (detrended component)	Euro Monitor retail sales data
<i>Probability of a crisis (t)</i>	-0.221*** (0.046)	-0.077*** (0.022)	-0.369** (0.179)	-0.205** (0.098)	-1.364*** (0.368)
<i>Probability of a crisis (t – 1)</i>	-0.171*** (0.046)	-0.069*** (0.022)	-0.465** (0.210)	-0.421*** (0.101)	-0.760** (0.344)
<i>Probability of a crisis (t – 2)</i>	-0.090* (0.046)	-0.016 (0.022)	-0.223 (0.190)	-0.236** (0.101)	-0.458 (0.369)
<i>Probability of a crisis (t – 3)</i>	-0.157*** (0.041)	-0.010 (0.019)			
<i>Interest rate</i>	-0.002*** (0.000)	-0.0002 (0.0002)	0.001 (0.002)	-0.000 (0.001)	-0.003 (0.004)
<i>Per capita GDP</i>	0.037*** (0.002)	0.005*** (0.001)	0.035*** (0.004)	0.006*** (0.001)	0.058** (0.026)
<i>Constant</i>	7.319*** (0.056)	-0.003 (0.026)	3.791*** (0.116)	-0.144*** (0.038)	7.061*** (0.348)
<i>Observations</i>	1196	1196	419	419	94
<i>Number of countries</i>	71	71	22	22	24
<i>R-squared (within)</i>	0.62	0.12	0.87	0.31	0.39
<i>Country fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Overall model test</i>	53.37***	4.25***	32.19***	4.73***	4.28***

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). In column 2, per capita consumption expenditure is detrended with a country-by-country Hodrick Prescott filter. All columns include country specific and time fixed effects. GDP per capita is in PPP constant 2000 international dollars.

Table 6: Heckman Two-Step Estimate of Currency Crisis and Its Impact on Consumer Expenditure and Retail Sales

<b>Impact of a Crisis</b>	per capita consumption expenditure	per capita consumption expenditure (detrended)	Retail sales (OECD)	Retail Sales (Euro Monitor)
<i>crisis event (<math>\delta</math>)</i>	-4.167*** (0.484)	-0.054*** (0.020)	-0.383* (0.211)	-1.064** (0.497)
<b>Probability of a Crisis</b>				
<i>political constraints</i>	-0.714*** (0.205)	-0.714*** (0.205)	-1.994* (1.191)	1.329 (1.671)
<i>legal origin</i>	-0.444*** (0.148)	-0.444*** (0.148)	-0.673 (0.529)	-0.730 (0.588)
<i>govt. budget</i>	-0.020** (0.010)	-0.020** (0.010)	0.024 (0.108)	0.013 (0.045)
<i>growth of domestic credit</i>	0.009*** (0.002)	0.009*** (0.002)	-5.871 (3.777)	0.009 (0.013)
<i>reserves/imports</i>	-0.084*** (0.029)	-0.084*** (0.029)	0.099 (0.079)	-0.194 (0.146)
<i>current account</i>	0.015 (0.010)	0.015 (0.010)	0.012 (0.011)	0.022 (0.051)
<i>overvaluation of exchange rate</i>	0.003*** (0.001)	0.003*** (0.001)	0.038 (0.054)	0.018* (0.009)
<i>growth rate of GDP</i>	-0.065*** (0.012)	-0.065*** (0.012)	0.014** (0.007)	-0.142** (0.067)
$\lambda = \rho\sigma$	1.872*** (0.239)	0.027*** (0.010)	0.173* (0.095)	0.278 (0.269)
<i>Observations</i>	1286	1286	482	135
<i>Overall Model test</i>	74.0***	7.2***	3.29*	4.59**

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Both equations contain a constant term (not reported). In column 2, per capita consumption expenditure is detrended with a country-by-country Hodrick Prescott filter.

$\lambda = \rho\sigma = 0$  provides a test whether the covariance of the error terms in the 2 equations is zero.

Table 7: Impact of Currency Crisis Lagged Dependent Variable:  
Arellano-Bond GMM Estimator<sup>+</sup>

	per capita consumption expenditure	per capita consumption expenditure (detrended component)	OECD retail sales index	OECD retail sales data (detrended component)	Euro Monitor per capita retail sales data
<i>Lagged dependent variable</i>	0.829*** (0.077)	0.309** (0.119)	0.970*** (0.057)	0.665*** (0.089)	0.966*** (0.063)
<i>Probability of a crisis (t)</i>	-0.426*** (0.119)	-0.452*** (0.096)	-1.220*** (0.223)	-1.029*** (0.219)	-0.699** (0.310)
<i>Probability of a crisis (t – 1)</i>	0.161 (0.213)	-0.049 (0.127)	-0.347* (0.195)	-0.365* (0.201)	-0.375** (0.141)
<i>Probability of a crisis (t – 2)</i>	-0.194** (0.083)	-0.064 (0.060)	-0.056 (0.277)	0.048 (0.192)	-0.103 (0.061)
<i>Probability of a crisis (t – 3)</i>	-0.154** (0.073)	-0.075 (0.056)			
<i>Observations</i>	1293	1293	437	437	82
<i>Number of countries</i>	73	73	22	22	28
<i>Joint significance test</i>	52.38***	4.53***	90.9***	55.55***	35.02***
Specification tests:(p-values)					
<i>OID test</i>	0.999	1.0	1.0	1.0	0.557
<i>Serial correlation: AR(1) test</i>	0.008	0.069	0.003	0.023	0.261
<i>Serial correlation: AR(2) test</i>	0.642	0.726	0.22	0.113	0.754

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

+Probability of a crisis is the predicted probability of a crisis from table 1, column 1 (uses only macroeconomic and institutional variables). In column 2, per capita consumption expenditure is detrended with a country-by-country Hodrick Prescott filter. All variables are in first-differences which removes all country-specific effects.

Table 8: Recovery from a Currency Crisis

	<i>Tranquil period</i>	$t_C$	$t_C + 1$	$t_C + 2$	$t_C + 3$
Growth of per capita consumption expenditure	1.14%	-1.78%*	-1.53%*	-0.5%	2.7%
Growth of per capita retail sales	1.8%	-2.8%*	1.17%	-0.42%	0.3%

All growth rates are in annual terms.  $t_C$  is the year of the crisis. We do a t-test in the table where \* indicates that growth rate in that period is significantly different (at the 5% level) from the growth rate in the tranquil period.

Table 9: Recovery of Consumer Expenditure From Crisis

	(1)	(2)	(3)	(4)	(5)	(6)
	Growth of per capita consumer expenditure ( $t_c, t_{c+1}$ )	Growth of per capita consumer expenditure ( $t_c, t_{c+2}$ )	Growth of per capita consumer expenditure ( $t_c, t_{c+3}$ )	Growth of per capita consumer expenditure ( $t_c, t_{c+1}$ )	Growth of per capita consumer expenditure ( $t_c, t_{c+2}$ )	Growth of per capita consumer expenditure ( $t_c, t_{c+3}$ )
<b>Pre Crisis Institutional Variables</b>						
<i>Political Constraints</i> ( $t_c - 1$ )	0.118** (0.054)	0.090*** (0.029)	0.077*** (0.022)	0.055* (0.033)	0.049* (0.028)	0.034** (0.016)
<i>Common law</i> ( $t_c - 1$ )	-0.014 (0.023)	-0.012 (0.016)	-0.009 (0.012)	-0.025 (0.019)	-0.008 (0.020)	-0.012 (0.013)
<b>Post Crisis Macro Variables</b>						
<i>Reserves/imports</i> (contemporaneous)				0.175 (0.290)	0.285 (0.243)	0.270** (0.131)
<i>Exports/GDP</i> (contemporaneous)				-0.019 (0.046)	0.015 (0.036)	0.045** (0.022)
<i>Fiscal balance/GDP</i> (contemporaneous)				0.001 (0.001)	0.001* (0.001)	0.0003 (0.0002)
<i>Domestic credit growth</i> (contemporaneous)				-0.026*** (0.009)	-0.019** (0.009)	-0.004 (0.005)
<b>Initial Conditions</b>						
<i>Impact of crisis</i> ( $t_c$ )	-0.202*** (0.046)	-0.142 (0.087)	-0.101 (0.064)	0.027 (0.043)	-0.004 (0.054)	-0.024 (0.031)
<i>Per capita consumer exp.</i> ( $t_c$ )	-0.021** (0.010)	-0.012** (0.006)	-0.014*** (0.005)	-0.010 (0.007)	-0.004 (0.005)	-0.009** (0.004)
<i>Constant</i>	0.111* (0.064)	0.062 (0.042)	0.080** (0.036)	0.075 (0.048)	0.011 (0.044)	0.038 (0.029)
<i>Number of crisis episodes</i>	300	293	289	147	148	153
<i>Number of countries</i>	94	94	94	64	64	64
<i>R-squared</i>	0.08	0.10	0.10	0.09	0.07	0.08
<i>Overall Model test</i>	6.57***	3.02**	4.13***	1.76*	2.27**	2.21**

Robust standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%  
Impact of crisis is measured as the percentage change in per capita expenditure between ( $t_{c-1}$ ) and ( $t_c$ )



Figure 1: Number of Currency Crisis per Year

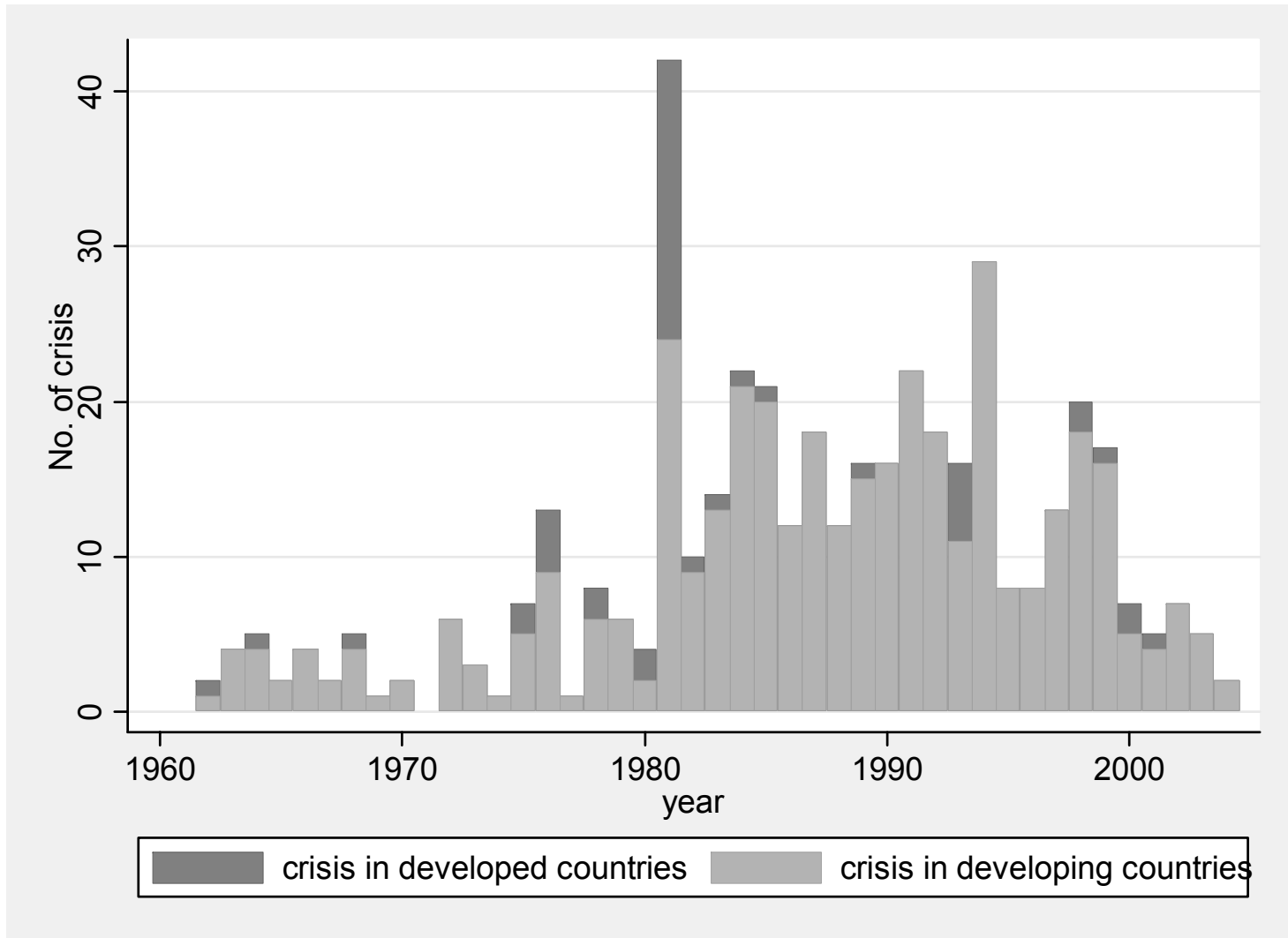


Figure 2: Conceptual Framework for Likelihood of Crisis

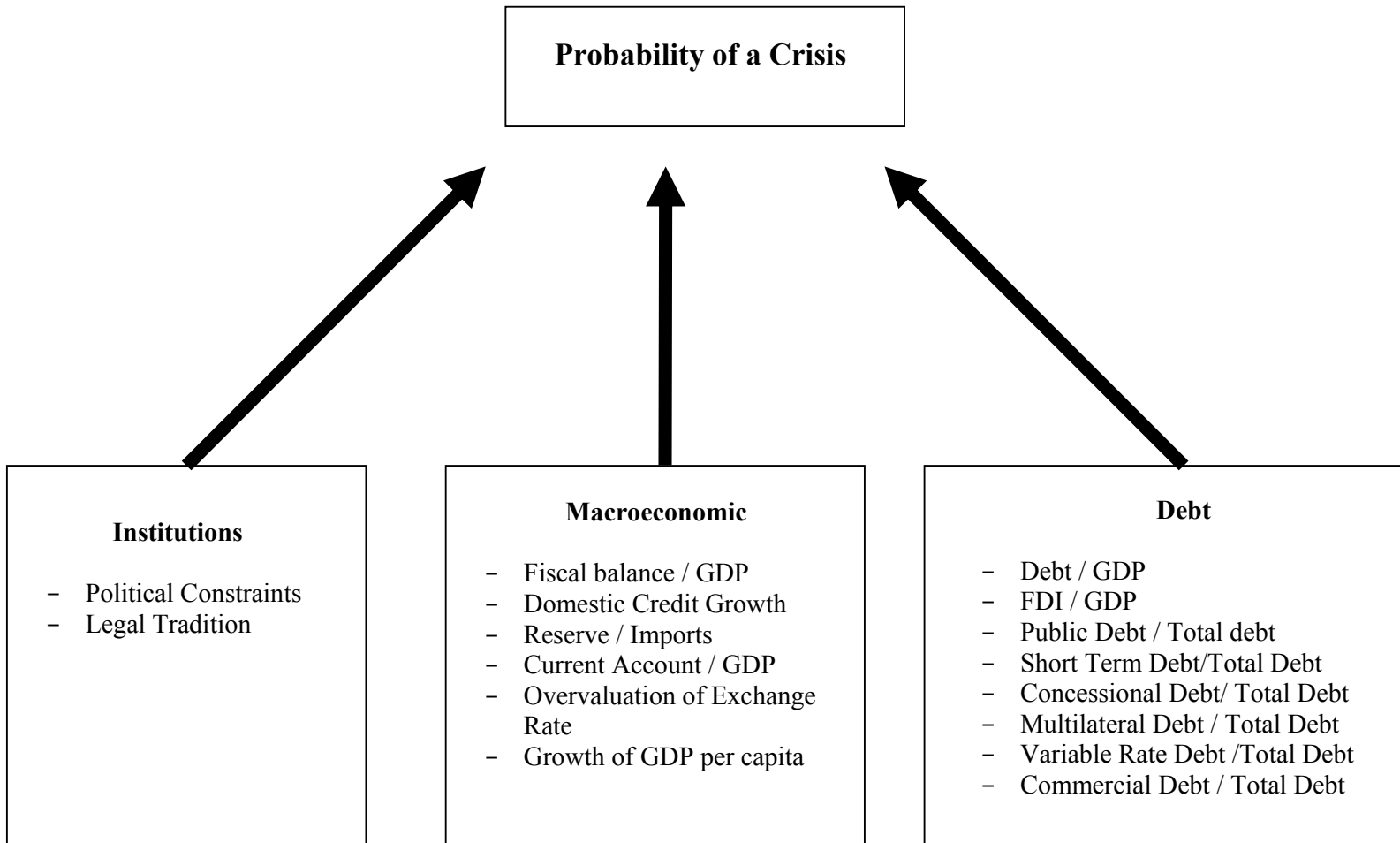


Figure 3: Consumer Expenditure Index and Currency Crisis

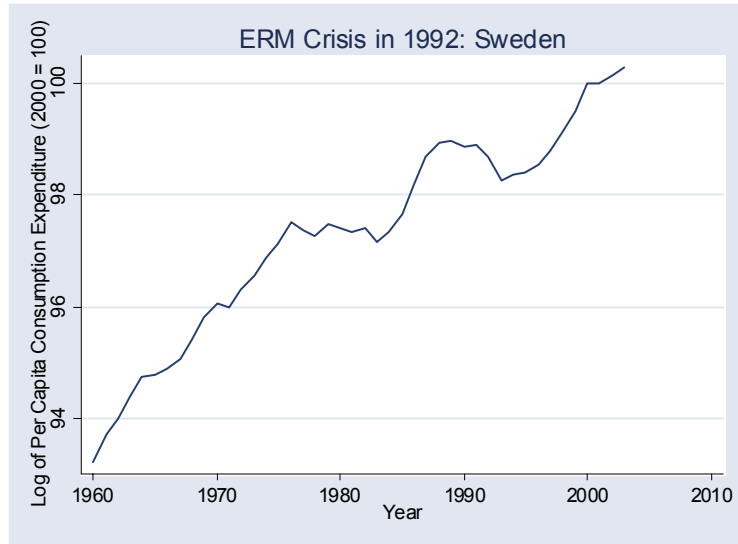
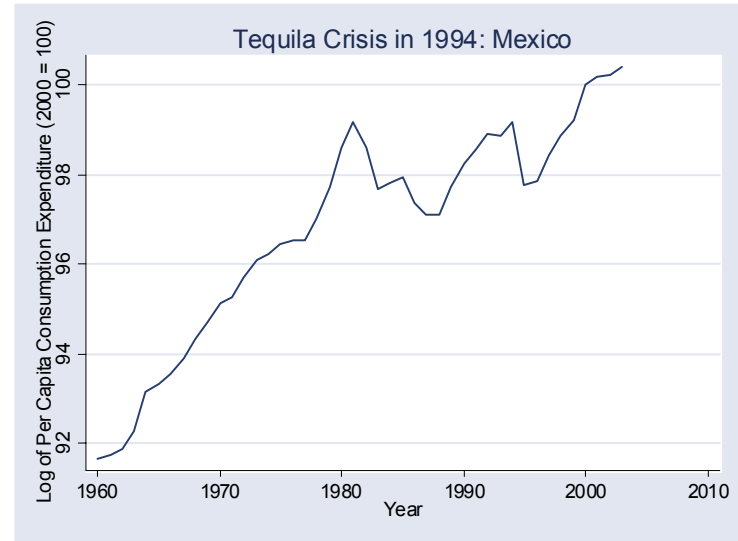


Figure 4: Retail Sales Index and Currency Crisis (OECD data)

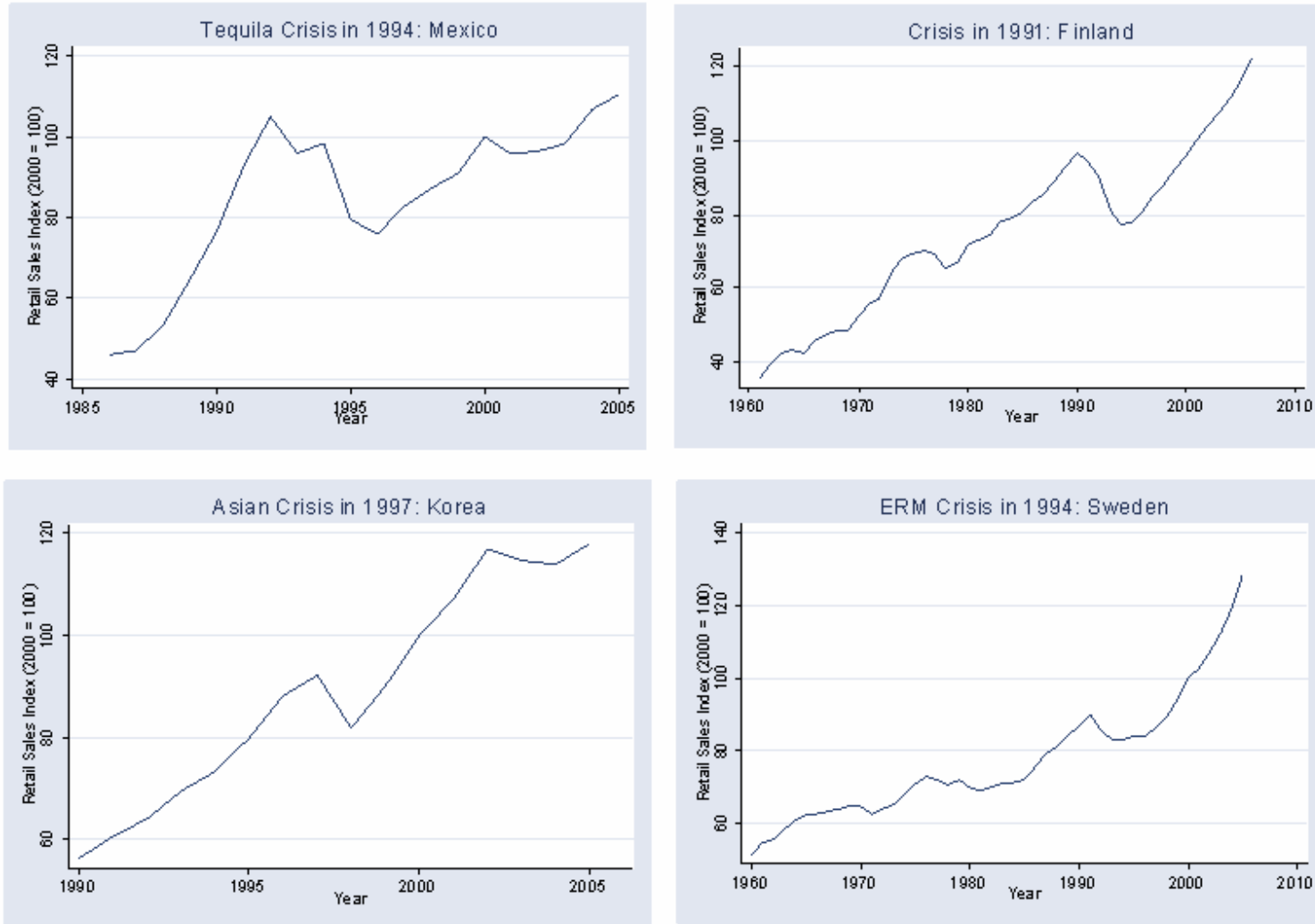


Figure 5: The Duration of Impact of Currency Crisis on Consumer Expenditure, Retail and Category Sales

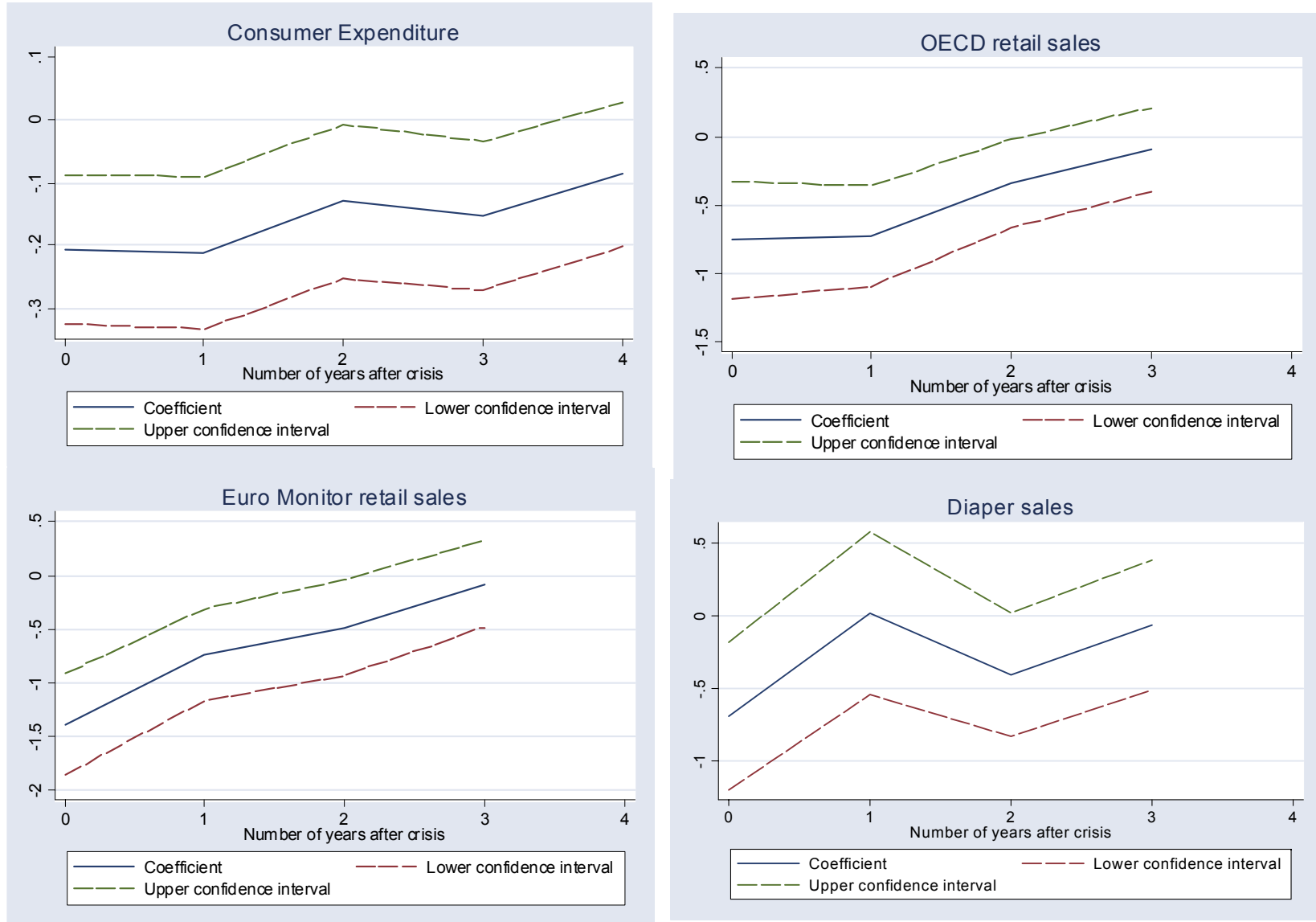
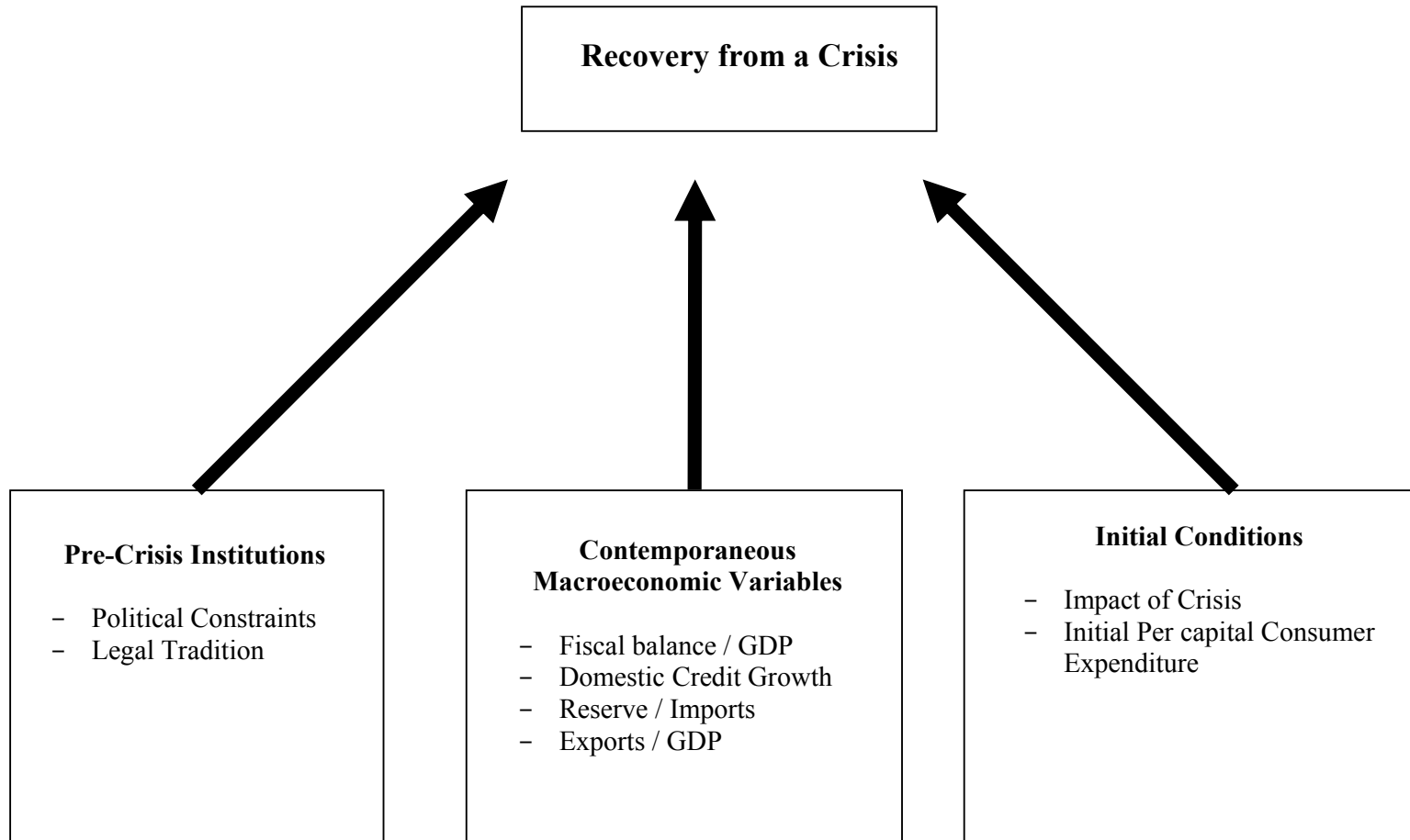


Figure 6: Conceptual Framework for Recovery from Crisis



Appendix Table: Variable Description and Summary Statistics

Variable	N	Mean	Description
<b>Probability of a Crisis</b>			
<i>Crisis Event</i>	6240	0.037	Dummy variable equal to 1 if nominal depreciation of currency $\geq 25\%$ in a year and increase in the rate of depreciation from previous year $\geq 10\%$ . Source: Date on exchange rates from International Finance Statistics
<i>Political constraints</i>	4800	0.337	Captures the number of veto points that provide a check on the power of the executive (President or Prime Minister). These include the existence of an upper chamber, a lower chamber in the legislature, an independent judiciary, and a federal structure, where power is shared between center and states. The variable is adjusted for the ideological alignment across these veto points, and the fact that there is a diminishing marginal effect of veto points on policy outcomes. Source Henisz (2000).
<i>Common law dummy</i>	7157	0.323	Dummy equal to 1 for common law countries. Source: La Porta et al (1997)
<i>Fiscal balance/GDP</i>	3025	-1.739	Government taxes less expenditure as percentage of GDP. Source: International Finance Statistics
<i>Domestic credit growth</i>	5388	18.177	Percentage growth in credit extended by a country's central bank to domestic borrowers, including the government and commercial banks. Source: International Finance Statistics
<i>Reserves/imports</i>	3846	3.359	Number of months of imports of goods and services which could be paid for by foreign reserves. Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. Source: International Finance Statistics
<i>Current account/GDP</i>	3929	-3.842	Measures current account balance as percentage of GDP. Current account is the sum of net exports of goods, services, net income, and net current transfers. Source: International Finance Statistics
<i>Overvaluation of exchange rate</i>	4255	-8.446	Percentage deviation of nominal exchange rate from PPP exchange rate. Source: International Finance Statistics
<i>Growth rate of GDP per capita</i>	4614	3.014	Percentage growth rate of per capita GDP (in constant 2000 dollars). Source: World Development Indicators
<i>Debt/GDP</i>	2773	4.08E+07	Debt to GDP ratio in a country (in percentage terms). Source: Global Development Finance
<i>Foreign direct investment/GDP</i>	3837	8.994	Foreign direct investment as percentage of total debt. Source: Global Development Finance
<i>Public debt/Total debt</i>	4069	92.164	Percentage of total debt borrowed by the government. Source: Global Development Finance
<i>Short-term debt/Total debt</i>	4091	12.258	Percentage of total debt on short-term maturity. Source: Global Development Finance
<i>Concessional debt/Total debt</i>	4069	49.109	Percentage of total debt that is at concessional interest rates. Source: Global Development Finance

<i>Multilateral debt/Total debt</i>	4091	27.316	Percentage of total debt owed to multilateral institutions. Source: Global Development Finance
<i>Variable rate debt/Total debt</i>	4069	23.045	Percentage of total debt with variable interest rate. Source: Global Development Finance
<i>Commercial Debt/Total debt</i>	4069	8.613	Percentage of total debt owed to commercial banks. Source: Global Development Finance
<b>Impact of Crisis</b>			
<i>Predicted probability of crisis</i>	1795	0.078	Predicted probability of a crisis from probit estimates with institutional and macroeconomic variables as regressors. Own calculations.
<i>Per capita consumption expenditure (log)</i>	6231	7.338	Log of private consumption expenditure in constant 2000 dollars. Source: World Development Indicators
<i>OECD Retail Sales Index (log)</i>	832	4.345	Log of seasonally adjusted volume index for retail sales (2000 = 100). Source: OECD Main Economic Indicators
<i>Per capita retail sales(log)</i>	230	7.93	Log of per capita retail sales in constant 2000 dollars. Source: Euro Monitor
<i>Hair Conditioner</i>	318	7.634	Volume of hair conditioners.
<i>Shampoo</i>	337	8.941	Volume of hair shampoos.
<i>Pads</i>	407	7.79	Volume of feminine pads.
<i>Laundry Detergent</i>	407	9.722	Volume of laundry detergent.
<i>Diapers</i>	407	8.003	Volume of diapers.
<i>Fabric Enhancer</i>	358	7.143	Volume of fabric enhancers.
<i>Per capita GDP(log)</i>	3886	8.036	Log of per capita GDP in constant 2000 dollars. Source: World Development Indicators
<i>Real interest rate</i>	3035	6.172	Nominal interest rate less rate of inflation. Source: International Finance Statistics
<b>Recovery from Crisis</b>			
<i>Exports/GDP</i>	5125	0.325	Log of private consumption expenditure in constant 2000 dollars. Source: World Development Indicators
<i>Impact of crisis</i>	311	-0.025	Fall in per capita consumption expenditure in year of crisis. Own calculations.



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