

# Do Phoenix Miracles exist?

## Role of financial markets in firm-level recovery from financial crises

Meghana Ayyagari

Asli Demirgüç-Kunt

Vojislav Maksimovic\*

March 2012

**Abstract:** We provide empirical evidence on the firm recoveries from financial system collapses (Systemic Sudden Stops (3S) episodes) in developing countries, and compare with the US experience in the 2008 financial crisis. While macro studies have found that economies recover from 3S episodes before the financial sector and termed these recoveries Phoenix miracles, micro-data across countries show that less than 28% of firms follow a pattern of recovery in operating cash flows without a recovery in external credit, and even these firms have access to other sources of cash. However, we do find that financial strategies consistent with Phoenix miracle recoveries are adopted by firms early in the 3S episodes, before the GDP bottoms out. We also find that firms with high short-term debt exposure increase operating cash flows while experiencing a sharp reduction in short-term credit, whereas firms with high prior cash holdings experience negative cash flows and deplete their cash holdings. The experience of US firms during the 2008 financial crisis also suggests no evidence of credit-less recoveries. In the US crisis where the financial system did not collapse as much, firms with high prior cash are still able to access external borrowing. The results on prior short term debt and cash holding are consistent with trade-off theories of firms' financial structure and cash holdings.

---

\*Ayyagari: School of Business, George Washington University, [ayyagari@gwu.edu](mailto:ayyagari@gwu.edu), Ph: 202-994-1292; Demirgüç-Kunt: World Bank, [ademirguckunt@worldbank.org](mailto:ademirguckunt@worldbank.org), Ph: 202-473-7479; Maksimovic: Robert H. Smith School of Business at the University of Maryland, [vmaksimovic@rhsmith.umd.edu](mailto:vmaksimovic@rhsmith.umd.edu), Ph:301-405-2125. We would like to thank participants at the NBER Project on Market Institutions and Financial Market Risk for helpful comments and suggestions. This paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

## Introduction

One of the most hotly debated policy questions with respect to the 2008 global crisis is how to stimulate business recovery. Because the crisis started in and severely affected the financial sector, the conventional assumption is that the recovery of firms depends on the recovery of the financial sector. While this conjecture appears reasonable, it has been challenged by observers in numerous crises across the world in recent years, who claim that firms recover before the financial sector recovers (e.g. Claessens, Kose, and Terrones, 2009, 2011; Abiad, Dell’Aricia, and Li, 2011; Calvo, Izquierdo, and Talvi, 2006a, 2006b). Of particular interest are emerging market crisis episodes characterized by Calvo et al. (2006a) as Systemic Sudden Stops (3S episodes) where output declines are associated with sharp declines in the liquidity of a country’s financial sector. These credit-less recoveries where external credit collapses with output but fails to recover as output bounces back to full recovery have been termed “Phoenix Miracles”.

Empirically, 3S episodes offer an unusual natural experiment since they provide an opportunity to observe how firms are affected in economies which have been subjected to a financial shock, which precedes or is contemporaneous with a recession. Much of the finance literature on emerging markets has focused on the importance of well-functioning financial institutions for firm and industry performance.<sup>1</sup> The macro literature on 3S episodes calls into question this literature. If the recovery of financial institutions is not key to the recovery of firms in developing countries hit with a financial shock, then causal interpretations of the role of association between external financing and firm and industry growth are brought into question.

---

<sup>1</sup> See for example King and Levine (1993), Demirguc-Kunt and Maksimovic (1998), Rajan and Zingales (1998), and Beck and Levine (2002) for a discussion of the role of financial institutions, and Cetorelli and Gambera (2001) and Claessens and Laeven (2005) for a discussion of the role of the banking system in particular.

To date there has been little evidence at the firm-level on how corporations respond to crises in general. In 3-S episodes, in particular, it is not known whether firms register a recovery in sales and corporate activity preceding a recovery in external financing after a crisis and whether the proposed mechanism in Calvo et al. (2006b) actually drives recovery in the corporate sector.

The theory of Phoenix Miracles also calls into question many of the policies advanced to solve the 2008 US financial crisis since researchers have identified similarities between the US crisis and prior emerging market crises (e.g. Boone and Johnson, 2008; Krugman, 2009) with others (e.g. Claessens, Kose, and Terrones, 2009) making the case for Phoenix Miracles in developed markets as well. Calvo and Kung (2010) label the US recovery as a new Phoenix Miracle while noting parallels between the US and past emerging market episodes.<sup>2</sup>

In this paper, we analyze the firm recovery process after a financing crisis. Specifically, we ask whether recovery of the financial sector precedes or coincides with the recovery in firms' output? Do firms experience Phoenix Miracles where their operating cash flows recover without a recovery in external credit? What are the cash flow, investment, and financing dynamics of firms during a 3S episode and what types of firms are more likely to be Phoenix Miracles? How do firms' strategies in 3S episodes compare to those of US firms during the 2008 US financial crisis?

To answer these questions, we explore whether the micro mechanism of the recovery process detailed in Calvo et al. (2006a, b) is borne out in our sample of publicly listed firms. To explain the existence of Phoenix Miracles, Calvo et al. (2006b) propose a partial equilibrium

---

<sup>2</sup> See Calomaris, Klingebiel, and Laeven (2005), and Claessens, Klingebiel, and Laeven (2005) for a discussion of the resolution of developing country crises. Brunnermeier (2009) provides an excellent description of the events during and leading up to the financial crisis in the US.

model with financial frictions, where firms in developing countries can obtain short-term credit from banks for working capital used to finance inventory accumulation or the wage bill. In their model, bank credit dries up in a crisis leading to a drop in firms' holdings of short term assets that are financed by bank credit. The short term assets/output ratio does not fully adjust to permit the firm to produce at the same level, leading to a drop in output and investment. Over time, the stock of short term assets is restored by discontinuing investments and out of self-generated cash flows. Thus, output recovers even while bank credit hasn't fully recovered, giving rise to the Phoenix Miracle.<sup>3</sup>

To test the model predictions and reconcile the macro evidence with micro data, we first use firm-level data from Bloomberg database for all the emerging market 3S episodes over the 1990s – Argentina, Indonesia, Korea, Malaysia, Mexico, Russia, Thailand, and two episodes in Turkey.<sup>4</sup> Each of the emerging market crisis episodes has also been previously identified as being a Phoenix Miracle, where there is a recovery in output while credit still stagnates. Developing countries are most likely to meet the conditions for the existence of Phoenix miracles following 3S episodes as firms in those countries are more likely to depend on short-term financing and have less access to long-term financing (e.g. Demircug-Kunt and Maksimovic, 1999; Fan, Titman, and Twite, 2010).<sup>5</sup>

---

<sup>3</sup> Micro-evidence of recovery from 3S episodes are also of independent interest as studies on economy-wide production and productivity forecasts (Miron and Zeldes, 1989; Bartelsman and Wolf, 2009; Young, 2009) have shown that micro-level evidence has more information and less measurement error than the macro data.

<sup>4</sup> Calvo, Izquierdo, and Mejia (2004) argue that global capital market turmoil acts as a coordinating factor external to the emerging markets in many of the sudden stop episodes. They show that sudden stops are not a common feature in developed economies (83% of depreciation episodes in developed markets over the 1990s were not accompanied by sudden stops) since developed countries are likely to remain open during currency crises.

<sup>5</sup> Publicly listed firms are typically the largest firms in an economy and thus presumably driving the recovery process. While we are limited by the unavailability of detailed balance sheet on private firms across countries as in other cross-country micro studies, we are able to examine the recovery process for a sample of private firms in Argentina (one of the 3S episodes in our sample) and find that the pattern mirrors the public firm sample.

Next we use data on US listed firms from Compustat to study recovery from the 2008 financial crisis in the US. We then compare the US experience with that of the 3S episodes to examine if US recovery is a Phoenix Miracle as suggested by Calvo and Kung (2010).

A closer look at the macro evidence suggests heterogeneity across countries even amongst the Phoenix Miracles identified by the macro literature.<sup>6</sup> Overall, of the 9 crisis episodes in our sample that were identified as 3S episodes in Calvo et al. (2006a), we are able to identify only 6 as potential miracles and 3 as non-miracles (Korea and the two Turkey crisis episodes) on the basis of macro statistics alone. When we look at the existence of Phoenix Miracles at the firm-level to examine if there is a recovery in firm sales without a recovery in aggregate short-term borrowing (as suggested by the micro mechanism in Calvo et al., 2006b), the number of potential miracles is further reduced. Of the 9 3S episodes, we find a recovery in corporate sales before a recovery in short-term borrowing in only 4 of the episodes.

We find no evidence that the US is a Phoenix Miracle. At the macro level, we find that GDP and Bank Credit (defined as the aggregate amount of assets held by banks excluding vault cash) decline in 2008 but begin to recover simultaneously in 2009. At the firm level, we find that both Sales and Debt in Current Liabilities (aggregated across publicly traded firms in Compustat) recover simultaneously, suggesting that output recovery was not credit-less.

In our developing country sample, we find that the recovery of firms' revenues or cash flows after the GDP trough is not credit-less and that on average firms substitute short-term credit with long-term external finance either through long-term borrowing or capital issuance. For instance, across the 3S episodes, only 31.52% of the firms recover operating cash flows

---

<sup>6</sup> In some countries like Thailand, there is no evidence of credit recovery even two periods after GDP recovery, suggesting a true Phoenix Miracle. However, in the instance of Korea and the two crisis episodes in Turkey, private credit recovers at the same time as GDP calling into question whether they are truly Phoenix Miracles. In Korea and the first crisis episode in Turkey in 1992-1996 private credit far surpasses original credit levels before the crisis.

without a corresponding recovery in short-term credit but this number drops to 28% when we also consider access to long-term credit, capital stock issuance, and other financing. In the US, while 32.56% of firms seem to be candidate Phoenix Miracles and have a recovery in operating cash flows without access to short-term credit, this reduces to 5.75% when we consider access to long-term credit, capital stock issuance, and other financing. Therefore these potential miracles are miracles in a very restricted sense, if at all, in that firms are not relying on short-term financing but relying on long-term financing. Thus, we find little support for the mechanism in Calvo et al. (2006b) that during the recovery period (as identified by them using macro data), firms finance themselves primarily out of cash saved from increasing operational cash flows and cutting investments. However, we do find that firms in the miracle countries in the early stages of the 3S episodes do adopt these strategies. On average, these firms cut investment, obtain less debt financing, and increase their operating cash flows and cash holdings before the macro recovery period.

We also find that firms in our emerging market sample select their short-term debt exposures and cash holdings before the 3S episodes in ways that help them cope with the crisis. Firms with high prior levels of short-term debt increase their cash flows from operations and reduce capital expenditures during the episode by enough to compensate for the reduction in financing in the early stage of the episode. In fact, these firms build up their cash holdings during the financial crisis. While these outcomes are consistent with credit-less recovery, one of the implications of the Phoenix Miracles thesis is that firms with higher short-term debt should suffer the most from a 3S episode. We find by contrast that initially high short-term debt firms are well positioned to increase their operational cash flows. This outcome is suggested by the trade-off theories of optimal capital structure (e.g. Scott, 1976), whereby firms choose their

capital structure by trading off the advantages of credit against the expected costs of financial distress.

By contrast, firms with high prior cash balances experience reduced operational cash flows, deplete their cash balances and are unable to access long-term debt and equity. However, they do have some increased access to short-term debt. This suggests that firms build up their cash holdings in cases where they have high exposure to demand shocks accompanying 3S episodes. Such firms do not exhibit financing patterns consistent with Phoenix miracles.

In the US, we do not find a difference in the outcomes of firms with high versus low levels of short-term debt, which is to be expected given the lesser reliance of US firms on short-term debt than developing country firms. We do find that firms with high prior cash balances suffer negative cash flows and deplete cash balances during the crisis. However, in an interesting contrast to the 3S episodes, we don't see as significant declines in borrowing (both long-term debt and short-term) with the high cash firms actually getting short-term and long-term debt from the financial system, which did not collapse as much as in the 3S episodes given the large amount of government assistance.

Overall, our results suggest that the phenomenon of Phoenix Miracles is not supported by firm-level data either in the emerging markets or the U.S. for the period of macro recovery. Even in the macro evidence, there is a great deal of heterogeneity in the relationship between GDP and credit recovery across the emerging market countries and in the US we find no evidence that there was a recovery in output without a recovery in credit. However, we do find that the firm-level recovery strategies consistent with Phoenix miracles are adopted by firms in the early stages of a 3S episode: firms increase operational cash flows, cut capital expenditures and reduce debt. Firms with high prior debt are most likely to adopt such strategies. By contrast, firms with

high prior cash holdings experience lower operational cash flows and deplete these holdings in the crisis. Both outcomes are consistent with theories of firm financial structure. In the US, where the financial system functioned relatively well, there is much less evidence of increases in operational cash flows, declines in short-term financing and cuts in capital expenditure. Initial short-term debt exposure did not predict higher operational cash flows during the crisis. However, large initial cash holdings did predict reduced operational cash flows.

Our paper contributes to the recent emerging literature on liquidity management and corporate investment.<sup>7</sup> Several recent papers have modeled the interdependence between corporate policies as we do in our paper (e.g. Gatchev, Pulvino, and Tarhan, 2010; Sudipto, Noe, and Wang; 2011a; Daniel, Denis, and Naveen, 2011; Chang, Dasgupta, and Wong, 2011b). However all these papers use U.S. data and none of them discuss the mechanism of the corporate recovery process after a financial crisis and whether or not it is in the presence of credit.

While our study is focused on crisis periods in emerging markets, our findings are also relevant to the papers looking at the effect of other systemic changes such as liberalizations in emerging markets. While some papers (e.g. Eichengreen, 2002) have argued that liberalizations have mixed results, other papers such as Levine and Zervos (1998), Levine (2001), Henry (2000, 2003), and Chari and Henry (2008), show a positive growth effect of international financial liberalizations. Bekaert, Harvey, and Lundblad (2005) in particular, convincingly show that equity market liberalizations reduce the cost of capital and financing constraints in emerging markets and have a strong significant effect on real economic growth. The evidence in our paper

---

<sup>7</sup> Campello et al. (2011) and Campello, Graham, and Harvey (2010) survey CFOs on liquidity management and find that credit lines are an important source for corporate spending during a crisis and firms substitute between credit lines and internal cash when facing a credit shortage. They find that when firms have limited access to credit lines, they choose between saving and investing during the crisis but with increasing access to credit lines, firms with more cash also invest more. Almeida, Campello, Laranjeira, and Weisbenner (2010) find that firms with large fractions of their long-term debt maturing at the time of crisis had a large and significant drop in their investment.

suggests that following liberalizations, the dependence of firms on the banking sector may be reduced, and their resilience conditional on a financial crises increases.

The rest of the paper is as follows: Section 2 describes the data and identification of the sample of 3S episodes. Section 3 presents the summary statistics at the macro and micro level on the existence of Phoenix miracles in the 9 3S episodes in our sample. Section 4 presents a microeconomic foundation of the miracles in our sample. Section 5 presents findings on the US financing crisis of 2008. Section 6 concludes.

## **2. Data**

### ***2.1. 3S Episodes***

The Sudden Systemic Stops (3S) identified in the macro literature are not mild recessions or contractions, but rather periods of output collapses of severe magnitude of about 10% or more from peak to trough. The dating and identification of 3S episodes in the macro literature follows the classification in Calvo et al. (2006a, b) who use a sample of emerging markets that are integrated in world capital markets and tracked by JP Morgan to construct its global Emerging Market Bond Index (EMBI). Calvo et al. (2006a, b) first characterize output collapses by a pre-crisis peak (period displaying the maximum level of output preceding a trough), trough (local minimum following the onset of a crisis) and full recovery point (period in which the pre-crisis peak output level is fully restored). Next they classify a 3S window as one that is marked by (a) a *capital flow window* where there is a large fall in capital flows exceeding two standard deviations from its mean that overlaps at any point in time with (b) an *aggregate-spread window* containing a spike in the aggregate EMBI spread exceeding two standard deviations from its mean. If either

the pre-crisis peak or trough of a previously identified output collapse episode falls within the 3S window, it is classified as a 3S collapse.

### **Insert Table 1 here**

While Calvo et al. identify 22 3S collapses through the 1980s and 1990s, we are restricted by the availability of firm level data to 9 3S episodes over the 1990s.<sup>8</sup> Table 1 shows the 9 3S episodes in our sample, with the dates of the pre-crisis peak, crisis trough and recovery point as identified by Calvo et al. (2006a). While the identification of these crises episodes follows the 3S classification, they coincide with large banking and currency crises over the 1990s as identified by other studies including Laeven and Valencia (2008).

## **2.2. Identification of Phoenix Miracles**

The literature has identified Phoenix Miracles as crisis episodes where there is a collapse in both output and credit but output recovers relatively quickly without a recovery in credit. For our sample, we start with 9 3S episodes over the 1990s that have been identified as potential Phoenix Miracles in Calvo et al. (2006a). We then consider each of the 9 episodes in detail and re-visit the GDP and macro credit numbers in each country to examine if output began to recover without a recovery in credit within a two-year period after the deepest point of the crisis (the trough). We categorize countries as *Phoenix Miracles at the macro level* if GDP began to recover without a simultaneous recovery in credit and we classify countries as *Non-Miracles at the macro level* if both GDP and credit began to recover simultaneously.

We categorize countries as *Phoenix Miracles at the micro level* if there was recovery in sales without a recovery in short-term borrowing (both sales and short-term borrowing

---

<sup>8</sup> Ecuador and Morocco had 3S collapses over the 1990s but we do not have these in our sample due to the unavailability of corporate balance sheet data in these countries from Bloomberg. These countries are not covered in other firm-level datasets such as Worldscope either.

aggregated across all firms in our sample in the country) within a two-year period after the deepest point of the crisis. We classify countries as *Non-miracles at the micro level* if either aggregate sales never show a recovery or both sales and short-term borrowing recover simultaneously within a two year period after the deepest point of the crisis. For our firm-level analysis, we apply the same definition to classify each individual firm as a *Phoenix Miracle at the firm level* if it experiences a recovery in sales without a recovery in credit. At the firm level we define credit both strictly as just short-term borrowing as well as a broader definition that includes short-term borrowing, long-term borrowing, and equity issuances.<sup>9</sup>

### **2.3. Sample Construction**

For our sample of emerging markets, we collect firm-level accounting information from Bloomberg for over 2500 publicly traded firms in the above 3S episodes over a five-year window, two years preceding the trough of the output collapse to two years after the trough. In identifying if the countries are Phoenix miracles at the micro level, we restrict the sample to firms with non-missing sales and short term borrowing over the five years. To examine corporate recovery, we use **Net Sales** defined as total operating revenue. We also use alternate measures including Output defined as Sales + Changes in Inventories and Corporate Profits computed as Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA). Our main measure of credit is **Short Term Borrowings** that includes bank overdrafts and short-term debts and borrowings.

In detailed firm-level analysis, where we identify individual firms as Phoenix Miracles, we focus on the statement of cash flows which provides a breakdown of cash flows from operating, investing, and financing activities that helps determine the short term viability of the

---

<sup>9</sup> Below, we also examine the recoveries of firms' cash flows as well as sales during 3S episodes.

company. We also use balance sheet positions that provide a snapshot of the firm's financial resources and obligations at a given point in time. Here our sample is restricted to 1326 firms across 5 countries after dropping firms with key non-missing balance sheet and cash flow statement information for each of the five years.<sup>10</sup> However, all our results are robust to allowing the size of the sample to vary as firms disappear or as new firms are listed and incorporated into the database. It may be noted that Bloomberg does not remove bankrupt or de-listed firms. In addition to detailed balance sheet and income statement information, we also have information on the exchanges on which the firm is traded, ownership, and industry classification (Bloomberg's industry classification is based on the Industry Classification Benchmark). All the accounting variables are converted to real terms by deflating by CPI Index. All our results are robust to using GDP deflator instead of CPI.

### **3. Summary Statistics on the existence of Phoenix Miracles**

#### ***3.1. Macro Evidence***

We first focus on the behavior of GDP and private sector bank credit covering a five-year window centered on troughs in output, in our sample of 3S collapse episodes. GDP is the real GDP in constant local currency units from World Development Indicators and credit is the Claims on the Private Sector by Deposit Money Banks from the International Financial Statistics (line 22d). The macro evidence enables us to benchmark against the 3S episodes identified in the literature and to evaluate whether the episodes identified are in fact 3S episodes.

**Insert Figure 1 here**

---

<sup>10</sup> Our sample size is comparable to sample sizes in other studies (e.g. Bleakley and Cowan, 2008; 2010) looking at crisis country episodes over the 1990s.

Figure 1A reproduces the picture of Phoenix Miracles from Calvo et al. (2006a) for 22 3S episodes where the drop in average GDP from t-2 to t was 7.8% and the drop in average credit was 15%. After t (the crisis trough), there is a steep V-shaped recovery in output to previous levels where as credit still stagnates and begins to recover only at t+1. Looking at our sample of nine 3S episodes over the 1990s in Figure 1B, we obtain a very similar picture. The fall in average GDP (bold line) and credit (dotted line) across the 9 episodes are 5.1%<sup>11</sup> and 16.1% respectively and GDP recovery precedes recovery in private credit by one whole period. Thus the macro evidence in our sample of crisis episodes is consistent with the aggregate evidence presented in Calvo et al. (2006a) that while output and credit collapse together, output recovers to pre-crisis levels without a similar recovery in credit, giving rise to the Phoenix Miracle.

#### **Insert Figure 2 here**

The aggregate data however mask a great deal of heterogeneity at the country level. Once we look at individual country episodes in Figure 2, we find that some of the potential Phoenix Miracle countries do not appear to be miracles, in that, output (bold line) recovery does not precede credit (dotted line) recovery. Thus, based on the macro statistics for each country, we can classify the 9 country episodes into (a) *Phoenix Miracles at the Macro level* where credit recovers a whole period (or even later) after GDP recovery as in the case of Argentina, Indonesia, Malaysia, Mexico, Russia, and Thailand (see Figure 2A) and (b) *Non-Miracles at the Macro level* where both GDP and credit recover at the same time as in the case of Korea and the two episodes in Turkey (see Figure 2B).

Even within each of these categories, we see stark variation in the credit patterns. In the Phoenix Miracles category (figure 2A), we see that in Thailand, credit doesn't begin to recover

---

<sup>11</sup> The statistics reported in Calvo et al. (2006) are for the average 3S episode. Similarly here, the figure of 5.12% indicating fall in average output differs from the average fall in output across all 9 episodes which is 8.2%. The average fall in credit across 8 episodes (we exclude Korea since there was no drop in credit) is 35%.

even two periods after recovery in GDP. In the case of most of the other episodes, while credit begins to recover, it does not reach pre-crisis levels even after two periods.<sup>12</sup> In the case of Russia however, while credit recovers with a one-period lag after output, within a period thereafter it far exceeds pre-crisis levels. Similarly, among the Non-Miracles category where credit and GDP recover at the same time, we see that in the case of Korea and the first crisis episode in Turkey, credit levels on recovery far exceed the pre-crisis levels. Note that the above breakdown of countries into Phoenix Miracles and Non Miracles is based entirely on macro statistics and in the next section we take a closer look at these categories using firm-level data.

### **Insert Table 2 here**

There is also substantial variation in the magnitude of GDP and credit collapses across the countries. Table 2 shows the drop in GDP and credit over the 5-year window surrounding the crisis trough reported in Table 1.<sup>13</sup> In the case of the Phoenix Miracles, over the five-year window surrounding the trough, GDP drops range from 5% in the case of Russia to 15% in the case of Argentina. Credit collapses range from 10% in the case of Malaysia to 69% in the case of Indonesia. In the case of Thailand, GDP drops by 12% and credit drops by 38%. In the non-miracles case, output drop ranges between 3% in Turkey to 7% in the case of South Korea and while Korea shows no drop in private sector credit, the two episodes in Turkey register credit drops of 17% and 33% respectively.

### **3.2. Micro Evidence**

In this section we examine if we observe the phenomenon of Phoenix Miracles at the micro-level by looking at the recovery in corporate sales and short-term borrowing. In Figure 3A

---

<sup>12</sup> Except in the case of Russia and the non-miracle countries, credit doesn't reach pre-crisis peak levels even by the full recovery point of GDP detailed in Table 1.

<sup>13</sup> The drop is computed between the pre-trough peak and the local minimum in the five-year window.

we present averages across the 9 episodes and find that there does not seem to be any evidence of a Phoenix Miracle. Both Sales (bold line) and Short Term Borrowing (dotted line) recover simultaneously albeit one period after GDP recovery.

### **Insert Figure 3 here**

When we start looking at individual countries, we can split the crisis episodes into two main categories: (a) *Phoenix Miracles at the Micro Level*: This is the case of Argentina, Malaysia, Korea and Thailand (see Figure 3B) where we see that corporate sales (in real terms) recovers at  $t+1$  in each case while short term borrowing (also in real terms) has still not recovered. While Argentina, Malaysia, and Thailand were also identified as macro miracles in section 3.1, Korea was not identified as a miracle at the macro level since GDP and Private Credit recovered simultaneously. However the micro evidence in Korea shows that sales recover before short term credit. (b) *Non-Miracles at the Micro level*: This is the case of the following 5 episodes - Mexico, Indonesia, Russia and the two Turkey episodes – where there is no credit-less recovery. We can further split the non-miracles into *Phoenix Miracles only at the Macro level* and *Non-Miracles at the Macro and Micro levels*. The macro evidence based on GDP and Private Credit in section 4.1 showed Phoenix Miracles at the macro level in Mexico, Indonesia, and Russia. However, as seen in Figure 3C, in each of these countries both Sales and Short Term Borrowing recover at the same time (at  $t+1$  in Indonesia and Russia and at  $t+3$  in Mexico). In both the Turkey episodes (see Figure 3D), we find that both corporate sales and credit collapse during the crisis and show no signs of recovery even two periods after GDP recovery.

To summarize the results from sections 3.1 and 3.2, based on macro data alone, we could categorize only 6 of the 9 3S episodes as potential Phoenix Miracles. When we look at firm-level

data aggregated up to the country level, we find that only 4 of the 9 3S episodes appear to be Phoenix miracles where corporate sales recover before a recovery in short-term borrowing.<sup>14</sup>

#### **4. Microeconomic Foundations of Phoenix Miracles**

##### *4.1. Identification of firm-level miracles*

In this section, we disaggregate our analysis to the firm level to first identify how many firms recover in each of the economies and then to identify firms that may be classified as potential miracles. To identify the miracles, we focus on the recovery period,  $t$  to  $t+2$ , identified by Calvo et al. (2006a) using macro data where GDP recovers without a recovery in net external credit. In Table 3, Panel A, we first identify the percentage of firms that had a recovery in operating cash flow over a two year period in each economy and then in panel B, we identify potential credit-less recoveries (Phoenix miracles) in each economy. We define recovery in terms of operating cash flows instead of sales to be consistent with the later tables that model the dynamics of cash flow, financing and investment behavior. However, as shown in Appendix A, our results on identification of firm-level miracles are similar if we were to define recovery in terms of cash flows. Moreover, the finance literature focuses on operating cash flows as the best metric of financial viability of a company and how much cash the company generates each period from its revenues.

Since we are aggregating across all firms in the economy, we use a balanced sample of firms with key non-missing balance sheet and cash flow statement data<sup>15</sup> in each of the five years

---

<sup>14</sup> When we compare sales recovery with GDP across all countries, we find aggregate firm sales tracks GDP closely except during the crisis period when sales recover one period after GDP. This lag between sales recovery and GDP recovery holds even when we look at alternate measures of measures of corporate output including Sales-Cost of Goods Sold (COGs), profitability as measured by EBITDA, and profitability adjusted for selling and general administrative expenses or EBITDA + SGA. We also obtain similar patterns when we look at sample of private firms from Argentina, the only country for which we have data on private firms from ORBIS database.

from two years before the crisis (t-2) to two years after the crisis (t+2). We also drop firms in the Utilities and Finance sector (Banks, Insurance, and Financial Services) and any erroneous observations such as negative sales or total assets. This leaves us with a sample of 214 firms in Indonesia, 289 firms in Korea, 76 firms in Mexico, 474 firms in Malaysia, and 273 firms in Thailand. We have no observations in Argentina, Russia, and Turkey because the cash flow statements in Bloomberg for these countries for our sample period are not populated.

If  $\Delta OCF_{t+1}$  is the change in operating cash flow from t to t+1 and  $\Delta OCF_{t+2}$  is the change in sales from t+1 to t+2, cash flows over the two year period is given by

$$\Delta OCF = \Delta OCF_{t+1} + \Delta OCF_{t+2} \quad (1)$$

**Insert Table 3 here**

If we were to define firms that recover as those that had a positive change in operating cash flow over the two period i.e.  $\Delta OCF > 0$ , panel A of Table 3 shows that in our sample of 1326 firms across the 5 countries, only 45.1% of the firms had a recovery in operating cash flow. Thus, across the five 3S episodes for which we have firm-level data, a large percentage of firms do not have a recovery in operating cash flow at all.

To identify Phoenix Miracles, we focus on firms that have had a recovery in operating cash flow from t to t+2 without a recovery in external credit over the same period. We use two definitions of external credit. First, in Panel B1, we define external financing by the amount of short-term debt financing over the two-year period. Thus, analogous to equation (1), we have:

$$\Delta L1 = \Delta STD_{t+1} + \Delta STD_{t+2} \quad (2)$$

---

<sup>15</sup> Our sample is restricted to non-missing values of the following variables from t-2 to t+2 : Sales (Income Statement), Short-term borrowing (Balance Sheet) and the following Cash Flow Statement variables - dividends, increase/decrease in short-term borrowing, increases in long-term borrowing, decreases in long-term borrowing, increases in capital stock, decreases in capital stock, increase in investments, decrease in investment, disposal of fixed assets, capital expenditures, cash from financing activities, cash from investing activities, and cash from operations, and cash from other financing activities.

where  $\Delta STD_{t+1}$  is the cash flow from net changes in short term borrowing reported on the cash flow statement at t+1 and  $\Delta STD_{t+2}$  is the cash flow from net changes in short term borrowing at t+2. So over the two periods, Phoenix Miracles are those firms that had  $\Delta S > 0$  with  $\Delta L1 \leq 0$ . In Panel B2, we define external financing by changes in short-term borrowing, long-term borrowing, net capital stock issuance, and net cash flow from other financing activities.<sup>16</sup> So we have:

$$\Delta L2 = \Delta L1 + \Delta LTD_{t+1} + \Delta LTD_{t+2} + \Delta CS_{t+1} + \Delta CS_{t+2} + \Delta OFIN_{t+1} + \Delta OFIN_{t+2} \quad (3)$$

where  $\Delta LTD_{t+1}$  and  $\Delta LTD_{t+2}$  are the net changes in long term borrowing reported on the cash flow statement at t+1 and t+2 respectively,  $\Delta CS_{t+1}$  and  $\Delta CS_{t+2}$  are the net capital stock issuances reported on the cash flow statement at t+1 and t+2 respectively, and  $\Delta OFIN_{t+1}$  and  $\Delta OFIN_{t+2}$  are the cash flows from other financing activities at t+1 and t+2 respectively.

Panel B1 of Table 3 shows that across the 5 countries in our sample, the percentage of firms that can be classified as Phoenix Miracles varies from 8.88% in Indonesia to 35.99% in Korea. Across the 5 3S episodes, we find that only 31.52% of the firms can be classified as Phoenix Miracles. Of the remaining we find that 13.57% of the firms had a recovery in operating cash flow and short-term borrowing, 19.23% had no recovery in operating cash flow but a recovery in short-term borrowing (suggesting that these firms may have faced a demand shock), and 35.67% of the firms had no recovery in either operating cash flow or short-term borrowing.

Panel B2 shows that when we expand the definition of external financing, the percentage of Phoenix Miracles across the 5 episodes drops to 27.90% (from 31.52% in panel B1). While the percentage of Phoenix Miracles goes down, the percentage of firms that had a recovery in operating cash flow and credit goes up by the same amount as expected. Furthermore, with this

---

<sup>16</sup> In Bloomberg, cash flow from other financing includes any financing activities not already included as a portion of Dividends Paid, increases/decreases in short-term borrowing, increases/decreases in long-term borrowings, increases/decreases in capital stock. It includes foreign exchange adjustments, changes in minority interests, and financing costs.

expanded definition of external financing, the percentage of firms that had no recovery in operating cash flow or credit goes down from 35.67% to 29.49% while the percentage of firms that had no recovery in operating cash flow but a recovery in credit goes up from 19.23% to 25.41%. Overall, from panels B1 and B2 we see that even in the countries that seemed to be potential Phoenix Miracles when we looked at aggregated sales and short-term borrowing (Korea, Malaysia, and Thailand), we find evidence that many firms had access to long-term debt financing and were able to issue equity.

#### *4.2. Alternate Sources of Financing*

In panel C, we focus on the different accounts in a firm's statement of cash flow position to examine if the firms in our sample had alternate sources of cash. Specifically in panel C1, in addition to the external sources of financing defined in equation (3), we include dividends paid, cash generated from disposal of fixed assets, and cash spent on net investments, capital expenditures, and acquisitions and other investing activities.

$$\Delta L3 = \Delta L2 + \Delta DIV_{t+1} + \Delta DIV_{t+2} + \Delta INV_{t+1} + \Delta INV_{t+2} \quad (4)$$

where  $\Delta DIV_{t+1}$  and  $\Delta DIV_{t+2}$  are the dividends paid at  $t+1$  and  $t+2$  respectively,  $\Delta INV_{t+1}$  and  $\Delta INV_{t+2}$  are the total cash from the sources and uses of investing activities (includes disposal of fixed assets, capital expenditures, net investments (increase in investments – sale of investments) and other investing activities(includes acquisitions)).

Across the 5 3S episodes, we find that the percentage of firms that had a recovery in operating cash flow without a recovery in credit (that is firms that were previously identified as candidate Phoenix Miracles) reduces to 8.45% in panel C. The percentage of firms that have a recovery in operating cash flow and credit is now 36.65% and only 8.14% of the firms have no

recovery in either operating cash flow or credit. The remaining (46.76%) firms experience no recovery in operating cash flow despite having positive credit over the two year period.

To summarize, Table 3 shows that even in the countries that have been identified as Phoenix Miracles based on macro statistics, the vast majority of firms that recover in these countries do so while obtaining external financing primarily from long-term debt and/or capital stock issuance. Furthermore, these firms continue to spend on capital expenditures and other investments suggesting that they are not liquidity constrained. Once we account for the alternate sources of cash, less than 9% are identified as having recovered in operating cash flow without a positive net credit position over the two periods. As shown in Appendix A, our results hold if we were to define recovery in terms of sales rather than operating cash flow where less than 8% of firms recover in sales without a positive net credit position over the two periods. Thus, the summary statistics do not support the notion of a significant role for Phoenix Miracle recoveries after time  $t$ , the low-point of GDP in our sample of 3S episodes.

#### *4.3. Dynamics of Firms' Financing and Investment Decisions*

In this section, we take a closer look at the dynamics of the financing and investment decisions of the firms during the entire crisis period. Following Gatchev, Pulvino, and Tarhan (2010) and Dasgupta, Noe, and Wang (2011), given the accounting identity that sources of cash equal uses of cash, the following should hold:

$$\text{Capex}_t + \text{Other Investments (including Acquisitions)}_t + \Delta\text{Cash}_t + \text{Dividends}_t + \text{Repurchases}_t - \text{Asset Sales}_t - \Delta\text{STD}_t - \Delta\text{LTD}_t - \text{EQUISS}_t - \text{Other Financing}_t - \text{Cashflow}_t = 0 \quad (5)$$

Consider then the following system of eleven equations describing the firms' *cash flow*, *investment* (capital expenditures, asset sales, other investments), *financing* (short-term debt

issuance, long-term debt issuance, equity issuance, changes in cash positions, other financing), and *distribution* (dividends, share repurchases) patterns as a function of the exogenous macroeconomic shock, as proxied by a dummy variable for the year of the sudden-stop ( $SS_t$ ), time dummies for the year before the crisis ( $SS_{t-1}$ ), and the two years after the crisis ( $SS_{t+1}$ ,  $SS_{t+2}$ ) and Tobin's Q:

$$\begin{aligned}
 \Delta \text{Capex}_{i,t} &= a_{1,i} + b_1 SS_{t-1} + c_1 SS_t + d_1 SS_{t+1} + g_1 SS_{t+2} + p_1 Q_{i,t} + e_{1,i,t} \\
 \text{Other Investments}_{i,t} &= a_{2,i} + b_2 SS_{t-1} + c_2 SS_t + d_2 SS_{t+1} + g_2 SS_{t+2} + p_2 Q_{i,t} + e_{2,i,t} \\
 -\text{Asset Sales}_{i,t} &= a_{3,i} + b_3 SS_{t-1} + c_3 SS_t + d_3 SS_{t+1} + g_3 SS_{t+2} + p_3 Q_{i,t} + e_{3,i,t} \\
 -\Delta \text{STD}_{i,t} &= a_{4,i} + b_4 SS_{t-1} + c_4 SS_t + d_4 SS_{t+1} + g_4 SS_{t+2} + p_4 Q_{i,t} + e_{4,i,t} \\
 -\Delta \text{LTD}_{i,t} &= a_{5,i} + b_5 SS_{t-1} + c_5 SS_t + d_5 SS_{t+1} + g_5 SS_{t+2} + p_5 Q_{i,t} + e_{5,i,t} \\
 -\text{Equity}_{i,t} &= a_{6,i} + b_6 SS_{t-1} + c_6 SS_t + d_6 SS_{t+1} + g_6 SS_{t+2} + p_6 Q_{i,t} + e_{6,i,t} \\
 \Delta \text{Cash}_{i,t} &= a_{7,i} + b_7 SS_{t-1} + c_7 SS_t + d_7 SS_{t+1} + g_7 SS_{t+2} + p_7 Q_{i,t} + e_{7,i,t} \\
 -\text{Other Financing}_{i,t} &= a_{8,i} + b_8 SS_{t-1} + c_8 SS_t + d_8 SS_{t+1} + g_8 SS_{t+2} + p_8 Q_{i,t} + e_{8,i,t} \\
 \text{Dividend}_{i,t} &= a_{9,i} + b_9 SS_{t-1} + c_9 SS_t + d_9 SS_{t+1} + g_9 SS_{t+2} + p_9 Q_{i,t} + e_{9,i,t} \\
 \text{Repurchases}_{i,t} &= a_{10,i} + b_{10} SS_{t-1} + c_{10} SS_t + d_{10} SS_{t+1} + g_{10} SS_{t+2} + p_{10} Q_{i,t} + e_{10,i,t} \\
 -\text{Cashflow}_{i,t} &= a_{11,i} + b_{11} SS_{t-1} + c_{11} SS_t + d_{11} SS_{t+1} + g_{11} SS_{t+2} + p_{11} Q_{i,t} + e_{11,i,t}
 \end{aligned} \tag{6}$$

All the dependent variables are scaled by lagged value of Total Assets. We control for Tobin's Q as a measure of investment opportunities and all the independent and dependent variables in the system are de-meanded by subtracting firm-level means over the five year period to account for firm-level fixed effects. The Data Appendix provides a detailed description of each of the variables and how they are computed.

By virtue of the sources-equal-uses constraint in (5), the coefficients of each of the variables should sum to 0 across equations. That is, the time dummies and Tobin's Q are exogenous to the system so the total response across the system of equations to any change in these variables must sum to zero. So we have:

$$\sum b_i = 0 \tag{7}$$

$$\sum c_i = 0 \tag{8}$$

$$\sum d_i = 0 \tag{9}$$

$$\sum g_i = 0 \tag{10}$$

$$\sum p_i = 0 \tag{11}$$

Empirically, we estimate (6) as a system of seemingly unrelated regression (SUR) models subject to the constraints in (7)-(11)<sup>17</sup>. For ease of interpretation of the coefficient estimates in the regression model, we do not multiply the source variables (Cashflow, Asset Sales,  $\Delta$ STD,  $\Delta$ LTD, Equity, Other Financing) by minus one and instead, equivalently multiply their corresponding coefficients by minus one when defining the constraints in (7)-(11).

In Table 4, the system is estimated on the sample of countries that are exogenously identified as miracles using the macro categorization where there is a recovery in GDP without a recovery in private credit – Indonesia, Mexico, Malaysia, and Thailand. However, our results are not materially different if we were to include Korea in the analysis. We remove the top and bottom 1% outliers for all the variables in the system.

#### **Insert Table 4 here**

In Table 4, Panel A we present the results of the SUR estimation for the period from  $t-2$  to  $t+2$ , with our time reference dummy being the pre-crisis period  $SS_{t-2}$ . Here we find some evidence of the recovery mechanism outlined in Calvo et al. (2006a) where firms cut investment and recover in cash flows without a recovery in short-term debt. However, both the decline in borrowing and the retrenchment of cash flows occur before  $t$ , the trough of GDP. Compared to two years before the crisis trough ( $SS_{t-2}$ ), the reference dummy, the firms in our sample have positive operating cash flows from  $SS_t$  to  $SS_{t+1}$ , with the biggest run-up in cash flows being at time  $t$ . Focusing on the financing positions, we find that for the average firm in our sample, during this period there is a significant decline in short-term debt, long-term debt, and equity issuances in  $SS_t$ ,  $SS_{t+1}$ , and  $SS_{t+2}$  compared to  $SS_{t-2}$ . Again, most of the decline occurs between

---

<sup>17</sup> Note that the SUR models are similar to fitting the models separately using OLS when we use the same set of right-hand-side variables in all equations. We prefer the SUR estimation since it allows for constrained estimation across the system and allows us to perform joint test of coefficients across the system.

time  $t-1$  and  $t$ . We also find that firms are cutting capital expenditures and other investments during this period but not engaging in greater asset sales compared to the pre-crisis period  $SS_{t-2}$ .

So overall we find some evidence of a credit-less recovery where firms cut investments and recover in operating cash flow without access to external credit but in a period earlier to the credit-less recovery period identified by Calvo et al. (2006a) using macro data. As the 3S episode unfolds, firms face reduced access to financing and make adjustments to increase cash flows and cut capital expenditures. These adjustments are in place by the time GDP bottoms out, and in the miracle countries the recovery of GDP is not associated with recovery of firm borrowing or investment to pre-3S levels.

In Table 4 panel B, we present the results of the SUR estimation for just the recovery period,  $t$  to  $t+2$ , identified by Calvo et al. (2006a) as the miracle period using macro data on GDP and credit. We find that compared to the crisis trough ( $SS_t$ ) (the reference dummy), the operating cash flows during the recovery years,  $SS_{t+1}$  and  $SS_{t+2}$  are lower, though the coefficients are small. There is a drop in capital expenditures in both years compared to the trough. While long-term debt financing does not recover, short-term debt declines in  $SS_{t+1}$  but increases in  $SS_{t+2}$  and equity issuances increases in both years. Overall, and consistent with Table 3, Panel B shows that there is not much recovery in operating cash flows and there is some amount of financing available so the average firm does not appear to be a Phoenix miracle in the recovery period identified by Calvo et al. (2006a).

Note that the sum of the coefficients across the Uses of Cash ( i.e. Changes in Cash + Capital Expenditures + Other Investments + Dividends + Re-purchases) minus the sum of the coefficients across the Sources of Cash (i.e. Operating Cash flow+ Asset Sales + Changes in long-term debt + Changes in short-term debt + Equity + Other Financing) sum up to 0. So if

operating cash flow which is a source of cash increases by one dollar, other sources of cash must decline by a dollar, the uses of cash must increase by one dollar or some combination of the different sources and uses of cash must account for the one dollar increase in operating cash flow. For instance, in panel A during the sudden stop trough,  $SS_t$ , operating cash flow increased by 2 cents (coefficient of  $SS_t$  in operating cash flow regression is 0.02), the other sources of cash declined by 11.9 cents while the uses of cash (i.e. investments, share repurchases, and dividend distributions) declined by 9.9 cents.

#### *4.4. Dynamics of Firms' Financing and Investment Decisions – Role of Short-Term Debt and Cash*

In this section, we examine heterogeneity in firms' investment and financing dynamics in response to the exogenous macro-economic shocks documented in section 4.3. Specifically, we focus on the firm's debt and cash positions prior to the crisis and how they influence firm behavior. Studies on capital structure choice and debt maturity in finance have established that firms in emerging markets rely more on short-term debt than long-term debt (e.g. Demirguc-Kunt and Maksimovic, 1999). Other studies have argued that this excessive reliance on short-term debt (*maturity mismatch* in assets and liabilities) should lead to a collapse in output and investment in these economies (e.g. Sachs et al. 1996; Furman and Stiglitz, 1998; Radelet and Sachs, 1998; and Chang and Velasco, 1999). Further, one of the implications of the microeconomic models outlined in Calvo et al. (2006b) to explain the existence of Phoenix Miracles is that firms that are more reliant on short-term bank financing should face greater financing constraints during the 3S episode. Thus one would expect firms with higher short-term debt to have greater drops in financing and investment during the crisis episode.

However, an alternative argument would suggest that only firms not exposed to major cash flow risk would seek a high exposure to short-term debt and be allowed to assume a high level of such loans by intermediaries. In this case, we would expect that the cash flows from firms with high short-term debt exposures do not fall as much as those of less levered firms.

A parallel literature has focused less on debt maturity and more on cash holdings arguing that firms trade off the precautionary motives (i.e. firms hold cash so as to not have to raise funds when external capital is expensive) with the agency motives (i.e. management and controlling shareholders may not use cash in the best interests of the firm, such as on excessive spending and value destroying acquisitions) in arriving at optimal cash balances. While most of this literature is based on studies of U.S. firms, Dittmar, Mahrt-Smith, and Servaes (2003) and Kalcheva and Lins (2007) find that firms hold more cash when shareholder protection is weak. Further, Lins, Servaes, and Tufano (2010) find that non-operational cash holdings (i.e. excess cash and marketable securities above that which is used in normal course of business) are only a small fraction of book assets and are used as a general insurance policy against future cash shortfalls. So one would expect high prior cash positions to be associated with future cash flow shortfalls.

In Table 5, we examine if firms with higher levels of short-term debt in  $SS_{t-2}$  have different investment and financing patterns than other firms during the whole period from  $t-2$  to  $t+2$  (panel A) and the post trough recovery period (panel B).<sup>18</sup> We estimate the system of equations in (6), by first including interactions of each of the time dummies with the level of short-term debt in  $t-2$ ,  $STD_{t-2}$ , where the level of short-term debt is taken from the Balance Sheet

---

<sup>18</sup> Bleakley and Cowan (2010) study a sample of emerging market firms during 1991-2002 and find no evidence that firms with high short-term exposure invest less immediately following a crisis episode. They however do not look at the dynamics over the entire 3S episode and compare only the crisis trough year in each country with all other years. They also don't study the entire system of financing and investment decisions as we do in our paper.

and scaled by total assets.<sup>19</sup> We once again estimate the system as a constrained SUR model subject to the constraints in equations (7)-(11) as well as additional constraints on each of the interaction coefficients across the system summing to zero.

**Insert Table 5 here**

In Panel A, we study the dynamics over the whole five year period comparing to pre-crisis levels  $SS_{t-2}$ . We find that firms with high prior levels of short-term debt in t-2 are in fact the firms that appear as candidate miracles because they have positive operating cash flows compared to t-2 and much lower levels of short-term debt compared to t-2. However, the panel also shows that these firms have access to significant equity issuances and some long-term borrowing suggesting that the recovery in cash flows is not credit-less. Comparing the coefficients, we see that during the crisis trough ( $SS_t$ ), for the firms with high prior levels of short-term debt, the total sources of cash increased by 5.2 cents. But this reflects an increase in operating cash flow of 18.5 cents (coefficient of  $STD_{t-2} \times SS_t$  in operating cash flow regression in panel B) and a decline in the other sources of cash (i.e. financing from different sources and asset sales) by 13.3 cents. The decline in sources of financing is largely accounted for by the decline in short-term debt (21.6 cents) since there was an increase of 4.1 cents in long-term debt and 4 cents in equity issuances. The uses of cash (i.e. investments, share repurchases, and dividend distributions) increased by 5.2 cents. We find similar patterns in  $SS_{t+1}$  and  $SS_{t+2}$  where there is a positive increase in operating cash flow and in issuance of long-term debt and equity.

The results are consistent with the notion that highly indebted firms are able to augment their internal cash flows to more than compensate for the decline in debt financing during 3S episodes. The combination of financing declines and larger cash flow increases suggests that the

---

<sup>19</sup> The main effect of short-term debt at t-2 is not included in the regressions since we de-mean all the variables as a way of accounting for firm fixed effects.

market for loans was working as predicted by corporate finance theories. The response to the 3S episodes is consistent with Phoenix recovery, but again the recovery in firms' positions occurs before the economy bottoms out.

Panel B of Table 5 confirms the timing of recovery in firms' cash positions by showing that during the recovery of the economy,  $t$  to  $t+2$ , firms with high initial short-term debt exposure in our sample do not have positive operating cash flows compared to time  $t$ . However, these firms seem to be increasing their capital expenditures over the period and also have access to short-term debt financing and equity.

### **Insert Table 6 here**

In Table 6, we examine if firms with higher levels of cash in  $SS_{t-2}$  have different investment and financing patterns than other firms across the whole period from  $t-2$  to  $t+2$  (panel A) and during the recovery period (panel B). The cash balances in  $t-2$  are scaled by total assets and are taken from the balance sheet. We estimate the system of equations as a constrained SUR model as before.

Panel A of Table 6 shows that when we look at the dynamics over the whole period comparing to levels in  $t-2$ , firms with high prior cash balances have negative cash flows, deplete their cash balances, and have significantly lower long-term debt and equity issuances. Their investments do not seem to be much lower than pre-crisis levels and they do seem to have access to some amount of short-term debt. A comparison of the coefficients shows that during the crisis trough ( $SS_t$ ), firms with high cash positions had a decrease in the total sources of cash by 11.4 cents with the largest decline being in long-term debt issuance of 14.4 cents while short-term debt borrowing actually increased by 10 cents. The total uses of cash also declined by 11.4 cents, though this is largely accounted for by the large decrease in cash balances of 26.5 cents rather

than capital expenditures which actually increase by 9.9 cents. As before, most of the adjustment to cash flows and financing occurs early in the 3S episode.

Panel B of Table 6 shows that compared to the crisis trough,  $SS_t$ , during the recovery years,  $SS_{t+1}$  and  $SS_{t+2}$ , firms with high cash balances in  $t-2$  continue to have negative operating cash flows, deplete their cash balances, cut capital expenditures and investments and do not have access to significant sources of financing.

In summary, from Tables 5 and 6, we find that during a 3S episode, the average emerging market firm in our sample has positive operating cash flow and a decline in financing from different sources compared to pre-crisis levels. However, we also have strong evidence that those with high levels of prior short-term debt have large positive operating cash flows and are able to issue long-term debt and equity. These firms continue to add to their cash balances and invest. So contrary to predictions that firms with high levels of short-term debt are most likely to be affected we find that while these firms do have lower levels of short-term debt, they are able to access other sources of financing. By contrast, firms with large cash positions in  $t-2$ , consistent with the finance literature on precautionary motive for cash holdings experience cash flow shortfalls and have large declines in long-term debt and equity issuances. However, even these firms are more likely to deplete their cash balances rather than obtain cash by foregoing investment to deal with the cash flow shortfalls.

Thus, we find evidence that firms in our sample of developing markets firms choose cash policies and leverage to partially protect them against financial and economic crises. Firms that are highly exposed to economic downturns hold large cash reserves. Less exposed firms use more short-term debt financing. The less exposed firms experience a Phoenix recovery, but the

cash flow, investment and financing adjustments occur before the GDP through. There is little evidence of Phoenix recoveries in the two years after the through.

## **5. 2008 US Financial Crisis**

In this section, we take a closer at the 2008 US financial crisis to investigate if the data shows a Phoenix Miracle in the US economy as suggested by Calvo and Kung (2010). The comparison of the US with emerging markets is particularly relevant since recently Boone and Johnson (2008) have argued that “the evolution of the current crisis seems remarkably similar to emerging market crises of a decade ago.” Krugman (2009) also notes the role of self-financing in the partial recovery of Japanese firms after the turn of the century. In addition, while the Phoenix Miracles have largely been an emerging market phenomena (Calvo et al., 2004), more recent studies (e.g. Claessens, Kose, and Terrones, 2009; World Economic Outlook, 2009) have documented a recovery in output ahead of a recovery in credit in recessions and credit crunches even in OECD countries. The comparison of the US and developing markets experiences is also of interest because it provides a contrast of how a mature financial system, with assistance from a solvent government provides financing in a crisis.

### *5.1. Output versus Credit Recovery – US Case*

#### **Insert Figures 4A and 4B**

In Figure 4A, we present the macro statistics on US-GDP and credit markets since 2005. The GDP numbers are seasonally adjusted real GDP estimates from the Bureau of Economic Analysis. As a measure of credit, we use Bank Credit from the Federal Reserve Board’s statistical release H.8 on the Assets and Liabilities of Commercial Banks in the US. Bank Credit

consists of the aggregate amount of assets held by all US commercial banks and includes both securities held by banks and loans and leases made by banks.<sup>20</sup> We use the December numbers each year from the H8 release which is in monthly data format. Figure 4A shows that both GDP and Bank Credit decline from 2008 to 2009 but begin to recover from 2009 to 2010. The drop in GDP from 2008 to 2009 was 2.63% where as the change in GDP from 2009 to 2010 was 2.85%. Bank Credit dropped by 3.78% from December 2008 to December 2009 but showed a positive increase of 2.15% from December 2009 to December 2010.

Next, we look at US firm-level data to understand if we see similar effects in the corporate sector. Using annual financial statements from Compustat for US publicly listed companies, in Figure 4B, we present evidence on sales and short-term borrowing, aggregated across all firms. In constructing the sample, we drop Canadian listings that are included as part of the Compustat U.S. domestic file, firms incorporated outside the U.S., ADRs, and financial services (NAICS 52 or SIC industries 60-64 and 67) resulting in a balanced panel of 3338 firms that had non-missing *Sales* (Income Statement data item #12) and *Debt in Current Liabilities* (Balance Sheet data item #34) reported over the six year period from 2005 to 2010.<sup>21</sup> Figure 4B shows that both sales and short-term debt begin to recover in 2009. In our sample, the aggregate sales dropped by 12.15% from 2008 to 2009 but increased by 9.69% from 2009 to 2010. Debt in

---

<sup>20</sup> As alternate measures we also use Loans and Leases by Commercial Banks, Commercial and Industrial Loans, and Consumer Loans. Loans and Leases by Commercial Banks is a sub-category of Bank Credit and includes Commercial and Industrial Loans, Real Estate Loans, Consumer Loans, Fed Funds, Repurchase Agreements with Brokers and other loans; Commercial and Industrial Loans is the corporate lending sub-component of Loans and Leases by Commercial Banks.

<sup>21</sup> The Compustat data download was in July 2011. So we may be missing data on some firms that have fiscal year ends in January-May 2011 (which would count as fiscal year 2010 data) that may not have been updated in Compustat. Hence, we use a balanced sample because we are looking at aggregate sales and debt figures in the economy and we don't want the year to year variation to be biased by non-missing data. However, to ensure that our results do not change if we were to include the non-missing data we re-do our analysis using quarterly statement data and do find a recovery in sales across all the firms in second quarter of 2009.

current liabilities, on the other hand, dropped by 28.88% from 2008 to 2009 and recovered by 3.94% from 2009 to 2010.

In unreported runs, we examine alternate measures of output at the firm level including Sales adjusted for Changes in total inventories, Sales adjusted for changes in finished-goods inventories and work in progress inventories, profitability as measured by earnings before interest, taxes, depreciation and amortization (EBITDA), and EBITDA adjusted for selling and general administrative expenses. In all instances, we find that output recovers in 2009 reaching pre-crisis levels of 2008 in 2010 in most cases. Overall, from Figures 4A and 4B we see that both output and credit in the US begin to recover simultaneously in 2009 although short-term credit levels are far below their pre-crisis peaks in 2008.

#### **Insert Table 7 here**

In Table 7, we present a detailed firm-level analysis using operating cash flows to understand how many firms recover and in how many cases recovery is in the absence of credit, suggesting potential phoenix miracles. In panel A of Table 7 we see that during the crisis period from 2008 to 2009, 59.86% of firms had a positive increase in operating cash flows while 40.02% of firms had a decline in operating cash flow. By contrast during 2009 to 2010 when there is a sales recovery, 50.1% of the firms in our sample had a positive increase in operating cash flow and 49.71% of the firms had a decline in operating cash flow.

In panel B of Table 7 we repeat our analysis of Table 3 for the sample of US firms using different measures of changes in financing as reported on the Balance Sheet and Statement of Cash Flows in Compustat. The Data Appendix provides details on how each of the variables is constructed. When we use changes in short-term borrowing (Balance Sheet data item #34) as a measure of credit, we find 32.56% of our sample to be Phoenix Miracles – these firms had a

positive increase in operating cash flow without a positive increase in short-term borrowing from 2009 to 2010.<sup>22</sup> Even amongst these candidate Phoenix Miracles, we find that 90% (unreported in the table) of the firms had an adequate cash balance in their balance sheet to cover their liquidity crunch. That is, the ratio of the absolute value of changes in short-term borrowing from 2009 to 2010 to their balance sheet Cash and Short-term Investments position in 2010, was <1 for 90% of the firms. When we look at the firms that are not candidate miracles, 17.73% of the firms had a positive increase in operating cash flow and short-term borrowing, 18.82% had a decline in operating cash flow but an increase in short-term borrowing and 30.89% of firms had a decline in operating cash flow and short-term borrowing.

The percentage of Phoenix Miracles is reduced to 5.75% when we consider the changes in Long-term Debt (Balance Sheet data item #9), Net Capital Stock Issuance (*Sale of Common and Preferred Stock*, data item #108 – *Purchase of Common and Preferred Stock*, data item #115), Cash from Dividends (*Cash Dividends*, data item #127), and Other Financing activities (*Financing Activities-Other*, data item #312).

In Panel C we examine the different accounts in the Statement of Cash flows to identify alternate sources of liquidity for the firms during the recovery period. We re-define credit to not only include net financing from changes in short-term debt, long-term debt, equity issuances, and other financing activities but also cash from other sources such as that which could have been saved by cutting dividends, capital expenditures, and acquisitions. Specifically, when we include cash that could have been generated by cutting Dividends (data item #21), Capital Expenditures (data item #128), Net Investments (*Sale of Investments* data item #109-*Increase in Investments* data item #113), Changes in Short-term Investments (data item #309) and Other Investing

---

<sup>22</sup> We prefer to use the balance sheet data for constructing changes in short-term and long-term borrowing over 2009-2010 because the corresponding items in the Statement of cash flows are missing for a large portion of the sample.

Activities (data item #310) and cash generated from Sale of Property, Plant and Equipment (data item #107) and Acquisitions (data item #129), we find that the percentage of candidate phoenix miracles in our sample decreases to 3.42%. Thus, a very small percentage of the firms in the US sample had a positive increase in sales from 2009 to 2010 while the overall change in credit (short-term debt, long-term debt, net capital stock issuance, cash generated from cutting dividends and cash from investing and operating activities) was negative.<sup>23</sup>

## *5.2. Firms' Financing and Investment Decisions during Recovery – US Case*

In this section we repeat the analysis in section 4.2 for the US case. We examine how the exogenous macroeconomic shock affected firms' operating cash flows, investment, financing, and distribution decisions jointly, subject to the accounting identity that sources of cash equal uses of cash. We re-estimate the system of equations in (6) over 2006-2010 using a sample of US firms from Compustat. We start with the balanced sample of 3,338 firms and remove the top and bottom 1% outliers for all the variables in the system. To estimate the effects during the crisis and recovery periods separately, we estimate the system by including four time dummies for 2007 (pre-crisis period), 2008 (crisis year), 2009 (crisis year) and 2010 (recovery year) with 2006 being the omitted time dummy. In all regressions, as before, we use de-measured values of all variables (to proxy for firm fixed effects). We also include controls for firm size (Log Total assets) and Tobin's Q. The system is estimated as a seemingly unrelated regression (SUR) model subject to the constraints that across the system, in each year, the coefficients sum to 0. That is,

$$\begin{aligned} \sum \text{Coefficients of Log Size} &= 0; \\ \sum \text{Coefficients of Tobin's Q} &= 0; \text{ and} \end{aligned}$$

---

<sup>23</sup> As is the practice in the literature (e.g. Gatchev, Pulvino and Tarhan, 2010), we replace missing data with zero to avoid dropping observations with missing Compustat variables. However, on having a detailed look at the annual 10-K reports for several companies, we find the statements to be consistent with the missing numbers being 0.

$\Sigma$  Coefficients of each of the time dummies =0.

**Insert Table 8 here**

Table 8 presents the results of the SUR model. We find that for the average firm in our sample, there is a drop in operating cash flows compared to 2006 levels in 2008 and 2010, although the declines are small in magnitude and significant only in 2008. There is also a small decline in the changes in cash positions through the sample period though the coefficients are significant only in 2008 and 2010. We find a significant drop in both capital expenditures and other investments from 2008 to 2010. However, asset sales do not increase but show a decrease in 2009 and 2010. On the financing side, while short term debt is positive and significant in 2008, it declines although by very small amounts in 2009 and 2010. Both long-term debt issuance and equity issuance decline from 2008 to 2010.

Comparing the magnitude of the coefficients, we see that in 2009, operating cash flows increased by a very small amount, 0.4 cents while other sources of cash (asset sales, long-term debt, short-term debt, equity issuances, and other financing) declined by 7.7 cents with the largest declines coming from equity and long-term debt. The uses of cash declined by 7.3 cents with the largest declines coming from the cut in capital expenditures (2.5 cents) and other investments (2.8 cents). Even during the recovery period in 2010 we find very small changes in operating cash flow and short-term debt.

Overall we find that during the US crisis, firms in our sample cut investments and were unable to raise much long-term debt financing and equity issuances. But there is little evidence of a significant decline in cash flows or short-term debt. Thus at the micro-level we don't find evidence of the US crisis being a credit-less recovery.

### 5.2.2. *Role of Short-Term Debt and Cash*

In this section we repeat our analysis in section 4.4 for US firms and examine how holdings of short-term debt and cash in 2006 affect cash flows, investment and financing patterns from 2007 to 2010. Studies of capital structure choice in developed countries find that firms in general have more long-term debt than in developing countries (e.g. Rajan and Zingales, 1995; Demircuc-Kunt and Maksimovic, 1999; Booth, Aivazian, Demircuc-Kunt, and Maksimovic, 2001) and that debt maturity choice is a function of institutional features such as taxation and inflation policies and development of legal and financial systems. Consequently, unlike in the case of emerging markets, this literature has no predictions to offer on the role of debt maturity structure in dealing with macroeconomic shocks.<sup>24</sup>

With cash balances on the other hand, studies have found support for both agency and precautionary motives for cash holdings. A large literature since Jensen (1986) has argued that firms with agency problems accumulate cash (e.g. Dittmar and Mahrt-Smith, 2007; Pinkowitz, Stulz, and Williamson, 2006; Harford, Mansi, and Maxwell, 2008). Other studies have suggested that firms hold cash as a precautionary motive to better cope with adverse shocks when access to capital markets is costly. So firms with riskier cash flows and poor access to external capital are more likely to hold cash (e.g. Almeida, Campello, and Weisbach, 2004; Han and Qiu, 2007). Recent studies such as Bates, Kahle, and Stulz (2009) find that the average cash-to assets ratio for US industrial firms more than doubled over the period 1980 to 2006 and that this increase can be explained by the precautionary motive for cash holdings. In this section, we examine the role

---

<sup>24</sup> Almeida, Campello, Laranjeira, and Weisbenner (2009) focus exclusively on how the maturity structure of long-term debt affected investment during the 2008 US financial crisis. They find that firms with large portions of long-term debt maturing right at the time of the crisis reduced investment more than similar firms that did not have refinance their debt during the crisis.

of high prior short-term debt and cash holdings on investment and financing outcomes during the crisis.

Panel A of Table 9 shows that firms with high levels of short-term debt in 2006 have negative operating cash flows in 2007 but thereafter have positive operating cash flows from 2008-2010, though these are not significant. These firms continue to add to their cash balances and investing, though these are again not significant. On the financing side, they have lower levels of short-term debt but continue to issue long-term debt and equity through the crisis and recovery years. Again, the financing variables are largely not significant in any of the years (equity issuances are significant only at the 10% level in 2008 and 2009). Overall, the magnitudes of all the coefficients are small and largely insignificant suggesting that high levels of short-term debt prior to the crisis has little impact on the outcomes of US firms during crisis and recovery.

In Panel B of Table 9, we examine how firms with high cash holdings respond to the shock. We find that firms with high cash holdings in 2006 experience significant cash flows shortfalls in each of the years from 2007 to 2010 and have large reductions in their cash positions. When we look at their investments, we find that these firms continue to spend on capital expenditures though there also seems to be a positive and significant increase in asset sales in 2009 and 2010. On the financing side, while firms with high prior cash have lower equity issuances, they continue to be able to have access to short-term debt and long-term debt.

Invoking the accounting identity that sources of cash equals uses of cash, we can compare the magnitudes of the coefficients. In the year 2009, we see that firms with high cash positions in 2006 decreased their operating cash flow by 6 cents. The uses of cash declined by 16.1 cents – while they spent 3.1 cents on capital expenditures, paid out 0.3 cents in dividends,

and spent 1.4 cents on share repurchases, they also depleted their cash balances by 20.8 cents and reduced other investments by 0.1 cents. The sources of cash in 2008 also declined by 16.1 cents with a 6 cents decline in operating cash flow and 19.6 cents decline in equity issuances. However, other financing sources increased with long-term debt increasing by 7.1 cents, short-term debt by 1.9 cents and other financing by 0.3 cents. We also see that in each of the years the sum of magnitudes of the financing coefficients is much larger than the sum of the investment coefficients suggesting that firms dealing with adverse cash flow shocks have higher financing-cash flow sensitivities than investment cash-flow sensitivities.

Table 9 thus shows that consistent with the precautionary motive of cash holdings, firms with high prior cash holdings had significant declines in cash flows, depleted cash balances, and were unable to access equity markets. However these firms were able to raise financing in the short-term and long-term debt markets and continued to spend money on capital expenditures.

Overall, the experience of US firms during the one-year recovery from the 2008 US financial crisis suggests that it parallels the emerging market experience in that the recoveries do not appear to be credit-less. The interesting contrast with the 3S episodes (albeit the output drops are much smaller) is that given the large amount of government assistance during the US crisis, the financial system provided financing for the high cash firms that were having cash flow deficits.

## **6. Conclusion**

We provide empirical evidence on the effect of Systemic Sudden Stops (3S), a natural experiment in which a country's banking system and GDP shrink, on firms in developing countries. In an influential paper, Calvo et al. (2006a) argue that recovery from these financial

crises by firms occurs before the recovery of the banking sector and outline a theoretical model of this recovery in which the financial sector does not play a role. They term these credit-less recoveries as “Phoenix Miracles.” This position has significant policy implications for the role of credit markets in stimulating recovery from a financial crisis and suggests that the role of the financial system is secondary.

While this thesis appears to be consistent with averaged macro data across a sample of 3S episodes, closer inspection reveals heterogeneity of responses across the countries, with only a minority fitting the pattern outlined by Calvo et al. (2006a). Our analysis of the recovery patterns and sources of financing in the firm-level data shows that even in these countries, less than 28% of the firms follow this pattern in the recovery period after the GDP bottoms out. However, there is evidence that firms increase operational cash flows, cut investment and reduce indebtedness in the early stages of 3S episodes, before the GDP bottoms out.

When we examine the 2008 U.S. financial crisis, we find no evidence of a credit-less recovery at the macro or micro level. At the macro level we find that both GDP and aggregate Bank Credit recover simultaneously in 2009 as do aggregate Sales and Short Term Credit at the micro level. A detailed firm-level analysis shows that once we account for the different sources of external credit, only 5.75% of the firms in the US sample are candidate Phoenix Miracles. In addition, if we were to consider the cash that could have been saved by these firms by cutting dividends, capital expenditures, acquisitions and other investments, only 3.42% of the firms in the US sample appear to have a recovery in operating cash flow not accompanied by credit.

Finally, we find that during the 3S episode, firms with high prior levels of short-term debt rather than being the most constrained have positive cash flows and are able to substitute short-term debt with equity and long-term debt compared to pre-crisis levels. In both the 3S episode

and the US crisis, we find that firms with high prior levels of cash holdings have negative cash flows and deplete their cash balances. These outcomes are predicted by trade-off theories of financial structure and the precautionary motive for holding cash.

The US crisis does provide an interesting contrast to the 3S episodes in that with the large amount of government intervention to support the financial system, we don't see as significant declines in borrowing (both long-term debt and short-term) with the high cash firms actually getting short-term and long-term debt from the financial system.

## References

Abiad, Abdul, Giovanni Dell'Araccia, and Bin Li, 2011, Creditless Recoveries. *IMF Working Paper Series*.

Almeida, H., M. Campello, B. Laranjeira, and S. Weisbenner, 2010, Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis, *NBER Working Paper Series 14990*

Bartelsman, E. J. and Z. Wolf, 2009, Forecasting Productivity Using Information from Firm-Level Data, *Tinbergen Institute Discussion Papers 09-043/3*.

Beck, Thorsten and Ross Levine, 2002, Industry growth and capital allocation: Does having a market- or bank-based system matter? *Journal of Financial Economics* 64, 147–180

Bekaert, Geert, Campbell R. Harvey, and Christian Lundblad, 2005, Does financial liberalization spur growth? *Journal of Financial Economics* 77, 3-55.

Bekaert, Geert, Campbell R. Harvey, Christian Lundblad and Stephan Siegel, 2007, Global Growth Opportunities and Market Integration, *Journal of Finance*, vol. 62(3), 1081-1137

Biggs, Michael, Thomas Mayer and Andreas Pick, 2010, Credit and Economic Recovery: Demystifying Phoenix Miracles, *SSRN Working Paper Series*

Bleakley, Hoyt and Kevin Cowan, 2008, Corporate Dollar Debt and Depreciations: Much Ado About Nothing?, *The Review of Economics and Statistics* 90(4), 612-626.

Bleakley, Hoyt and Kevin Cowan, 2010, Maturity Mismatch and Financial Crises: Evidence from Emerging Market Corporations, *Journal of Development Economics* 93, 189-205.

Boone, Peter, and Simon Johnson, 2008, Baseline Scenario, First Edition, September 29, 2008.

Brunnermeier, Markus K., 2009. Deciphering the Liquidity and Credit Crunch 2007-2008. *Journal of Economic Perspectives* 23, 77-100.

Bushman Robert M., Abbie J. Smith, X. Frank Zhang, 2007, Investment-Cash Flow Sensitivities are Really Investment-Investment Sensitivities, *Working Paper*.

Calvo, Guillermo A., Alejandro Izquierdo, and Luis-Fernando Mejía. 2004, On the Empirics of Sudden Stops: The Relevance of Balance-Sheet Effects, *Proceedings of the Federal Reserve Bank of San Francisco*.

Calvo, Guillermo A., Izquierdo, Alejandro, and Ernesto Talvi, 2006a, The Economics of Sudden Stops in Emerging Economies: Sudden Stops and Phoenix Miracles in Emerging Markets, *American Economic Review* 96(2), 405-410.

Calvo, Guillermo A., Izquierdo, Alejandro, and Ernesto Talvi, 2006b, Phoenix Miracles in Emerging Markets: Recovering without Credit from Systemic Financial Crises, *IADB Working Paper Series 570*.

Calvo, Guillermo A., and Rudy Loo-Kung, 2010, US Recovery: A New Phoenix Miracle. *IADB Discussion Paper No. IDB-DP-106*.

Calomiris, Charles; Klingebiel, Daniela, and Luc Laeven, 2005, “Financial Crisis Policies and Resolution Mechanisms: A Taxonomy from Cross-Country Experience”. In: Patrick Honohan and Luc Laeven (Eds.), [Systemic Financial Distress: Containment and Resolution](#), Chapter 2, Cambridge: Cambridge University Press, Forthcoming.

Campello, M., J. Graham, E. Giambona, and C. Harvey, 2011, Liquidity Management and Corporate Investment During a Financial Crisis. *Review of Financial Studies forthcoming*.

Campello, M., J. Graham, and C. Harvey, 2010, The Real Effects of Financial Constraints: Evidence from a Financial Crisis. *Journal of Financial Economics* 97, 470-487.

Cetorelli, N., and M. Gambera, 2001, Banking structure, financial dependence and growth: International evidence from industry data. *Journal of Finance* 56, 617–648.

Chari A. and P. Henry, 2008, “Firm Specific Information and the Efficiency of Investment”, *Journal of Financial Economics* 87(3), 636-655.

Chari V.V., L.J. Christiano and P.J. Kehoe, 2008, “Facts and Myths about the Financial Crisis of 2008,” Working Paper, Federal Reserve Bank of Minneapolis.

Chang, X., Dasgupta, D., and Wong, G. 2011, “How do firms allocate internal cash flow? The effect of misvaluation and costly external finance” *Working Paper*

Claessens, Stijn, M. Ayhan Kose and Marco E Terrones, 2011, “How do Business and Financial Cycles Interact?” *IMF Working Paper Series*.

Claessens, Stijn, M. Ayhan Kose and Marco E Terrones, 2009, “What Happens During Recessions, Crunches and Busts?” *Economic Policy* 24, 653-700.

Claessens, Stijn, Klingebiel, Daniela, and Laeven, Luc, 2005, “Crisis Resolution, Policies, and Institutions: Empirical Evidence”, In: Patrick Honohan and Luc Laeven (Eds.), [Systemic Financial Distress: Containment and Resolution](#), Chapter 6, Cambridge: Cambridge University Press, Forthcoming.

Claessens, Stijn, and Laeven, Luc, 2005, Financial Dependence, banking sector competition, and economic growth, *Journal of the European Economic Association* 3, 179-207.

Daniel, N., D. Denis and L. Naveen, 2011, Sources of Financial Flexibility: Evidence from How Firms Manage Cash Flow Shortfalls, *working paper*.

Dasgupta, Sudipto, Thomas H Noe, and Zhen Wang, 2011, Where did all the dollars go? The effect of cash flow shocks on capital and asset structure, *Journal of Financial and Quantitative Analysis forthcoming*.

Demirguc-Kunt, Asli, and Vojislav Maksimovic, 1998, Law, finance, and firm growth, *Journal of Finance* 53, 2107-2137.

Demirguc-Kunt, Asli, and Vojislav Maksimovic, 1999, Institutions, Financial Markets, and Firms Debt Maturity, *Journal of Financial Economics* 54(3), 295-336.

Dobozi, I and G. Pohl, 1995, Real Output Decline in Transition Economies - Forget GDP, Try Power Consumption Data!, *Transition*, vol. 6, no. 1-2, p. 17

Eichengreen, B., 2002. Capital account liberalization: what do the cross-country studies tell us? *World Bank Economic Review* 15, 341–366.

Fan, J., S. Titman, and G. Twite, 2010, An International Comparison of Capital Structure and Debt Maturity Choices, *Journal of Financial and Quantitative Analysis forthcoming*.

Gatchev, Vladimir A., Todd Pulvino, and Vefa Tarhan, 2010, “The Interdependent and Intertemporal Nature of Financial Decisions: An Application to Cash Flow Sensitivities”, *Journal of Finance* 65(2), 725-763.

Henry, P. (2000). “Do stock market liberalizations cause investment booms?”. *Journal of Financial Economics* 58, 301–334.

Henry, P. (2003). “Capital account liberalization, the cost of capital, and economic growth”. *American Economic Review* 93, 91–96.

Hovakimian, A., Hovakimian, G., Tehranian, H., 2004, Determinants of target capital structure: the case of dual debt and equity issues. *Journal of Financial Economics*, 71, 517-540.

Huang, Zhangkai, Colin Mayer, and Oren Sussman, 2008, How Do Firms Finance Large Cash Flow Requirements? *Oxford Financial Research Center Working Paper Series*.

Honohan, Patrick and Luc Laeven (eds.), 2005, [Systemic Financial Distress: Containment and Resolution](#), Cambridge, UK: Cambridge University Press.

Huntley, J., 2008, Phoenix Falling: Recovering from Sudden Stops in Emerging Markets, *mimeo*, Northwestern University

Ivashina, Victoria, and David S. Scharfstein, 2010, Bank Lending During the Financial Crisis of 2008, *Journal of Financial Economics* 97 (3), 319-338.

King, R.G. and R. Levine, 1993, Finance and growth: Schumpeter might be right, *Quarterly Journal of Economics* 108, 717-738.

Krugman, Paul, 2009, Japan's Recovery, *Commentary in the NY Times Blog*, April 2, 2009

Laeven, L. and F. Valencia, 2008, Systemic Banking Crises: A New Database, *IMF Working Paper Series*.

Levine, R., (2001). "International Financial Liberalization and Economic Growth" *Review of International Economics* 9(4), 688-702.

Levine, R., Zervos, S. (1998). "Capital control liberalization and stock market development". *World Development* 26, 1169–1184.

Miron, J. A. and S. P. Zeldes, 1989, Production, sales, and the change in inventories: An identity that doesn't add up, *Journal of Monetary Economics* 24(1), 31-51.

Rajan, R.G., Zingales, L., 1998, Financial dependence and growth. *American Economic Review* 88, 559–586.

Ravallion, Martin, 2003, Measuring Aggregate Economic Welfare in Developing Countries: How Well do National Accounts and Surveys Agree?, *Review of Economics and Statistics*, 85: 645-652.

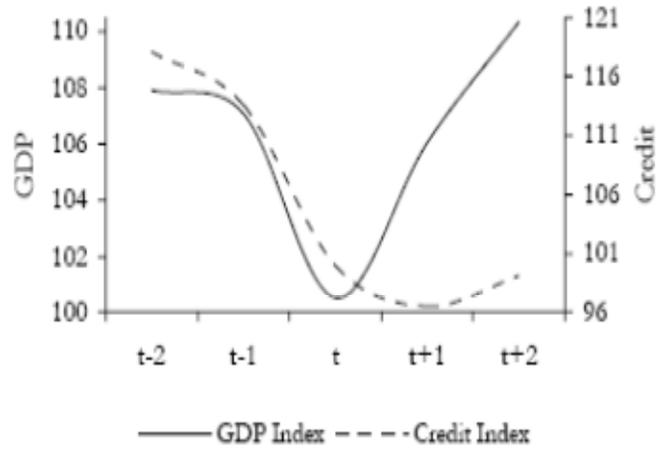
Scott, James H., 1976, A theory of optimal capital structure, *The Bell Journal of Economics* Vol. 7(1), 33-54.

Young, A., 2009, The African Growth Miracle, *World* 68.

**Figure 1: Output and Credit Collapses during 3S episodes**

**(A) Averages across 22 3S episodes**

Source: Calvo et al. (2006)



**(B) Averages across 9 3S episodes**

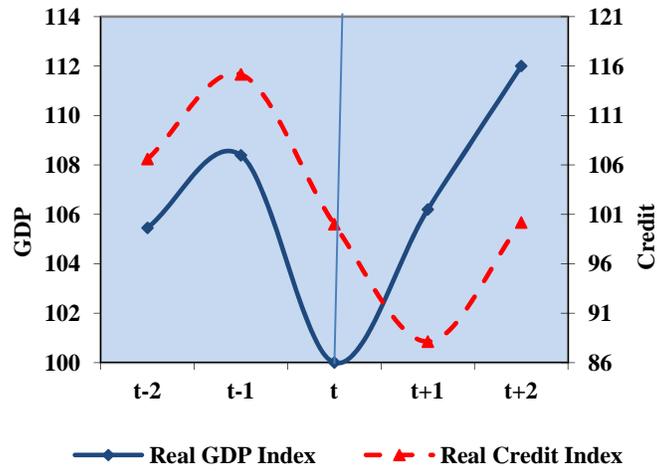
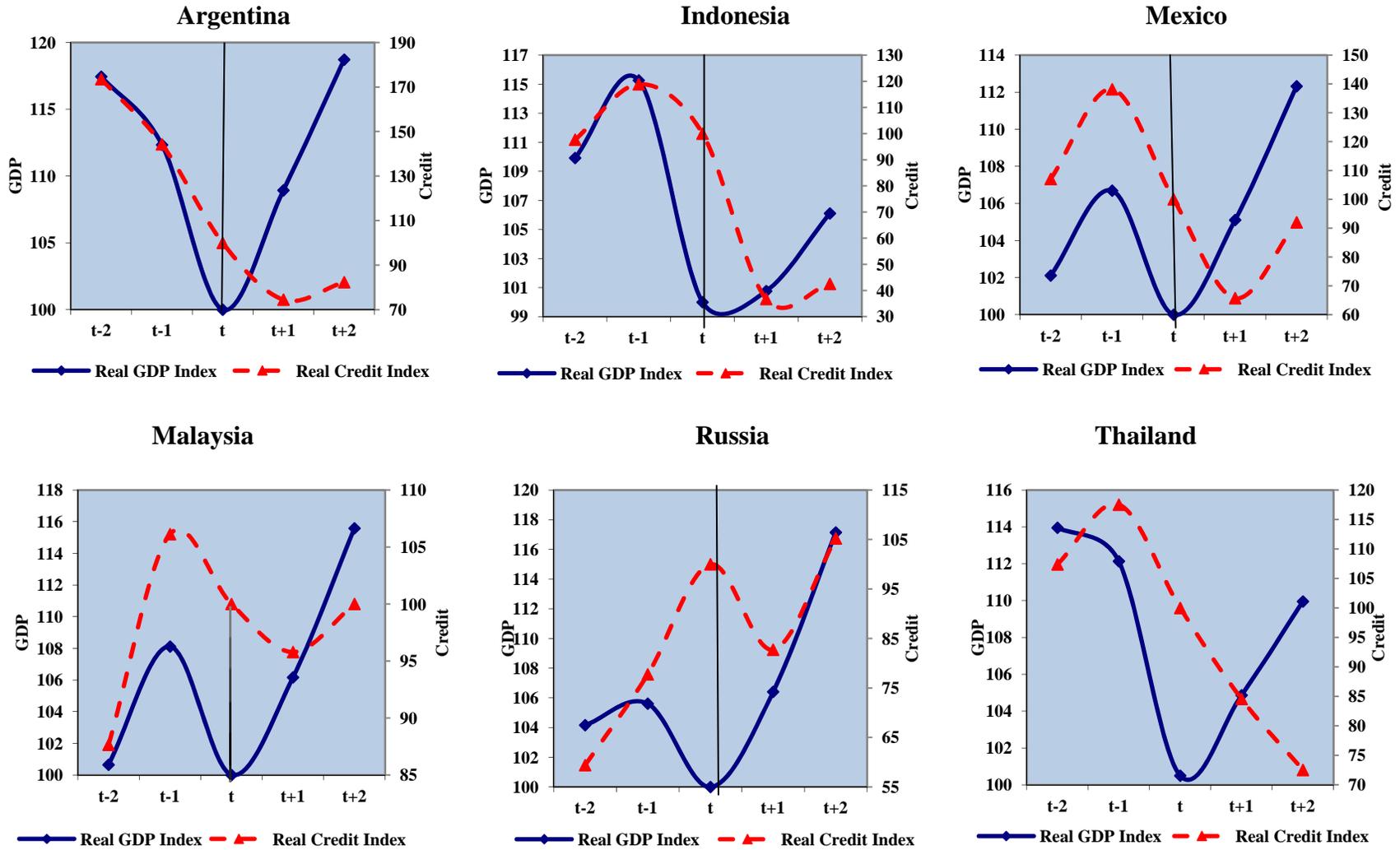


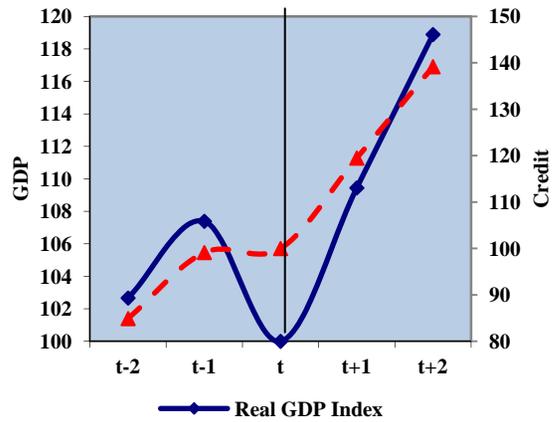
Figure 2: Macro Evidence - Heterogeneity across 3S episodes

2A: Phoenix Miracles at the Macro level

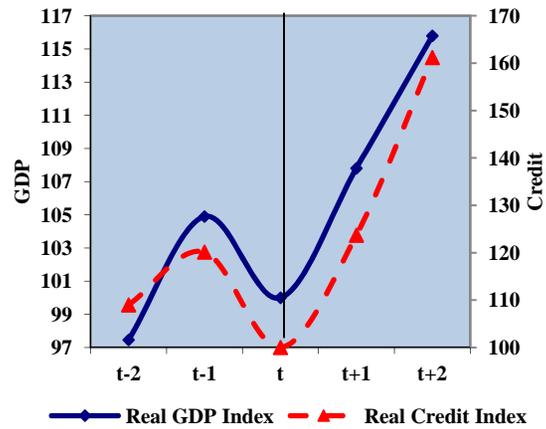


## 2B: Non-Miracles at the Macro Level

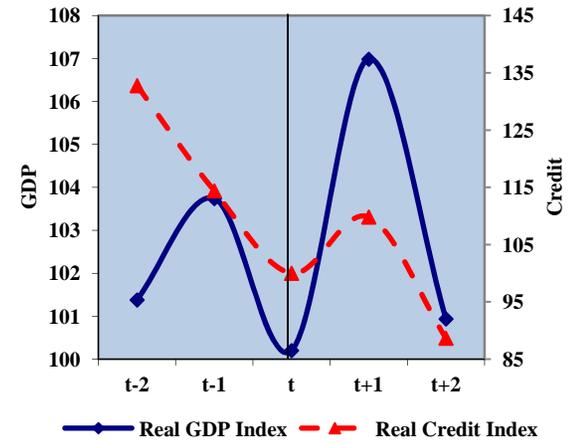
### Korea



### Turkey 1994

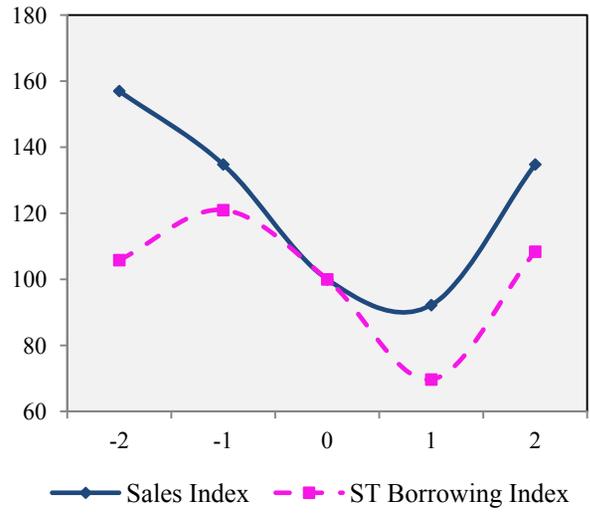


### Turkey 1999

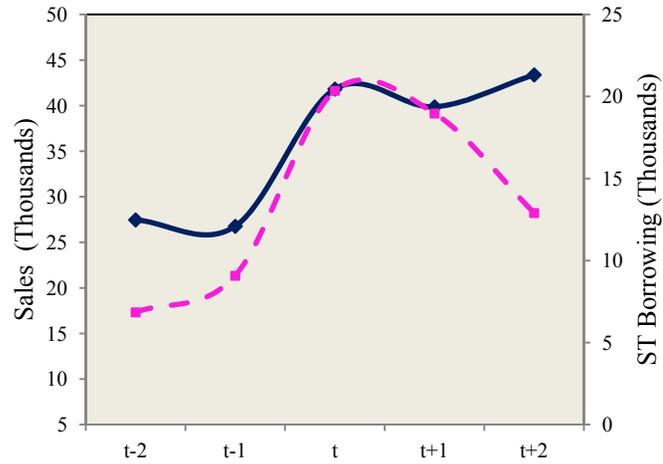


**Figure 3: Recovery in Corporate Sales versus Short Term Credit – Phoenix Miracles at the Micro Level**

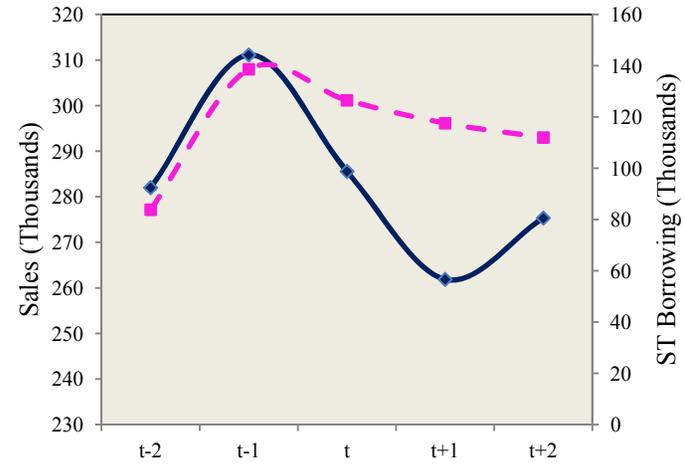
**3A. Average across 9 episodes**



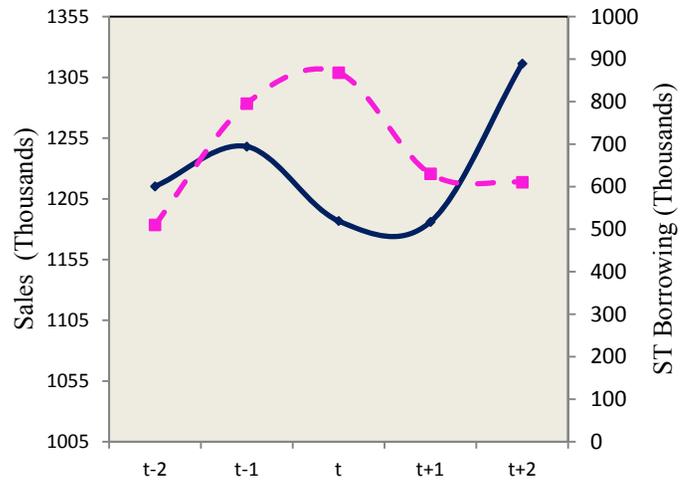
### 3B. Phoenix Miracles at the Macro and Micro Level Argentina



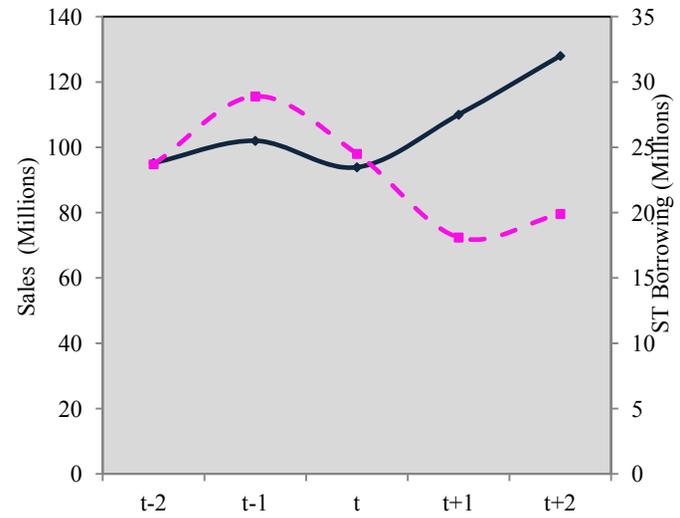
### Malaysia



### Thailand

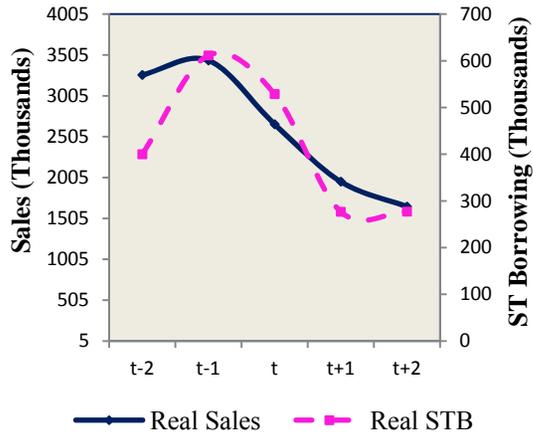


### Korea

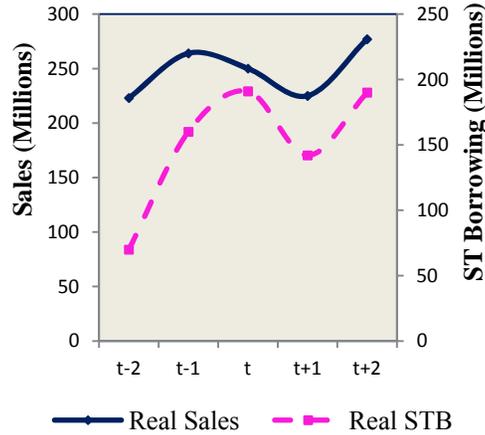


### 3C. Phoenix Miracles only at the Macro Level but not at the Micro-Level

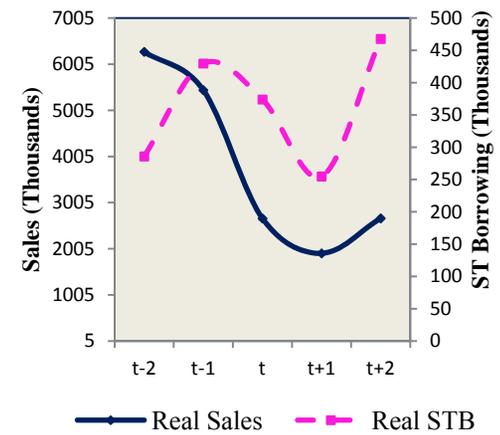
**Mexico**



**Indonesia**

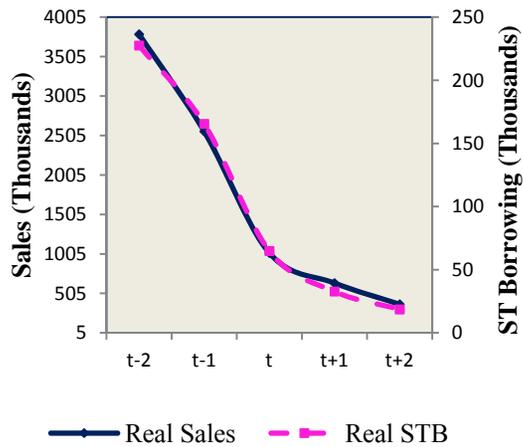


**Russia**

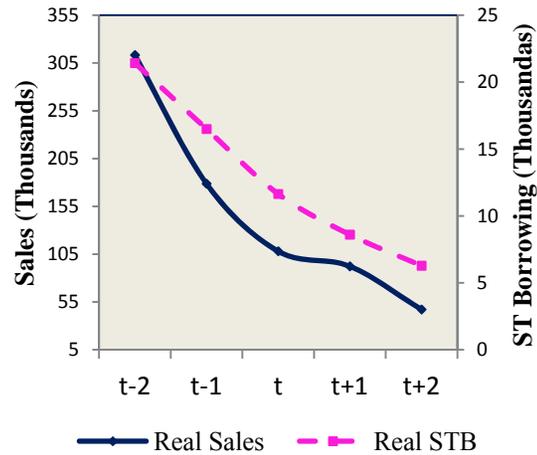


### 3D. No Phoenix Miracles at the Macro or Micro Level

**Turkey (1994)**



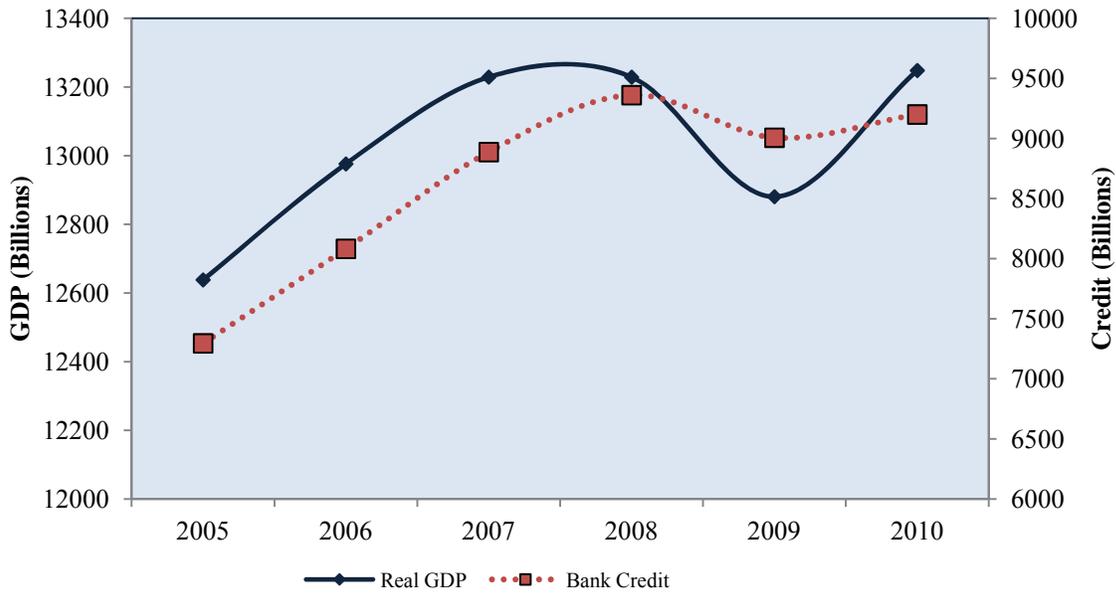
**Turkey (1999)**



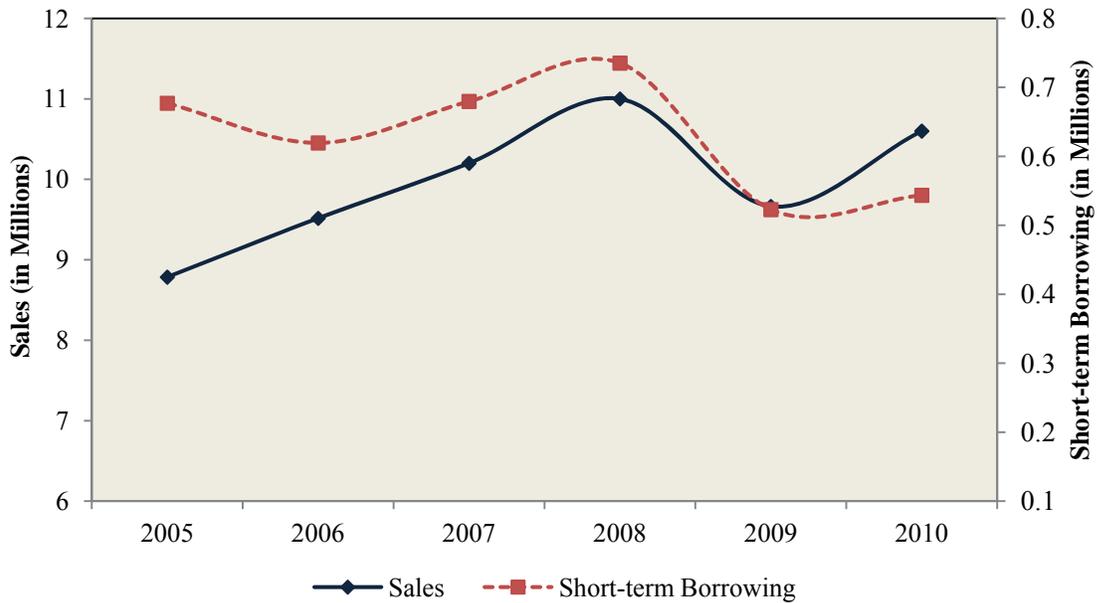
### Figure 4: The US Financial Crisis

This figure shows patterns of output and credit at both the macro and micro levels from 2005-2010 in the United States. Figure 6A outlines GDP and Bank Credit and Figure 6B outlines aggregate Sales and Short-term Borrowing. GDP is annual real Gross Domestic Product in billions of chained 2005 dollars from the Bureau of Economic Analysis. Bank Credit is the December values in each year, of the seasonally adjusted aggregate amount of assets held by all U.S. commercial banks and is sourced from statistical release H8 (*Assets and Liabilities of Commercial Banks in the United States*) of the Federal Reserve Board. Sales and Short-term borrowing are the aggregate sales and debt in current liabilities respectively, computed by summing across the sample of firms in Compustat database each year.

#### 4A: GDP and Bank Credit



#### 4B: Sales and Short-Term Borrowing



**Table 1: 3S Collapse Episodes over the 1990s**

This table presents the dates associated with the Sudden Systemic Stop (3S) episodes over the 1990s as outlined in Calvo, Izquierdo, and Talvi (2006a). The pre-crisis peak is the year displaying the maximum level of output (GDP) preceding a trough, trough is the local minimum following the onset of a crisis and recovery point is the year in which the pre-crisis peak output level is fully restored.

---

| <b>Dating of Output Collapse from<br/>Calvo et al. (2006)</b> |                    |                    |        |                   |
|---|--------------------|--------------------|--------|-------------------|
| #   | Country            | Pre-Crisis<br>Peak | Trough | Recovery<br>Point |
| 1   | Argentina          | 1998               | 2002   | 2004              |
| 2   | Indonesia          | 1997               | 1998   | 2003              |
| 3   | Malaysia           | 1997               | 1998   | 2000              |
| 4   | Mexico             | 1994               | 1995   | 1997              |
| 5   | Russia             | 1997               | 1998   | 1999              |
| 6   | South Korea        | 1997               | 1998   | 1999              |
| 7   | Thailand           | 1996               | 1998   | 2002              |
| 8   | Turkey (1992-1996) | 1993               | 1994   | 1995              |
| 9   | Turkey (1997-2001) | 1998               | 1999   | 2000              |

---

**Table 2: Drop in GDP and Private Credit across the 3S Episodes**

Columns 1 and 2 provide the years in which GDP and Credit begin to recover in relation to time  $t$ , which is the local minimum following the onset of the 3S crisis episode. Columns 3 and 4 provide the percentage drop in GDP and Credit respectively from the pre-crisis peak to the local minimum following the onset of the 3S episode. GDP is the real GDP in constant local currency units from World Development Indicators and Credit is the Claims on the Private Sector by Deposit Money Banks from the International Financial Statistics (line 22d) deflated by the Consumer Price Index (CPI).

|                         | 1               | 2                  | 3               | 4                  |
|-------------------------|-----------------|--------------------|-----------------|--------------------|
|                         | Recovery of GDP | Recovery of Credit | Drop in GDP (%) | Drop in Credit (%) |
| <i>Phoenix Miracles</i> |                 |                    |                 |                    |
| Argentina               | t               | t+1                | -15%            | -57%               |
| Indonesia               | t               | t+1                | -13%            | -69%               |
| Mexico                  | t               | t+1                | -6%             | -52%               |
| Malaysia                | t               | t+1                | -7%             | -10%               |
| Russia                  | t               | t+1                | -5%             | -17%               |
| Thailand                | t               | t+3                | -12%            | -38%               |
| <i>Non- Miracles</i>    |                 |                    |                 |                    |
| South Korea             | t               | t                  | -7%             | -                  |
| Turkey (1992-1996)      | t               | t                  | -5%             | -17%               |
| Turkey (1997-2001)      | t               | t                  | -3%             | -33%               |

**Table 3: Recovery from 3S episodes - Potential Phoenix Miracles in 3S Episodes**

In Panel A, we present the percentage of firms in each country that had a recovery (defined by a positive change) in operating cash flow (OCF) over the period  $t$  to  $t+2$ , with  $t$  being the crisis trough. In Panel B, we identify four categories of firms based on their OCF recovery and credit recovery - the percentage of firms that had a zero or positive change in OCF and a positive change in credit, a zero/positive change in OCF while change in credit is zero/negative (these firms are candidate Phoenix Miracles), a negative change in OCF while change in credit is positive, and a negative change in OCF and a zero/negative change in credit. We use two definitions of changes in credit. In panel B1 we use Changes in Short-term borrowing and in panel B2, we use Changes in Short-term borrowing, changes in long-term debt (long-term debt issuance-long-term debt reduction), net capital stock issuance (equity issuance – repurchases), and other financing. The definition in C1 includes the definition in B2 plus dividends, and cash from investing activities including sale of property, plant, and equipment, changes in investments, changes in short-term investments, and cash from other investing activities.

**Panel A: Recovery of Firms**

| <b>Country</b> | <b>Total Number of firms</b> | <b>% of firms with recovery in OCF from <math>t</math> to <math>t+2</math></b> | <b>% of firms with no recovery in OCF from <math>t</math> to <math>t+2</math></b> |
|----------------|------------------------------|--|---|
| Indonesia      | 214                          | 46.26  | 53.74   |
| Mexico         | 76                           | 34.21  | 65.79   |
| Korea          | 289                          | 51.21  | 48.79   |
| Malaysia       | 474                          | 44.3   | 55.7  |
| Thailand       | 273                          | 42.12  | 57.87   |
| <i>Total</i>   | <i>1326</i>                  | <i>45.1</i>  | <i>54.9</i>   |

**Panel B: Identifying Phoenix Miracles at the firm level**

| <b>Country</b>   | <b>Recovery in OCF and Credit</b> | <b>Recovery in OCF Only (PHOENIX)</b> | <b>No Recovery in OCF but Recovery in Credit</b> | <b>No Recovery in OCF or Credit</b> |
|--|-----------------------------------|---------------------------------------|--|-------------------------------------|
| <b>Panel B1: Credit is defined as Short-Term Borrowing</b>   |                                   |                                       |  |                                     |
| Indonesia  | 8.88                              | 37.38                                 | 10.28  | 43.46                               |
| Mexico   | 11.84                             | 22.37                                 | 25.00  | 40.79                               |
| Korea  | 15.22                             | 35.99                                 | 26.30  | 22.49                               |
| Malaysia   | 16.03                             | 28.27                                 | 16.46  | 39.24                               |
| Thailand   | 11.72                             | 30.40                                 | 21.98  | 35.90                               |
| <i>Total</i>   | <i>13.57</i>                      | <i>31.52</i>                          | <i>19.23</i>                                     | <i>35.67</i>                        |
| <b>Panel B2: Credit is defined as Short-Term, Long-Term Borrowing, Net Capital Stock Issuance and Other Financing Activities</b> |                                   |                                       |  |                                     |
| Indonesia  | 12.62                             | 33.64                                 | 19.63  | 34.11                               |
| Mexico   | 13.16                             | 21.05                                 | 38.16  | 27.63                               |
| Korea  | 21.45                             | 29.76                                 | 29.76  | 19.03                               |
| Malaysia   | 18.35                             | 25.95                                 | 27.00  | 28.69                               |
| Thailand   | 15.38                             | 26.74                                 | 19.05  | 38.83                               |
| <i>Total</i>   | <i>17.19</i>                      | <i>27.90</i>                          | <i>25.41</i>                                     | <i>29.49</i>                        |

**Panel C: Examining Other Sources of Credit**

| <b>Country</b>  | <b>Recovery in OCF<br/>and Credit</b> | <b>Recovery in OCF<br/>Only</b> | <b>No Recovery in OCF<br/>but Recovery in<br/>Credit</b> | <b>No Recovery in<br/>OCF or Credit</b> |
|---|---------------------------------------|---------------------------------|--|---|
| Panel C1: Credit is defined as Short-Term, Long-Term Borrowing, Net Capital Stock Issuance, Other Financing Activities, Cash generated from cutting dividends and disposal of assets and Cash used for capital expenditures, net investments, acquisitions and other investing activities |                                       |                                 |  |   |
| Indonesia   | 31.78                                 | 14.49                           | 38.79  | 14.95                                   |
| Mexico  | 25.00                                 | 9.21                            | 60.53  | 5.26                                    |
| Korea   | 45.33                                 | 5.88                            | 47.75  | 1.04                                    |
| Malaysia  | 37.55                                 | 6.75                            | 48.95  | 6.75                                    |
| Thailand  | 32.97                                 | 9.16                            | 44.32  | 13.55                                   |
| <i>Total</i>  | <i>36.65</i>                          | <i>8.45</i>                     | <i>46.76</i>   | <i>8.14</i>                             |

**Table 4: Cash Flow, Investment, and Financing Dynamics – Emerging Market Firms**

The regression specification for the system of equations in the table is Source/Use of cash =  $a + b_1$ Dummy for pre-crisis trough ( $SS_{t-1}$ ) +  $b_2$  Dummy for crisis trough ( $SS_t$ ) +  $b_3$  Dummy for post-crisis trough ( $SS_{t+1}$ ) +  $b_4$  Dummy for post-crisis trough ( $SS_{t+2}$ ) +  $b_5$  Q + e. The omitted dummy is the pre-crisis trough  $SS_{t-2}$ . The dependent variable is any one of the following variables – Operating Cash Flow, Changes in Cash Holding, Capital Expenditures, Acquisitions, Other Investments, Dividends, Re-purchases, Asset Sales, Changes in Long-term debt, Changes in Short-term debt, Equity Issuances, and Other Financing. Q is Tobin’s Q ratio. All variables are demeaned by firm-level means. The system is estimated as a seemingly unrelated regression model subject to the constraints that the coefficients of each of the independent variables across the system of equations sum to zero. In Panel A, we report regressions for the full 3S episode (t-2 to t+2) and in panel B we only report regressions for the recovery period (t to t+2). The Data Appendix provides detailed definitions of each of the variables.

**Panel A: Dynamics over 3S Episode (t-2 to t+2)**

**Number of firm-years=4158**

|            | Operating Cash flow | Changes in Cash    | Capital Expenditures | Other Investments    | Dividends            | Re-purchases      | Asset Sales          | Changes in long-term debt | Changes in short-term debt | Equity Issuances     | Other Financing    |
|------------|---------------------|--------------------|----------------------|----------------------|----------------------|-------------------|----------------------|---------------------------|----------------------------|----------------------|--------------------|
| $SS_{t-1}$ | -0.008*<br>(0.004)  | -0.007*<br>(0.004) | -0.005<br>(0.004)    | -0.004<br>(0.003)    | -0.003***<br>(0.001) | 0.000<br>(0.000)  | -0.000<br>(0.001)    | -0.016***<br>(0.004)      | 0.008**<br>(0.004)         | -0.006*<br>(0.003)   | 0.002**<br>(0.001) |
| $SS_t$     | 0.020***<br>(0.004) | -0.002<br>(0.004)  | -0.060***<br>(0.003) | -0.025***<br>(0.003) | -0.012***<br>(0.001) | 0.000<br>(0.000)  | -0.002***<br>(0.001) | -0.056***<br>(0.004)      | -0.038***<br>(0.004)       | -0.023***<br>(0.003) | -0.000<br>(0.001)  |
| $SS_{t+1}$ | 0.019***<br>(0.004) | -0.000<br>(0.004)  | -0.073***<br>(0.003) | -0.022***<br>(0.003) | -0.011***<br>(0.001) | 0.000<br>(0.000)  | -0.002***<br>(0.001) | -0.061***<br>(0.004)      | -0.039***<br>(0.004)       | -0.021***<br>(0.003) | -0.001<br>(0.001)  |
| $SS_{t+2}$ | 0.007<br>(0.004)    | -0.007*<br>(0.004) | -0.065***<br>(0.003) | -0.022***<br>(0.003) | -0.008***<br>(0.001) | 0.000*<br>(0.000) | -0.002***<br>(0.001) | -0.060***<br>(0.004)      | -0.031***<br>(0.004)       | -0.018***<br>(0.003) | 0.001<br>(0.001)   |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Panel B: Dynamics over Recovery Period (t to t+2)**

**Number of firm-years=2613**

|            | Operating Cash flow  | Changes in Cash    | Capital Expenditures | Other Investments | Dividends           | Re-purchases      | Asset Sales       | Changes in long-term debt | Changes in short-term debt | Equity Issuances    | Other Financing    |
|------------|----------------------|--------------------|----------------------|-------------------|---------------------|-------------------|-------------------|---------------------------|----------------------------|---------------------|--------------------|
| $SS_{t+1}$ | -0.001<br>(0.003)    | 0.003<br>(0.003)   | -0.013***<br>(0.002) | 0.003<br>(0.002)  | 0.001<br>(0.000)    | -0.000<br>(0.000) | -0.000<br>(0.000) | -0.005**<br>(0.002)       | -0.002<br>(0.002)          | 0.003*<br>(0.002)   | -0.001<br>(0.001)  |
| $SS_{t+2}$ | -0.015***<br>(0.003) | -0.005*<br>(0.003) | -0.005***<br>(0.002) | 0.003<br>(0.002)  | 0.004***<br>(0.000) | 0.000<br>(0.000)  | 0.000<br>(0.000)  | -0.003<br>(0.002)         | 0.008***<br>(0.002)        | 0.005***<br>(0.002) | 0.002**<br>(0.001) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Table 5: Role of Short-term Debt – Emerging Market Firms**

The regression specification for the system of equations is Source/Use of cash =  $a + b_1$ Dummy for pre-crisis trough ( $SS_{t-1}$ ) +  $b_2$  Dummy for crisis trough ( $SS_t$ ) +  $b_3$  Dummy for post-crisis trough ( $SS_{t+1}$ ) +  $b_4$  Dummy for post-crisis trough ( $SS_{t+2}$ ) +  $b_5$ Dummy for pre-crisis trough ( $SS_{t-1}$ ) x ST Debt $_{t-2}$  +  $b_6$  Dummy for crisis trough ( $SS_t$ ) x ST Debt $_{t-2}$  +  $b_7$  Dummy for post-crisis trough ( $SS_{t+1}$ ) x ST Debt $_{t-2}$  +  $b_8$  Dummy for post-crisis trough ( $SS_{t+2}$ ) x ST Debt $_{t-2}$  +  $b_9$  Q + e. The omitted dummy is the pre-crisis trough  $SS_{t-2}$ . The dependent variable is any one of the following variables – Operating Cash Flow, Changes in Cash Holding, Capital Expenditures, Acquisitions, Other Investments, Dividends, Re-purchases, Asset Sales, Changes in Long-term debt, Changes in Short-term debt, Equity Issuances, and Other Financing. Q is Tobin’s Q ratio. All variables are demeaned by firm-level means. The system is estimated as a seemingly unrelated regression model subject to the constraints that the coefficients of each of the independent variables across the system of equations sum to zero. In Panel A, we report regressions for the full 3S episode (t-2 to t+2) and in panel B we only report regressions for the recovery period (t to t+2). The Data Appendix provides detailed definitions of each of the variables.

**Panel A: Dynamics over 3S Episode (t-2 to t+2)**  
**Number of firm-years=4158**

|                           | Operating Cash flow | Changes in Cash     | Capital Expenditures | Other Investments | Dividends         | Re-purchases         | Asset Sales       | Changes in long-term debt | Changes in short-term debt | Equity Issuances    | Other Financing   |
|---------------------------|---------------------|---------------------|----------------------|-------------------|-------------------|----------------------|-------------------|---------------------------|----------------------------|---------------------|-------------------|
| STD $_{t-2}$ x $SS_{t-1}$ | 0.060***<br>(0.023) | 0.061***<br>(0.020) | -0.020<br>(0.019)    | -0.025<br>(0.016) | -0.006<br>(0.004) | -0.001**<br>(0.000)  | -0.002<br>(0.003) | 0.033<br>(0.021)          | -0.131***<br>(0.019)       | 0.053***<br>(0.015) | -0.004<br>(0.006) |
| STD $_{t-2}$ x $SS_t$     | 0.185***<br>(0.023) | 0.025<br>(0.020)    | 0.013<br>(0.019)     | 0.016<br>(0.016)  | -0.003<br>(0.004) | -0.001**<br>(0.000)  | -0.001<br>(0.003) | 0.041*<br>(0.021)         | -0.216***<br>(0.019)       | 0.040***<br>(0.015) | 0.003<br>(0.006)  |
| STD $_{t-2}$ x $SS_{t+1}$ | 0.205***<br>(0.024) | 0.039*<br>(0.021)   | 0.038*<br>(0.020)    | 0.012<br>(0.017)  | 0.002<br>(0.004)  | -0.001***<br>(0.000) | -0.003<br>(0.003) | 0.050**<br>(0.023)        | -0.214***<br>(0.021)       | 0.043***<br>(0.016) | 0.010*<br>(0.006) |
| STD $_{t-2}$ x $SS_{t+2}$ | 0.195***<br>(0.024) | 0.039*<br>(0.021)   | 0.049**<br>(0.020)   | 0.021<br>(0.017)  | -0.004<br>(0.004) | -0.001***<br>(0.000) | -0.000<br>(0.003) | 0.035<br>(0.023)          | -0.200***<br>(0.020)       | 0.072***<br>(0.016) | 0.004<br>(0.006)  |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Panel B: Dynamics over Recovery Period (t to t+2)**  
**Number of firm-years=2613**

|                           | Operating Cash flow | Changes in Cash  | Capital Expenditures | Other Investments | Dividends          | Re-purchases      | Asset Sales       | Changes in long-term debt | Changes in short-term debt | Equity Issuances   | Other Financing  |
|---------------------------|---------------------|------------------|----------------------|-------------------|--------------------|-------------------|-------------------|---------------------------|----------------------------|--------------------|------------------|
| STD $_{t-2}$ x $SS_{t+1}$ | -0.017<br>(0.019)   | 0.009<br>(0.018) | 0.033***<br>(0.012)  | -0.017<br>(0.011) | 0.007**<br>(0.003) | -0.000<br>(0.000) | -0.002<br>(0.003) | 0.015<br>(0.015)          | 0.029*<br>(0.016)          | -0.000<br>(0.012)  | 0.008<br>(0.005) |
| STD $_{t-2}$ x $SS_{t+2}$ | -0.023<br>(0.019)   | 0.010<br>(0.017) | 0.042***<br>(0.012)  | -0.003<br>(0.011) | 0.001<br>(0.003)   | -0.000<br>(0.000) | 0.001<br>(0.003)  | -0.002<br>(0.015)         | 0.043***<br>(0.016)        | 0.027**<br>(0.012) | 0.002<br>(0.005) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Table 6: Role of Cash – Emerging Market Firms**

The regression specification for the system of equations is Source/Use of cash =  $a + b_1$ Dummy for pre-crisis trough ( $SS_{t-1}$ ) +  $b_2$  Dummy for crisis trough ( $SS_t$ ) +  $b_3$  Dummy for post-crisis trough ( $SS_{t+1}$ ) +  $b_4$  Dummy for post-crisis trough ( $SS_{t+2}$ ) +  $b_5$ Dummy for pre-crisis trough ( $SS_{t-1}$ ) x Cash  $t-2$  +  $b_6$  Dummy for crisis trough ( $SS_t$ ) x Cash  $t-2$  +  $b_7$  Dummy for post-crisis trough ( $SS_{t+1}$ ) x Cash  $t-2$  +  $b_8$  Dummy for post-crisis trough ( $SS_{t+2}$ ) x ST Debt Cash  $t-2$  +  $b_9$  Q + e. The omitted dummy is the pre-crisis trough,  $SS_{t-2}$ . The dependent variable is any one of the following variables – Operating Cash Flow, Changes in Cash Holding, Capital Expenditures, Acquisitions, Other Investments, Dividends, Re-purchases, Asset Sales, Changes in Long-term debt, Changes in Short-term debt, Equity Issuances, and Other Financing. Q is Tobin's Q ratio. All variables are demeaned by firm-level means. The system is estimated as a seemingly unrelated regression model subject to the constraints that the coefficients of each of the independent variables across the system of equations sum to zero. In Panel A, we report regressions for the full 3S episode (t-2 to t+2) and in panel B we only report regressions for the recovery period (t to t+2). The Data Appendix provides detailed definitions of each of the variables.

**Panel A: Dynamics over 3S Episode (t-2 to t+2)**

**Number of firm-years=4158**

|                            | Operating<br>Cash flow | Changes<br>in Cash   | Capital<br>Expenditures | Other<br>Investments | Dividends         | Re-<br>purchases  | Asset<br>Sales      | Changes in<br>long-term<br>debt | Changes<br>in short-<br>term debt | Equity<br>Issuances | Other<br>Financing  |
|----------------------------|------------------------|----------------------|-------------------------|----------------------|-------------------|-------------------|---------------------|---------------------------------|-----------------------------------|---------------------|---------------------|
| Cash $_{t-2}$ x $SS_{t-1}$ | -0.177***<br>(0.058)   | -0.449***<br>(0.050) | 0.067<br>(0.047)        | 0.199***<br>(0.039)  | 0.013<br>(0.010)  | 0.001<br>(0.001)  | 0.023***<br>(0.007) | -0.142***<br>(0.053)            | 0.189***<br>(0.050)               | -0.065*<br>(0.039)  | 0.000<br>(0.014)    |
| Cash $_{t-2}$ x $SS_t$     | -0.014<br>(0.057)      | -0.265***<br>(0.049) | 0.099**<br>(0.046)      | 0.058<br>(0.039)     | -0.008<br>(0.009) | 0.001<br>(0.001)  | -0.003<br>(0.007)   | -0.144***<br>(0.053)            | 0.100**<br>(0.049)                | -0.049<br>(0.038)   | -0.004<br>(0.014)   |
| Cash $_{t-2}$ x $SS_{t+1}$ | -0.185***<br>(0.056)   | -0.395***<br>(0.048) | 0.036<br>(0.046)        | -0.007<br>(0.038)    | -0.005<br>(0.009) | 0.001<br>(0.001)  | -0.002<br>(0.007)   | -0.184***<br>(0.052)            | 0.072<br>(0.048)                  | -0.049<br>(0.038)   | -0.023*<br>(0.014)  |
| Cash $_{t-2}$ x $SS_{t+2}$ | -0.172***<br>(0.058)   | -0.341***<br>(0.050) | 0.043<br>(0.047)        | -0.000<br>(0.039)    | -0.013<br>(0.009) | 0.001*<br>(0.001) | 0.005<br>(0.007)    | -0.117**<br>(0.053)             | 0.088*<br>(0.049)                 | -0.078**<br>(0.039) | -0.036**<br>(0.014) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Panel B: Dynamics over Recovery Period (t to t+2)**

**Number of firm-years=2613**

|                            | Operating<br>Cash flow | Changes in<br>Cash   | Capital<br>Expenditures | Other<br>Investments | Dividends         | Re-purchases      | Asset<br>Sales    | Changes<br>in long-<br>term debt | Changes in<br>short-term<br>debt | Equity<br>Issuances | Other<br>Financing   |
|----------------------------|------------------------|----------------------|-------------------------|----------------------|-------------------|-------------------|-------------------|----------------------------------|----------------------------------|---------------------|----------------------|
| Cash $_{t-2}$ x $SS_{t+1}$ | -0.167***<br>(0.042)   | -0.136***<br>(0.038) | -0.055**<br>(0.027)     | -0.055**<br>(0.025)  | -0.002<br>(0.007) | -0.000<br>(0.000) | -0.000<br>(0.006) | -0.042<br>(0.033)                | -0.027<br>(0.034)                | 0.012<br>(0.026)    | -0.023**<br>(0.011)  |
| Cash $_{t-2}$ x $SS_{t+2}$ | -0.152***<br>(0.043)   | -0.073*<br>(0.039)   | -0.054*<br>(0.028)      | -0.044*<br>(0.026)   | -0.006<br>(0.007) | 0.000<br>(0.000)  | 0.008<br>(0.006)  | 0.030<br>(0.034)                 | -0.011<br>(0.035)                | -0.019<br>(0.026)   | -0.033***<br>(0.011) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Table 7: Potential Phoenix Miracles in the US**

In Panel A, we present summary statistics on our sample of US firms that had a zero change in operating cash flow, a positive change in operating cash flow and a negative change in operating cash flow over the years 2008 to 2009 and 2009 to 2010 respectively. In Panel B, we identify four categories of firms based on their operating cash flow recovery and credit recovery over 2009 to 2010 - the percentage of firms that had a zero or positive change in operating cash flow and a positive change in credit, a zero/positive change in operating cash flow while change in credit is zero/negative (these firms are candidate Phoenix Miracles), a negative change in operating cash flow while change in credit is positive, and a negative change in operating cash flow and a zero/negative change in credit. We use two definitions of changes in credit: We use Changes in Short-term borrowing and next expand this to also include changes in long-term debt (long-term debt issuance-long-term debt reduction), net capital stock issuance (equity issuance – repurchases), and other financing. In Panel C, we repeat the classification in panel B using an alternate definition of credit that uses the expanded definition in panel B and further includes dividends, and cash from investing activities including sale of property, plant, and equipment, changes in investments, changes in short-term investments, and cash from other investing activities.

**Panel A: Recovery of Firms**

|  | 2008-2009       |        | 2009-2010       |        |
|--|-----------------|--------|-----------------|--------|
|  | Number of firms | %      | Number of firms | %      |
| Zero change in operating cash flow     | 4               | 0.12   | 6               | 0.18   |
| Positive Change in Operating cash flow | 1995            | 59.86  | 1656            | 50.11  |
| Negative Change in Operating cash flow | 1334            | 40.02  | 1643            | 49.71  |
| Total                                  | 3333            | 100.00 | 3305            | 100.00 |

**Panel B: Identifying Phoenix Miracles at the firm level**

| <b>Measure of Changes in Credit</b>  | <b>Recovery in OCF and Credit</b> | <b>Recovery in OCF Only (PHOENIX MIRACLES)</b> | <b>No Recovery in OCF but Recovery in Credit</b> | <b>No Recovery in OCF or Credit</b> |
|--|-----------------------------------|--|--|-------------------------------------|
| Changes in Short-term Debt   | 17.73%                            | 32.56%   | 18.82%   | 30.89%                              |
| Changes in Short-Term Debt, Changes in Long-Term Debt, Net Capital Stock Issuance, and Other Financing | 44.54%                            | 5.75%  | 43.93%   | 5.78%                               |

**Panel C: Alternate Sources of Credit**

| <b>Measure of Changes in Credit</b>   | <b>Recovery in OCF and Credit</b> | <b>Recovery in OCF Only</b> | <b>No Recovery in OCF but Recovery in Credit</b> | <b>No Recovery in OCF or Credit</b> |
|---|-----------------------------------|-----------------------------|--|-------------------------------------|
| Changes in Short-Term Debt, Changes in Long-Term Debt, Net Capital Stock Issuance, Other Financing, Dividends, and Cash from Investing Activities | 46.87%                            | 3.42%                       | 46.14%   | 3.57%                               |

**Table 8: Cash Flow, Investment, and Financing Dynamics – US firms**

The regression specification for the system of equations in the table is Source/Use of cash =  $a + b_1$ Dummy for pre-crisis year (2007) +  $b_2$  Dummy for crisis year 2008 +  $b_3$  Dummy for crisis year 2009 +  $b_4$  Dummy for recovery year 2010 +  $b_5$  Q +  $b_6$ Firm Size + e. The dependent variable is any one of the following variables – Changes in Cash, Capital Expenditures, Acquisitions, Other Investments, Dividends, Re-purchases, Asset Sales, Changes in Long-term debt, Changes in Short-term debt, Equity Issuances, and Other Financing. Operating Cash Flow is the cash flow from operating activities. Q is Tobin’s Q ratio. Size is log of Total Assets. All variables are demeaned by subtracting the firm-level means over the sample period. The system is estimated as a seemingly unrelated regression model subject to the constraints that the coefficients of each of the independent variables across the system of equations sum to zero. The Data Appendix provides detailed definitions of each of the variables.

**Number of firm-years=13379**

|                   | Operating Cash flow  | Changes in Cash      | Capital Expenditures | Other Investments    | Dividends            | Re-purchases         | Asset Sales          | Changes in long-term debt | Changes in short-term debt | Equity Issuances     | Other Financing      |
|-------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------------|----------------------|----------------------|
| Pre-Crisis (2007) | 0.003<br>(0.003)     | -0.003<br>(0.004)    | -0.002<br>(0.001)    | -0.017***<br>(0.003) | 0.000<br>(0.000)     | 0.004***<br>(0.001)  | 0.000<br>(0.000)     | -0.003<br>(0.002)         | -0.000<br>(0.001)          | -0.016***<br>(0.005) | -0.000<br>(0.000)    |
| Crisis (2008)     | -0.008***<br>(0.003) | -0.019***<br>(0.004) | -0.004***<br>(0.001) | -0.029***<br>(0.003) | -0.000<br>(0.000)    | 0.002**<br>(0.001)   | -0.000*<br>(0.000)   | -0.003<br>(0.002)         | 0.003***<br>(0.001)        | -0.041***<br>(0.005) | -0.001<br>(0.000)    |
| Crisis (2009)     | 0.004<br>(0.003)     | -0.006<br>(0.004)    | -0.025***<br>(0.001) | -0.028***<br>(0.003) | -0.001***<br>(0.000) | -0.012***<br>(0.001) | -0.001***<br>(0.000) | -0.030***<br>(0.002)      | -0.006***<br>(0.001)       | -0.040***<br>(0.005) | -0.000<br>(0.000)    |
| Recovery (2010)   | -0.001<br>(0.003)    | -0.015***<br>(0.004) | -0.022***<br>(0.001) | -0.020***<br>(0.003) | 0.000<br>(0.000)     | -0.007***<br>(0.001) | -0.001***<br>(0.000) | -0.018***<br>(0.002)      | -0.002**<br>(0.001)        | -0.040***<br>(0.005) | -0.002***<br>(0.000) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Table 9: Role of Short-term Debt and Cash – US Firms**

The table presents coefficient estimates of firm cash flow estimated by a system of equations. The regression specification for the system of equations is Source/Use of cash = a + b<sub>1</sub>Dummy for pre-crisis year 2007 + b<sub>2</sub> Dummy for crisis year 2008+ b<sub>3</sub> Dummy for crisis year 2009 + b<sub>4</sub> Dummy for recovery year 2010 + b<sub>5</sub>Dummy for year 2007 x ST Debt (or Cash) in 2006 + b<sub>6</sub> Dummy for year 2008 x ST Debt (or Cash) in 2006 + b<sub>7</sub> Dummy for year 2009 x ST Debt (or Cash) in 2006 + b<sub>8</sub> Dummy for year 2010 x ST Debt (or Cash) in 2006 + b<sub>9</sub> Q + b<sub>10</sub>Firm Size + e. The dependent variable is any one of the following variables – Operating Cash Flow, Changes in Cash Holding, Capital Expenditures, Acquisitions, Other Investments, Dividends, Re-purchases, Asset Sales, Changes in Long-term debt, Changes in Short-term debt, Equity Issuances, and Other Financing. Q is Tobin’s Q ratio. Size is log of Total Assets. All variables are demeaned by subtracting the firm means across the sample period. The system is estimated as a seemingly unrelated regression model subject to the constraints that the coefficients of each of the independent variables across the system of equations sum to zero. Panel A uses interactions with ST Debt in 2006 and panel B uses interactions with Cash in 2006. The Data Appendix provides detailed definitions of each of the variables.

**Panel A: Number of firm-years=13379**

|   | Operating Cash flow  | Changes in Cash    | Capital Expenditures | Other Investments | Dividends         | Re-purchases      | Asset Sales      | Changes in long-term debt | Changes in short-term debt | Equity Issuances  | Other Financing  |
|---|----------------------|--------------------|----------------------|-------------------|-------------------|-------------------|------------------|---------------------------|----------------------------|-------------------|------------------|
| STD <sub>2006</sub> x Pre-Crisis (2007) | -0.014***<br>(0.005) | -0.011*<br>(0.006) | -0.000<br>(0.002)    | 0.001<br>(0.005)  | -0.000<br>(0.000) | -0.001<br>(0.001) | 0.000<br>(0.000) | -0.003<br>(0.004)         | 0.001<br>(0.001)           | 0.005<br>(0.007)  | 0.000<br>(0.001) |
| STD <sub>2006</sub> x Crisis (2008)     | 0.001<br>(0.005)     | 0.007<br>(0.005)   | 0.002<br>(0.002)     | 0.004<br>(0.004)  | 0.000<br>(0.000)  | 0.000<br>(0.001)  | 0.000<br>(0.000) | 0.000<br>(0.003)          | -0.001<br>(0.001)          | 0.011*<br>(0.007) | 0.000<br>(0.001) |
| STD <sub>2006</sub> x Crisis (2009)     | 0.001<br>(0.005)     | 0.007<br>(0.005)   | 0.002<br>(0.002)     | 0.004<br>(0.004)  | 0.000<br>(0.000)  | 0.000<br>(0.001)  | 0.000<br>(0.000) | 0.000<br>(0.003)          | -0.001<br>(0.001)          | 0.011*<br>(0.007) | 0.000<br>(0.001) |
| STD <sub>2006</sub> x Recovery (2010)   | 0.005<br>(0.005)     | 0.008<br>(0.006)   | 0.002<br>(0.002)     | 0.004<br>(0.004)  | 0.000<br>(0.000)  | 0.000<br>(0.001)  | 0.000<br>(0.000) | 0.002<br>(0.004)          | -0.001<br>(0.001)          | 0.008<br>(0.007)  | 0.001<br>(0.001) |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

**Panel B Number of firm-years=13379**

|  | Operating Cash flow  | Changes in Cash      | Capital Expenditures | Other Investments    | Dividends          | Re-purchases        | Asset Sales         | Changes in long-term debt | Changes in short-term debt | Equity Issuances     | Other Financing     |
|--|----------------------|----------------------|----------------------|----------------------|--------------------|---------------------|---------------------|---------------------------|----------------------------|----------------------|---------------------|
| Cash <sub>2006</sub> x Pre-Crisis (2007) | -0.055***<br>(0.013) | -0.140***<br>(0.015) | 0.008*<br>(0.004)    | -0.043***<br>(0.012) | 0.001<br>(0.001)   | 0.001<br>(0.003)    | -0.000<br>(0.001)   | 0.006<br>(0.010)          | 0.000<br>(0.003)           | -0.122***<br>(0.019) | -0.001<br>(0.002)   |
| Cash <sub>2006</sub> x Crisis (2008)     | -0.064***<br>(0.013) | -0.205***<br>(0.015) | 0.011**<br>(0.004)   | -0.116***<br>(0.012) | 0.002<br>(0.001)   | 0.020***<br>(0.003) | 0.001<br>(0.001)    | 0.025**<br>(0.010)        | 0.014***<br>(0.003)        | -0.259***<br>(0.019) | -0.004**<br>(0.002) |
| Cash <sub>2006</sub> x Crisis (2009)     | -0.060***<br>(0.013) | -0.208***<br>(0.015) | 0.031***<br>(0.004)  | -0.001<br>(0.012)    | 0.003**<br>(0.001) | 0.014***<br>(0.003) | 0.002***<br>(0.001) | 0.071***<br>(0.010)       | 0.019***<br>(0.003)        | -0.196***<br>(0.019) | 0.003*<br>(0.002)   |
| Cash <sub>2006</sub> x Recovery (2010)   | -0.006<br>(0.013)    | -0.159***<br>(0.015) | 0.021***<br>(0.004)  | -0.021*<br>(0.012)   | 0.002<br>(0.001)   | 0.009**<br>(0.003)  | 0.001**<br>(0.001)  | 0.044***<br>(0.010)       | 0.009***<br>(0.003)        | -0.197***<br>(0.019) | -0.000<br>(0.002)   |

\*, \*\*, and \*\*\* represent significant at 1%, 5%, and 10% level respectively.

## Appendix A: Potential Phoenix Miracles in Emerging Market 3S Episodes – Defining recovery in terms of sales

In Panel A, we present the percentage of firms in each country that had a recovery (defined by a positive change) in sales over the period  $t$  to  $t+2$ , with  $t$  being the crisis trough. In Panel B, we identify four categories of firms based on their sales recovery and credit recovery - the percentage of firms that had a zero/positive change in sales and a positive change in credit, a zero/positive change in sales while change in credit is zero/negative (these firms are candidate Phoenix Miracles), a negative change in sales while change in credit is positive, and a negative change in sales and a zero/negative change in credit. We use two definitions of changes in credit. In panel B1 we use Changes in Short-term borrowing and in panel B2, we use Changes in Short-term borrowing, Changes in Long-term debt (long-term debt issuance-long-term debt reduction), Net Capital Stock Issuance (equity issuance – repurchases), and Other Financing. In Panel C, we repeat the classification in panel B using an alternate definition of credit. The definition in C1 includes the definition in B2 plus Dividends, and Cash from investing activities including sale of property, plant, and equipment, changes in investments, changes in short-term investments, and cash from other investing activities.

### Panel A: Recovery of Firms

| Country      | Total Number of firms | % of firms with recovery in sales from $t$ to $t+2$ | % of firms with no recovery in sales from $t$ to $t+2$ |
|--------------|-----------------------|---|--|
| Indonesia    | 214                   | 50.47   | 49.53  |
| Mexico       | 76                    | 9.21  | 90.79  |
| Korea        | 289                   | 73.36   | 26.64  |
| Malaysia     | 474                   | 51.90   | 48.10  |
| Thailand     | 273                   | 65.20   | 34.80  |
| <i>Total</i> | <i>1326</i>           | <i>56.64</i>  | <i>43.36</i>   |

### Panel B: Identifying Phoenix Miracles at the firm level

| Country  | Recovery in Sales and Credit | Recovery in Sales Only (PHOENIX) | No Recovery in Sales but Recovery in Credit | No Recovery in Sales or Credit |
|--|------------------------------|----------------------------------|---|--------------------------------|
| <b>Panel B1: Credit is defined as Short-Term Borrowing</b>   |                              |                                  |   |                                |
| Indonesia  | 10.75%                       | 39.72%                           | 8.41%                                       | 41.12%                         |
| Mexico   | 1.32%                        | 7.89%                            | 35.53%                                      | 55.26%                         |
| Korea  | 28.03%                       | 45.33%                           | 13.49%                                      | 13.15%                         |
| Malaysia   | 20.89%                       | 31.01%                           | 11.60%                                      | 36.50%                         |
| Thailand   | 20.51%                       | 44.69%                           | 13.19%                                      | 21.61%                         |
| <i>Total</i>   | <i>19.61%</i>                | <i>37.03%</i>                    | <i>13.20%</i>                               | <i>30.17%</i>                  |
| <b>Panel B2: Credit is defined as Short-Term, Long-Term Borrowing, Net Capital Stock Issuance and Other Financing Activities</b> |                              |                                  |   |                                |
| Indonesia  | 18.22%                       | 32.24%                           | 14.02%                                      | 35.51%                         |
| Mexico   | 6.58%                        | 2.63%                            | 44.74%                                      | 46.05%                         |
| Korea  | 39.10%                       | 34.26%                           | 12.11%                                      | 14.53%                         |
| Malaysia   | 27.64%                       | 24.26%                           | 17.72%                                      | 30.38%                         |
| Thailand   | 23.44%                       | 41.76%                           | 10.99%                                      | 23.81%                         |
| <i>Total</i>   | <i>26.55%</i>                | <i>30.09%</i>                    | <i>16.06%</i>                               | <i>27.30%</i>                  |

**Panel C: Examining Other Sources of Credit**

| <b>Country</b>  | <b>Recovery in Sales and Credit</b> | <b>Recovery in Sales Only</b> | <b>No Recovery in Sales but Recovery in Credit</b> | <b>No Recovery in Sales or Credit</b> |
|---|-------------------------------------|-------------------------------|--|---------------------------------------|
| Panel C1: Credit is defined as Short-Term, Long-Term Borrowing, Net Capital Stock Issuance, Other Financing Activities, Cash generated from cutting dividends and disposal of assets and Cash used for capital expenditures, net investments, acquisitions and other investing activities |                                     |                               |  |                                       |
| Indonesia   | 36.45%                              | 14.02%                        | 34.11%   | 15.42%                                |
| Mexico  | 9.21%                               | 0.00%                         | 76.32%   | 14.47%                                |
| Korea   | 68.86%                              | 4.50%                         | 24.22%   | 2.42%                                 |
| Malaysia  | 45.99%                              | 5.91%                         | 40.51%   | 7.59%                                 |
| Thailand  | 53.11%                              | 12.09%                        | 24.18%   | 10.62%                                |
| <i>Total</i>  | <i>48.79%</i>                       | <i>7.84%</i>                  | <i>34.62%</i>                                      | <i>8.75%</i>                          |

## Data Appendix: Variable Construction and Definitions

### Panel A: Emerging Market Sample

| <b>Variable</b>            | <b>Bloomberg Mnemonic</b>   |
|----------------------------|---|
| Operating cash flow        | Cash from Operating Activities (CF_CASH_FROM_OPER)  |
| Tobin's Q                  | $(\text{Total Assets (BS\_TOT\_ASSET)} + \text{Last Price(PX\_LAST)} * \text{Common Shares Outstanding(BS\_SH\_OUT)} - \text{Total Common Equity(TOT\_COMMON\_EQY)}) / \text{Total Assets (BS\_TOT\_ASSET)}$                            |
| Changes in Cash            | Net Changes in Cash (CF_NET_CHNG_CASH)  |
| Capital Expenditures       | Capital Expenditures/Property Additions (CF_CAP_EXPEND_PRPTY_ADD)   |
| Other Investments          | Proceeds from sale of long-term investments that are carried at cost or market (CF_DECR_INVEST) + Purchase of long-term investments that are carried at cost or market (CF_INCR_INVEST) + Other Investing Activities (CF_OTHER_INV_ACT) |
| Dividends                  | Cash dividends (CF_DVD_PAID)  |
| Re-purchases               | Decreases in capital stock (CF_DECR_CAP_STOCK)  |
| Asset Sales                | Disposal of fixed assets (CF_DISP_FIX_ASSET)  |
| Changes in Short-term debt | Increases/Decreases in short-term borrowing (CF_INCR_ST_BORROW)   |
| Changes in Long-term debt  | Increases in long-term borrowing (CF_INCR_LT_BORROW)+ Reimbursement of long-term Borrowing (CF_REIMB_LT_BORROW)   |
| Equity Issuances           | Increases in capital stock (CF_INCR_CAP_STOCK)  |
| Other Financing            | Other financing Activities (CF_OTHER_FNC_ACT)   |

### Panel B: U.S. Sample

| <b>Variable</b>      | <b>Compustat Item # (Cash Flow Format 7)</b>  |
|----------------------|---|
| Changes in Cash      | Cash and Cash Equivalents - Inc/Decrease (data 274)   |
| Capital Expenditures | Capital Expenditures (SCF data 128)   |
| Other Investments    | Increase in investments (data113)+ Acquisitions (SCF data129) –Sale of investments(data109) - Changes in short-term investments (SCF data309) - Other investing activities (SCF data 310) |
| Dividends            | Cash dividends (SCF data127)  |
| Re-purchases         | Purchase of Common and Preferred Stock (data 115)   |
| Asset Sales          | Sale of Property, Plant, and Equipment (data 107)   |
| Short-term debt      | Change in debt in current liabilities (data34)  |

|                     |   |
|---------------------|---|
| Long-term debt      | Change in long-term debt (data9)  |
| Equity Issuances    | Sale of Common and Preferred Stock (data 108)   |
| Other Financing     | Financing Activities-other (SCF data312)  |
| Tobin's Q           | Total Assets (data6)+Price-Close(data24)*Common Shares Outstanding(data25)- Total Common Equity(data60) |
| Operating Cash Flow | Cash Flow from operating activities (SCF data 308)  |