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Do Phoenix Miracles Exist?

Firm-Level Evidence from Financial Crises

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Abstract

This paper provides empirical evidence on firm recoveries from financial system collapses in developing countries (systemic sudden stops episodes), and compares them with the experience in the United States in the 2008 financial crisis. Prior research found that economies recover from systemic sudden stop episodes before the financial sector. These recoveries are called Phoenix miracles, and the research questioned the role of the financial system in recovery. Although an average of the macro data across a sample of systemic sudden stop episodes over the 1990s appears consistent with the notion of Phoenix recoveries, closer inspection reveals heterogeneity of responses across the countries, with only a few countries fitting the pattern. Micro data show that across countries, only a small fraction (less than 31 percent) of firms follow a pattern of recovery in sales without a recovery in external credit, and even these firms have access to external sources of cash. The experience of firms in the United States during the 2008 financial crisis also suggests no evidence of credit-less recoveries. An examination of the dynamics of firms' financing, investment and payout policies during recovery periods shows that far from being constrained, the firms in the sample are able to access long-term financing, issue equity, and significantly expand their cash holdings.

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1.   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 the financial sector is a precondition to recovery in the corporate sector. While this conjecture appears reasonable, it has been challenged by observers in numerous crises across the world in recent years, in which real sector recovery preceded that of the financial sector (e.g. Calvo, Izquierdo, and Talvi, 2006a, 2006b; Claessens, Kose, and Terrones, 2009; Abiad, Dell'Aricia, and Li, 2011). Of particular interest are 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. 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 the proposed mechanism in Calvo et al. (2006b) actually drives recovery in the corporate sector or whether firms register a recovery in sales and corporate activity preceding a recovery in external financing after a crisis.

The theory of Phoenix Miracles call 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). Calvo and Kung (2010) label the US recovery as a new Phoenix Miracle while noting parallels between the US and past emerging market episodes. By contrast, Campello, Graham, Giambona, and Harvey (2011) and Campello, Graham, and Harvey (2010) use survey data to conclude that the US financial crisis limited but mostly did not preclude access to credit lines.

In this paper, we use a database of listed firms in emerging markets to analyze the recovery process after a financing crisis. Specifically, we ask whether recovery of the financial

sector precedes or occurs at the same time as the recovery in output of the corporate sector? Do firms experience Phoenix Miracles where their sales recover without a recovery in external credit? We then compare and contrast the experience of the emerging market firms to that of US firms during the 2008 US financial crisis and investigate if the US recovery process is a Phoenix Miracle as suggested by recent macro studies.

To answer these questions, we explore if the micro mechanism of the recovery process detailed in Calvo et al. (2006a, b) is borne out in our sample of publicly listed firms.[2] To explain the existence of Phoenix Miracles, Calvo et al. (2006b) propose a partial equilibrium 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 terms 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.[3]

To test the model predictions and reconcile the macro evidence with micro data, we first use firm-level data from Bloomberg database for 9 emerging market 3S episodes over the 1990s – Argentina, Indonesia, Korea, Malaysia, Mexico, Russia, Thailand, and two episodes in Turkey.[4] 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 the meet the conditions for the existence of Phoenix miracles following 3S episodes as firms in those countries are more likely to depend on short-

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[2] 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.

[3] 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.

[4] 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.

term financing and have less access to long-term financing (e.g. Demirguc-Kunt and Maksimovic,1999; Fan, Titman, and Twite, 2010).

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. The comparison with emerging markets is particularly relevant since Calvo and Kung (2010) draw parallels between the recovery process in the US crisis and past emerging market episodes and suggest that the US recovery is a new Phoenix miracle. Boone and Johnson (2008) commenting on the 2008 US financial crisis argue that "the evolution of the current crisis seems remarkably similar to emerging market crises of a decade ago." Others (e.g. Claessens, Kose, and Terrones, 2009) have made the case for Phoenix Miracles in developed markets as well, with Krugman (2009) noting the role of self-financing in the partial recovery of Japanese firms after the turn of the century.[5]

We have the following main findings: First, a closer look at the macro evidence suggests that there is heterogeneity across countries even amongst the Phoenix Miracles identified by the macro literature. In some countries like Thailand, there is no evidence of credit recovery even two periods after GDP recovery, suggesting a true Phoenix Miracle. However, some of the other episodes identified as Phoenix Miracles do not appear to be such even on the basis of macro evidence alone. For instance, while private credit lags GDP recovery by one period in most cases, in the instance of Korea and two crisis episodes in Turkey, private credit recovers at the same time as GDP calling into question whether they are truly Phoenix Miracles. In both Korea and the first crisis episode in Turkey in 1992-1996 (as well as in Russia though credit lags GDP recovery there), private credit far surpasses original credit levels before the crisis. 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.

Second, we look at the existence of Phoenix Miracles at the micro level to examine if there is a recovery in aggregate sales without a recovery in aggregate short-term borrowing (according to the micro mechanism suggested by Calvo et al., 2006b). We analyze the financial

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[5] See also Calomaris, Klingebiel,and Laeven (2005), and Claessens, Klingebiel,and Laeven (2005) for a discussion of the resolution of developing country crises.

statements of affected firms to determine their cash outflows and inflows, as in Gatchev, Pulvino, and Tarhan, (2010) and Dasgupta, Noe, and Wang (2011). We find that the number of potential miracles is further reduced. Of the 6 potential miracles identified in the macro data, only in the case of Argentina, Malaysia, and Thailand, do we find a recovery in corporate sales before a recovery in short-term borrowing. In Indonesia, we find both sales and short-term credit recover at the same time where as in Mexico and Russia we find that while credit begins to recovers, sales still hasn't recovered, suggesting that these 3 countries are not Phoenix Miracles. Of the 3 non-miracles identified in the macro data, the 2 crisis episodes in Turkey remain non-miracles at the micro level, with corporate sales and short-term credit not only moving together, but also not having recovered. However, Korea appears as a Phoenix miracle in the micro data with sales recovering before a recovery in credit markets.

Third, 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.

We then focus our analysis at the firm-level to understand the microeconomic foundations of what drives the recovery process in the emerging markets and the US. While the mechanism outlined in Calvo et al. (2006b) suggests that recovery is driven by restoring the stock of short term assets out of self-generated cash flows and discontinuing investments, we find that the recovery 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. Thus, 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 firms finance themselves primarily out of cash saved from cutting investments following a crisis.[6]

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[6] This is broadly consistent with a few of the studies (e.g. Bleakley and Cowan, 2008; 2010) that have examined firm investment patterns in a small sample of crisis episodes to conclude that the pattern of recovery across firms is not correlated with the mechanism suggested by Calvo et al. (2006b). However, there are inherent inconsistencies in these studies with findings that firms dependent on short-term financing engage in both involuntary restructuring at

Finally, we examine the investment and financing behavior of firms dealing with positive and adverse cash flow shocks to better understand corporate decision making during the crisis period and recovery. We find that both in the emerging markets fitting Calvo's definition of miracles and in the US, firms use their positive cash flow shocks to add to their cash balances and repay short-term debt. Firms facing a negative cash flow shock and presumably financially constrained are still able to borrow in the long-term debt markets and issue equity, thus calling into question the notion of credit-less recoveries.

Overall our results suggest that the phenomenon of Phoenix Miracles is not supported by the micro level data either in the emerging markets or the U.S. 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.

Our paper contributes to the recent emerging literature on liquidity management and corporate investment during the US financial crisis. Campello et al. (2011) and Campello, Graham, and Harvey (2010) survey CFOs 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. None of these papers discuss the mechanism of the corporate recovery process and whether or not it is in the presence of credit.

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.

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a loss and increasing investment during crises and the interpretation of increases in inventories in a crisis as voluntary increase in investment.

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% 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.

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.[7] 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 crisis 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

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[7] 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.

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 recovery 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 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.

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. In detailed firm-level analysis, where we identify individual firms as Phoenix Miracles, we further restrict the sample 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.[8] However, all our results are robust to allowing the size of the sample to vary 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

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[8] 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.

exchanges on which the firm is traded, ownership, and industry classification. Bloomberg's industry classification is based on the Industry Classification Benchmark.

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 our analysis of firm recoveries, we focus on both the balance sheet positions (that provide a snapshot of the firm's financial resources and obligations at a given point in time) and 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 company. 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).

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%[9] and 16.1%,

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[9] 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%.

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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.

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 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.[10] 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.

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.[11] 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

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[10] 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.

[11] The drop is computed between the pre-trough peak and the local minimum in the five-year window.

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

3.2.1   Sales versus GDP Recovery

In this sub-section, we first examine whether corporate sales tracks recovery in GDP. Figure 3A shows the behavior of corporate sales (dotted line) along with GDP (bold line) over the period t-2 to t+2. Interestingly we find that while GDP recovers at t and returns to pre-crisis levels by t+2, we find that recovery in sales begins a whole period later at t+1 and does not return to pre-crisis levels. The drop in average corporate sales across the nine 3S episodes is a 43% compared to the 8% drop in GDP across the same set of crisis episodes.[12] Figure 3B shows the relation between sales and GDP from 6 periods before the crisis to four periods after the crisis. The figure reveals that across the countries aggregate firm sales tracks GDP closely except during the crisis period.[13]

In Figure 3C we explore other measures of corporate output including Sales-COGs, profitability as measured by EBITDA, and profitability adjusted for wages or EBITDA + Wages[14] and find a similar one period lag between GDP recovery and corporate output recovery. As in other cross-country micro studies, we are restricted to examining the micro data for public firms since detailed balance sheet data on private firms across countries is unavailable. However, we were able to obtain operating revenue on a sample of private firms (156 firms with non-missing data over 10 years) in Argentina from the ORBIS database.[15] In Figure 3D, we examine

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[12] It may be noted that our micro level analysis is focused only on the corporate sector (largely manufacturing firms) while the GDP numbers reflect other sectors of the economy and not just the corporate sector.

[13] Figure 3B does not include Russia and Turkey because the firm-level data do not allow us to go back six years before the crisis.

[14] A description of the construction of national income statistics from the International Financial Statistics reveals that sales from commercial income statements are adjusted for changes in output inventories and work in progress to measure production. The components of inventory are not well populated in the Bloomberg database and so we use other approximations of production.

[15] We used the 2009 version of ORBIS data which goes back ten years to 1999. Hence we are unable to replicate the private firm analysis for the other 3S countries since the crises periods are before 1999.

the relation between GDP and corporate sales for just the private firms and find a similar pattern as before – corporate sales begin to recover one period after GDP recovery. All our results hold when we restrict the sample to firms with fiscal year ends in December.

Once we disaggregate across countries in Figure 4, we again find a great deal of heterogeneity. In Figure 4A, when we look at the set of countries where the macro data showed a Phoenix Miracle, we find that sales (dotted line) begins to recover simultaneously with GDP (bold line) as in the case of Thailand or one to three periods after GDP recovery as in the case of Argentina, Indonesia, Malaysia, Mexico, and Russia. However the sales and GDP patterns do not appear to be correlated at all in the case of the Non-Miracle countries – Korea and the two Turkey episodes (see Figure 4B). In the case of Korea there is no drop in sales during the crisis period and in the case of Turkey's two crisis episodes, aggregate sales does not seem to recover even three periods after GDP recovery. While we previously classified Korea and the two Turkey episodes as Non-miracles at the aggregate level since GDP and credit recovered simultaneously, Figure 4B suggests that micro data also point towards them being non-miracles. We discuss this in greater detail in section 3.2.2.

In addition to the robustness checks in Figures 3B-3D, we undertake several other checks to understand whether statistical issues or sample selection issues are driving the discrepancy between recovery in economy-wide GDP versus corporate sales. First, we find that our results are robust to restricting the sample to firms with fiscal year ends in Dec 31st (<15% of our sample of firms have fiscal year ends before Dec 31st) suggesting that our results are not driven by timing issues related to the reporting of balance sheet information.[16] Second, our results are also robust to not restricting the sample to firms with all five years of data on sales or output suggesting that our results are not driven by sample selection issues associated with firms entering and leaving the database.

To explore whether our results are driven by discrepancies in official reported GDP statistics, we look at two other measures - value added in the manufacturing sector from World Development Indicators and electric power consumption. Several economists including Dobozi and Pohl (1995) have argued that electric power consumption data are a more reliable indicator

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[16] We prefer to use annual data instead of quarterly data since the coverage of firms is better in the annual Bloomberg file. However, our results are robust to using quarterly data rather than annual data.

of overall short-run economic activity than official GDP statistics which may be biased due to any number of reasons including under-reporting of output by enterprises (to avoid taxes) and old reporting systems used by statistical offices. We find that the GDP troughs identified in the crisis episodes coincide with troughs in manufacturing value added and in power consumption, though the power consumption data do not exhibit a collapse as large as that of the GDP.

While we find no evidence that the GDP statistics are not representative, several papers have suggested that there may be statistical measurement error in computing macro numbers. For instance, Bartelsman and Wolf (2009) show that productivity forecasts using micro data are more accurate and better than the macro alternative. Miron and Zeldes (1989) examine two measures of monthly manufacturing production – the index of industrial production and a second measure constructed from the accounting identity that output is given by the sum of sales and changes in inventories and find several discrepancies. They conclude substantial measurement error exists in the macro (industry level) price indices as compared to those constructed from micro data. Similar discrepancies between macro-level and household consumption data in national account statistics have been noted by Ravallion (2003) and Young (2009). Hence the need for examining the recovery process from a crisis using detailed firm-level data.

3.2.2   Sales versus Credit Recovery

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 5A 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.

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 5B) 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

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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 5C, in each of these countries both Sales and Short Term Borrowing recover at the same time (at t+1 in the case of Indonesia and Russia and t+3 in the case of Mexico). In both the Turkey episodes (see Figure 5D), 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 just the macro data, 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.

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. We next focus on their balance sheet and cash flow statements over the two periods following the trough of the crisis. 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[17] in each of the five years 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

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[17] 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.

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.

In Table 3, we first identify the percentage of firms that had a recovery in sales over a two year period in each economy in panel A and then identify potential credit-less recoveries (Phoenix miracles) in each economy in panel B. First, consider the two year internal from t to t+2. If ΔS_{t+1} is the change in sales from t to t+1 and ΔS_{t+2} is the change in sales from t to t+2, output over the two year period is given by

$$\Delta S = \Delta S_{t+1} + \Delta S_{t+2} \tag{1}$$

If we were to define firms that recover as those that had a positive change in sales over the two period i.e. $\Delta S > 0$, panel A of Table 3 shows that in our sample of 1326 firms across the 5 countries, only 57% of the firms had a recovery in sales. The percentage of firms that had a positive change in sales is higher (61.39%) in the micro miracle countries (aggregate sales recovering before a recovery in short term credit). In the non-miracle countries, in Indonesia where aggregate sales and credit begin to recover simultaneously, 50.47% of the firms have a recovery in sales where as in Mexico where there is no recovery in aggregate sales, only 9.21% of the firms show a positive change in sales over the two period. Thus, panel A tells us that across the five 3S episodes for which we have firm-level data, a large percentage of firms do not have a recovery in sales at all. Even in the episodes that can be classified as micro miracles, nearly 40% of the firms had no recovery in sales.

To identify phoenix miracles, we focus on firms that have had a recovery in sales 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:

$$\Delta L1 = \Delta STD_{t+1} + \Delta STD_{t+2} \tag{2}$$

where ΔSTD_{t+1} is the cash flow from net changes in short term borrowing reported on the cash flow statement at t+1 and ΔSTD_{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.[18] So we have:

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

where ΔLTD_{t+1} and ΔLTD_{t+2} are the net changes in long term borrowing reported on the cash flow statement at t+1 and t+2, respectively, ΔCS_{t+1} and ΔCS_{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 7.89% in Mexico (identified as a Macro miracle but not a Micro miracle since there was no recovery in aggregate sales from t to t+2) to 45.33% in Korea (a Micro miracle but not a Macro miracle). Across the 5 3S episodes, we find that only 37.03% of the firms can be classified as Phoenix Miracles, thus suggesting that less than half the sample can be classified as miracles since they recovered in the absence of short-term borrowing. Of the remaining we find that 19.61% of the firms had a recovery in sales and short-term borrowing, 13.20% had no recovery in sales but a recovery in short-term borrowing (suggesting that these firms may have faced a demand shock), and 30.17% of the firms had no recovery in either sales 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 30.44% (from 37.03% in panel B1). The largest percentage of Phoenix Miracles is 41.76% in Thailand (identified as both a Macro and Micro Miracle), but even here, the percentage of Phoenix miracles drops from 44.69% when we define external financing narrowly as short-term financing, to 41.76% when we define external financing to also include long-term borrowing, capital stock issuance and other financing activities. While the percentage of Phoenix Miracles goes down, the percentage of firms that had a recovery in sales and credit goes up by the same amount as expected. Furthermore, with this

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[18] 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 sales or credit goes down from 30.17% to 27.30% while the percentage of firms that had no recovery in sales but a recovery in credit goes up from 13.20% to 16.06%. 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 micro-level data (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 Credit

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.

$$\Delta L3 = \Delta L2 + \Delta DIV_{t+1} + \Delta DIV_{t+2} + \Delta INV_{t+1} + \Delta INV_{t+2} \tag{4}$$

where ΔDIV_{t+1} and ΔDIV_{t+2} are the dividends paid at t+1 and t+2, respectively, ΔINV_{t+1} and ΔINV_{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)). In Panel C2, we add in cash flow from operations. So we have:

$$\Delta L4 = \Delta L3 + \Delta OPER_{t+1} + \Delta OPER_{t+2} \tag{5}$$

where $\Delta OPER_{t+1}$ and $\Delta OPER_{t+2}$ are the cash flow from operations at t+1 and t+2, respectively.

Across the 5 3S episodes, we find that the percentage of firms that had a recovery in sales without a recovery in credit (that is firms that were previously identified as candidate Phoenix Miracles) reduces to 7.84% in panel C1 and further to a mere 1.73% when we include cash flow from operations in panel C2. The percentage of firms that have a recovery in sales and credit in now 54.90% and only 3.39% of the firms have no recovery in either sales or credit. The remaining (39.97%) firms experience no recovery in sales 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 and aggregate sales and credit, 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 and have positive cash flow from operating activities suggesting that they are not liquidity constrained. Once we account for the alternate sources of cash, a very small percentage (3.39%) are identified as not having recovered in sales and credit and an even smaller percentage (<2%) as having recovered in sales without a positive net credit position over the two periods.

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), we use an empirical model that allows us to examine how a cash flow shock can affect firms' investment, financing, and distribution decisions jointly, subject to the accounting identity that sources of cash equal uses of cash. Say a firm experiences a one dollar increase in operating cash flow. This incremental cash flow could be used to increase capital expenditures or pay down debt or increase shareholder dividends or make any combination of investment and financing decisions that result in a net response of one dollar. That is, given the accounting identity that sources of cash equal uses of cash, the following should hold:

Capex_t + Other Investments (including Acquisitions)$_t$ + ΔCash_t + Dividends$_t$ + Repurchases$_t$ - Asset Sales$_t$ - ΔSTD_t - ΔLTD_t - EQUISS$_t$ - Other Financing$_t$ $\equiv$ Cashflow$_t$ (6)

Consider then the following system of ten equations describing firms' *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) decisions as a function of operating cash flow and a set of control variables:

$$\begin{aligned}
\Delta\text{Capex}_{i,t} &= a_{1,i} + b_1\,\text{OCF}_{i,t} + c_1\,\mathbf{X}_{i,t} + e_{1,i,t} \\
\text{Other Investments}_{i,t} &= a_{2,i} + b_2\,\text{OCF}_{i,t} + c_2\,\mathbf{X}_{i,t} + e_{2,i,t} \\
-\text{Asset Sales}_{i,t} &= a_{3,i} + b_3\,\text{OCF}_{i,t} + c_3\,\mathbf{X}_{i,t} + e_{3,i,t} \\
-\Delta\text{STD}_{i,t} &= a_{4,i} + b_4\,\text{OCF}_{i,t} + c_4\,\mathbf{X}_{i,t} + e_{4,i,t} \\
-\Delta\text{LTD}_{i,t} &= a_{5,i} + b_5\,\text{OCF}_{i,t} + c_5\,\mathbf{X}_{i,t} + e_{5,i,t} \\
-\text{Equity}_{i,t} &= a_{6,i} + b_6\,\text{OCF}_{i,t} + c_6\,\mathbf{X}_{i,t} + e_{6,i,t} \\
\Delta\text{Cash}_{i,t} &= a_{7,i} + b_7\,\text{OCF}_{i,t} + c_7\,\mathbf{X}_{i,t} + e_{7,i,t} \\
-\text{Other Financing}_{i,t} &= a_{8,i} + b_8\,\text{OCF}_{i,t} + c_8\,\mathbf{X}_{i,t} + e_{8,i,t} \\
\text{Dividend}_{i,t} &= a_{9,i} + b_9\,\text{OCF}_{i,t} + c_9\,\mathbf{X}_{i,t} + e_{9,i,t} \\
\text{Repurchases}_{i,t} &= a_{10,i} + b_{10}\,\text{OCF}_{i,t} + c_{10}\,\mathbf{X}_{i,t} + e_{10,i,t}
\end{aligned}$$

(7)

where OCF is Operating Cash Flow from the Statement of Cash Flows (net of working capital accruals as suggested by Bushman et al., 2007). The operating cash flow variable and all the dependent variables are scaled by lagged value of Total Assets. X is a set of control variables and includes Tobin's Q as a measure of investment opportunities, and an initial Firm Size dummy, that takes the value 1 if total assets was greater than or equal to the median assets in the country in year t-2, and 0 otherwise. All the independent and dependent variables in the system are de-meaned to account for firm level fixed effects. The Data Appendix provides a detailed description of each of the variables and from where they are derived.

By virtue of the sources-equal-uses constraint in (6), the cash flow coefficients should add up to unity and the coefficients of all other variables should sum to 0. That is, if OCF_t 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. Tobin's Q and size dummy 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:

$$\Sigma\,b_i = 1 \tag{8}$$

$$\Sigma\,c_i = 0 \tag{9}$$

Empirically, we estimate (7) as a system of seemingly unrelated regression models subject to the constraint that across equations,[19] cash flow coefficients sum to one and all other

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[19] Note that the seemingly unrelated regression models (SUREG) 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 SUREG estimation since

coefficients sum to zero. For ease of interpretation of the coefficient estimates, we do not multiply the source variables (Asset Sales, ΔSTD, ΔLTD, Equity, Other Financing) by minus one and instead, equivalently multiply their corresponding cash flow coefficients by minus one when the defining the constraints in (8) and (9). Since we are interested in the individual cash flow sensitivities in each period, we estimate equation (7) by also including three time dummies, for the crisis period (t) and the two recovery years (t+1 and t+2), and interaction of the cash flow variable with each of the time dummies. Thus, if γ_{i1} is the coefficient of $OCF_{i,t}$ x time t dummy, γ_{i2} is the coefficient of $OCF_{i,t}$ x time t+1 dummy, and γ_{i3} is the coefficient of $OCF_{i,t}$ x time t+2 dummy, equation (8) may be re-written as:

$$\begin{array}{l} \Sigma\,(b_i + \gamma_{i1}) = 1 \\ \Sigma\,(b_i + \gamma_{i2}) = 1 \\ \Sigma\,(b_i + \gamma_{i3}) = 1 \end{array} \left.\right\} \qquad (10)$$

In Table 4, we present the results of the SUREG estimation. We report the combined effect of the cash flow coefficients and the interaction terms to allow ease of interpretation. The system is estimated on the sample of countries that can be exogenously identified as miracles using the macro classification – Indonesia, Mexico, Malaysia, and Thailand. We remove the top and bottom 1% outliers for all the variables in the system. Furthermore, we allow for asymmetry in firms' reactions to positive versus negative cash flow shocks by estimating equation (7) on two separate sub-samples of firms with positive operating cash flows (panel A) and firms with negative operating cash flows (panel B). Note that the interpretation of the signs of the negative cash flow coefficients will be inverse that of the interpretation of the positive cash flow coefficients. So for instance, if a firm facing a positive cash flow has a capital expenditure coefficient of +0.296 this would mean the firm is spending 29.6 cents on capital expenditures out of a $1 positive cash flow shock. On the other hand, if a firm facing a negative cash flow has a capital expenditure coefficient of -0.296 this would again mean the firm is spending 29.6 cents on capital expenditure.

When we look at the firms with positive operating cash flows, panel A shows that before the crisis (that is in the years t-2 and t-1), a $1 increase in cash flow is associated with an

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it allows for constrained estimation across the system and allows us to perform joint test of coefficients across the system.

increase in cash balances by 40.7 cents, an increase in capital expenditures by 10.7 cents, and an increase in other investments (includes net long-term investments and acquisitions) by 18.9 cents. The $1 cash flow shock is also associated with decrease in long-term debt by 8.9 cents, decrease in short-term debt by 21.1 cents, increase in equity issuances by 4 cents, and decrease in other financing by 2.7 cents. Thus, during the pre-crisis period we see that when there is a positive one dollar shock in cash flow, the use variables increase by $0.707 (=0.407+0.107+0.189+0.006-0.001) and other sources variables decrease by $0.293 (= -0.006-0.089-0.211+0.04-0.027) thus summing the response across the system (Uses-Sources) to one dollar.

When we look at the dynamics of cash flow sensitivities we see that firms continue to add to their cash balances during the crisis (44.5 cents) and recovery periods (42 cents in T+1 and 48.8 cents in T+2) out of every dollar increase in cash flow. The firms also continue their investing activities though the levels are lower than the pre-crisis investing levels. During the crisis, out of every $1 cash flow shock, firms invest 9.5 cents in capital expenditures and 15.7 cents in other investments. During the recovery period in the first year (T+1), a $1 increase in cash flow is associated with an increase in capital expenditures by 15.6 cents and other investments by 17.6 cents and in year T+2 the corresponding numbers are 26 cents and 15.4 cents. A dollar increase in cash flow is associated with a decrease in dividends of 1.8 cents in T, an increase in dividends by 1.3 cents in T+1 and 5.4 cents in T+2. There is also a significant decline in asset sales of 1.2 cents in T and 1.4 cents in T+1.

Focusing on the financing positions, we see that during the crisis and recovery periods, in general increases in cash flow are associated with a decrease in short-term debt. Specifically, a 1$ increase in cash flow is associated with a decrease in short-term debt of 19.1 cents in T, 18.7 cents in T+1 and 7.9 cents in T+2. The firms facing positive cash flow shocks also have a reduction in long-term debt in the pre-crisis years of 8.9 cents and in the crisis year of 8.6 cents. A $1 increase in cash flow is also associated with a reduction in other financing by 2.7 cents in pre-crisis years, 3.7 cents in T, and 2.5 cents in T+1.

Panel C shows the sum of the cash flow coefficients across the sources and uses as well as across the investment and financing variables separately. As expected the sum of the cash flow sensitivities across the Uses of Cash minus the sum of the cash flow sensitivities across the

Sources of Cash sum up to $1. Overall, we find that the absolute magnitude of the investment cash flow sensitivities dominate the financing cash flow sensitivities for the firms in our sample having positive cash flow shocks in most years except the crisis year

In Panel B of Table 4 we examine the cash flow sensitivities of firms facing adverse cash flow shocks. Note that since the cash flows are negative the interpretation of the coefficients is reversed so that a positive sign indicates a decrease and a negative sign indicates an increase. First during the pre-crisis period, we find that firms facing an adverse cash flow shock reduce their cash balances by 10.3 cents, increase capital expenditures by 9.8 cents and decrease other investments by 8 cents. They also have an increase in dividends of 1.5 cents. Interestingly, decreases in cash flow are associated with an increase in long-term borrowing by 20.7 cents, increase in short-term debt by 46 cents, increase in other financing by 4 cents and increase in equity issuances by 21.8 cents.

During the crisis year T, firms facing an adverse cash flow shock continue to deplete their cash balances by 23.8 cents, borrow 26.4 cents in long-term debt, 24.4 cents in short-term debt and issue 26 cents in equity when facing a $1 shortfall in cash flow. During the recovery period T+1, decreases in cash flow are associated with reduction in cash balances by 19.8 cents, increase in long-term debt by 54.4 cents and an increase in short-term debt by 26 cents. During T+2, cash flow shortfalls are associated with reduction in cash balances by 37.6 cents, increase in equity issuance by 24.2 cents and increase in other financing by 8.1 cents. Panel C shows that for the sample of firms facing adverse cash flow shocks the absolute magnitude of the financing-cash flow sensitivities dominate that of the investment cash flow sensitivities.

In summary, we find that during a 3S episode and subsequent recovery, the emerging market firms in our sample with positive operating cash flow shocks repay their short-term debt and firms with adverse cash flow shocks increase their external borrowing and equity issuances.

5.   2008/09 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), where real economic activity recovers before a recovery in the credit markets. The comparison 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, April 2009) have documented a recovery in output ahead of a recovery in credit in recessions and credit crunches even in OECD countries.

5.1   *Output versus Credit Recovery – US Case*

In Figure 6A, 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.[20] We use the December numbers each year from the H8 release which is in monthly data format. Figure 6A 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% whereas 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 6B, 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*

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[20] 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.

(Balance Sheet data item #34) reported over the six year period from 2005 to 2010.[21] Figure 6B 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 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 6A and 6B 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.

In Table 5, we present a detailed firm-level analysis using Compustat 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 5 we see that during the crisis period from 2008 to 2009, only 32.65% of firms had a positive increase in sales while 64.08% of firms had a decline in sales. By contrast during 2009 to 2010, 69.38% of the firms in our sample had a positive increase in sales and only 27.17% of the firms had a decline in sales. In unreported logit regressions, we find that the firms who had a positive increase in sales tend to be larger firms, in manufacturing (SIC codes 20-39), and with lower pre-crisis (in 2007) levels of short-term and long-term debt.

In panel B of Table 5 we repeat our analysis of Table 3 for the sample 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

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[21] The Compustat data download was in July 2011. So we may be missing data on some firms that have fiscal year ends in January-May2011 (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.

constructed. When we use changes in short-term borrowing (Balance Sheet data item #34) as a measure of credit, we find 45.63% of our sample to be Phoenix Miracles – these firms had a positive increase in sales without a positive increase in short-term borrowing from 2009 to 2010.[22] 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, 27.2% of the firms had a positive increase in sales and short-term borrowing, 9.29% had a decline in sales but an increase in short-term borrowing and 17.88% of firms had a decline in sales and short-term borrowing.

The percentage of Phoenix Miracles is reduced to 8.96% 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). And of these firms, 59% (unreported in the table) had adequate cash balances to cover their liquidity crunch.

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. First, 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 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 5.54%. This further reduces to 2.76% (92 firms out of 3338) once we include the Cash Flow from Operating Activities (data item #308).

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[22] 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.

Even among these 92 firms, 53% (unreported in the table) had a sufficient cash balance to cover their liquidity crunch. 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.[23]

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 positive and negative cash flow shocks affect firms' 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 (7) 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 2006-2007 (pre-crisis period), 2008 (crisis year), 2009 (crisis year) and 2010 (recovery year) and interactions of Operating cash flow (OCF) with each of the four dummies. In all regressions, we use de-meaned values of all variables (to proxy for firm fixed effects) and control for firm size (Log Total assets) and Tobin's Q. The system is estimated as a seemingly unrelated regression (SURE) model subject to the constraints that across the system, in each year, the operating cash flow coefficients sum to one while the other coefficients sum to 0. That is,

Σ Coefficient of OCF + Σ Coefficient of (OCF x 2006-2007 dummy) = 1;

Σ Coefficient of OCF + Σ Coefficient of (OCF x 2008 dummy) = 1;

Σ Coefficient of OCF + Σ Coefficient of (OCF x 2009 dummy) = 1;

Σ Coefficient of OCF + Σ Coefficient of (OCF x 2010 dummy) = 1;

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[23] 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 . When we re-compute Table 4 after dropping observations with missing data on long-term borrowing, net capital stock issuance and other financing, our sample is reduced to 1609 firms of which 34.62% are candidate Phoenix miracles. When we examine alternate sources of credit and further drop observations with missing data on the different investing and operating activities in the Statement of Cash flows, our sample is reduced to 890 firms and we find that only 14.16% of the firms had a recovery in sales without a recovery in credit.

Σ Coefficients of Log Size =0;

Σ Coefficients of Tobin's Q=0; and

Σ Coefficients of each of the time dummies =0.

In Table 6, we report the combined effects of Operating cash flow and the interaction terms each year. Panel A reports the results from the SUREG system for the sample of firms with positive operating cash flows while panel B reports the results from the SUREG estimation for the sample of firms with negative operating cash flows. In unreported logit regressions, we find that larger firms are more likely to have positive operating cash flows than negative operating cash flows.

Panel A shows that in the years before the crisis (2005-2007), a $1 increase in cash flow is associated with an increase in cash balances by 53.8 cents, increase in capital expenditures by 17.2 cents, increase in other investments (including acquisitions) by 31.7 cents, increase of 0.4 cents in dividends (insignificant) and a 5.3cents increase in share repurchases. The $1 increase in cash flow is also associated with an insignificant increases in asset sales, an increase in long-term debt by 5 cents, decrease in short-term debt by 3.8 cents, increase in equity issuance by 8.1 cents and a decrease in other financing by 0.9 cents. Thus, during the pre-crisis period we see that when there is a positive one dollar shock in cash flow, the use variables increase by $1.08 (=0.538+0.172+0.317+0.004+0.053) and other sources variables also increase by $0.084 (=0.050-0.038+0.081-0.009) thus summing the response across the system (Uses-Sources) to one dollar.

When we look at the different uses of cash during the crisis and recovery periods, we find that firms facing a positive cash flow shock continue to add to their cash balances and make investments, although the capital expenditures are lower than pre-crisis levels. A $1 increase in cash flow results in an increase in cash savings of 58.1 cents in 2008, 70.9 cents in 2009 and 56.2 cents in 2010. Increase in capital expenditures during crisis and recovery periods are lower than pre-crisis levels where as increase in other investments is about the same as pre-crisis levels. A $1 increase in cash flow is associated with an increase in capital expenditures of 14.4 cents in 2008, 7.2 cents in 2009 and 10.2 cents in 2010 and an increase in other investments by 29.5 cents

in 2008, 23.7 cents in 2009 and 31.6 cents in 2010.[24] Increase in dividend payments are 1.7 cents in 2008, 2.8 cents in 2009 and 4.1 cents in 2010. Share repurchases increase by 5.5 cents in 2008, decrease by 2.3 cents in 2009 and there is an insignificant increase of 1.7 cents in 2010.

We also find that firms facing positive cash flow shocks use their cash flows to reduce their short-term debt and other financing while raising equity. In 2008, increases in cash flow are associated with a decrease in short-term debt and other financing of 4 cents and 1.5 cents, respectively and an increase in long-term debt and equity of 5 cents and 9.7 cents, respectively. In 2009, increases in cash flow are associated with a decrease in short-term debt of 4 cents and an increase in equity issuances of 8 cents, respectively. Long-term debt and other financing decrease by insignificant amounts in 2009. In 2010, increases in cash flow are associated with a decrease in short-term debt and other financing of 2.3 cents and 1.3 cents, respectively and an increase in equity issuance by 10.8 cents. Note that not all equity issuances are issuances of new stock since the item includes conversion of special stock and/or debt into common stock, exercise of stock options and/or warrants and any stock splits/reverse stock splits associated with merger and acquisition activity.

Panel B presents cash flow sensitivities for the firms facing adverse cash flow shocks. Note that the interpretation of the signs of the coefficients is switched here so that a negative coefficient means an increase in the dependent variable and a positive coefficient implies a decrease in the dependent variable. Overall, we find that firms facing adverse cash flow add to their cash balances during crisis and recovery periods, increase their capital expenditures and other investments, borrow long-term debt and issue equity while reducing their other financing. Specifically, when firms in our sample face a $1 shortfall in cash flow, they add 18.5 cents to their cash balances in 2006-07 (pre-crisis), 20 cents in 2008 and 23.6 cents in 2009 and 23.3 cents in 2010. Increases in capital expenditure are 1.8 cents in 2006-07 and 2008, 2.2 cents in

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[24] As described in the Appendix, the Other Investments variable is computed from Compustat (for firms following cash flow format 7) as Acquisitions + (Increase in Investments – Sale of Investments) – Changes in Short-term Investments – Other investing Activities. Thus it includes the cash flow associated with mergers and acquisition activity. When we re-estimate the system by stripping the Other Investments variable of Acquisitions and including it as an independent variable, we find that over 50% of the Other Investments/Cash Flow sensitivity is due to Acquisitions. We don't use this in all our regressions since we are unable to separate out acquisitions in the Bloomberg sample on emerging market sample.

2009 and 3 cents in 2010. Increases in other investments are 10 cents during pre-crisis levels, 6.2 cents in 2009 and 12.4 cents in 2010.

Firms facing adverse cash flow shocks of $1 borrow 9.3 cents of long-term debt during pre-crisis levels, 9.6 cents in 2008, 16.1 cents in 2009 and 2010. They also have large equity issuances in excess of $1 - $1.209 in 2006-07, $1.19 in 2008, $1.099 in 2009 and $1.241 in 2010. We find that the firms issuing equity and long-term debt are the larger firms in the sample of firms facing adverse cash flow shocks.[25] This is consistent with recent literature showing that equity is an important source of finance for firms facing substantial cash flow requirements (e.g. Huang, Mayer, and Sussman, 2008) and that unprofitable firms issue equity (e.g. Hovakimian, et al., 2004). Changes in short-term debt, dividends, asset sales, share repurchases for firms facing adverse cash flow shocks are not economically (all less than 1 cent) or statistically significant.

The other variables in each of the regressions are Tobin's Q and firm size and since these represent neither sources nor uses of funds, the sum of their coefficients should add up to zero in each case. The results suggest that in the positive cash flow sample, firms with higher Tobins Q add more to their cash balances, have higher capital expenditures and other investments and higher dividends and are more active in issuing equity. Larger firms also have higher capital expenditures and other investments and have larger long-term and short-term borrowing. We find similar results in the negative cash flow sample in addition to finding that that higher Tobins Q firms and larger firms also have lower asset sales (statistically significant at the 1% level).

Panel C presents a summation of the cash flow coefficients in each year in each of the panels. As expected we find that each year, the sum of cash flow coefficients across the Sources (Cash, Capex, Other Investments, Dividends, Repurchases) – Uses (Asset Sales, Long-term Debt, Short-term Debt, Other Financing) sum to 1. When we compare the sum of cash flow coefficients across the investment variables (Capex + Other Investments – Asset Sales) to that across the financing variables (Long-term debt + Short-term debt + Equity + Other Financing – Repurchases) we see that for firms facing a positive cash flow shock, in each year, the investment cash flow sensitivities dominate the financing cash flow sensitivities. However, when we look at firms facing adverse cash flow shocks, we find that the financing cash flow

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[25] The large equity issuances coefficient in the sample is party driven by some firms having very small negative operating cash flows (the operating cash flows in this sample of 2972 firms range from -4.43 to -0.0001301).

sensitivities dominate the investment cash flow sensitivities. Thus financing variables seem to act as buffer against negative cash-flow changes, consistent with the notion that financing variables are less costly to adjust than investment variables (e.g. Gatchev, Pulvino, and Tarhan, 2010; Dasgupta, Noe, and Wang, 2011).

5.2.1 *Manufacturing vs. Non-manufacturing Firms*

In Table 7, we split the sample into manufacturing and non-manufacturing firms. Thus we have 4 panels – two panels on manufacturing (panel A1) and non-manufacturing (panel A2) sub-samples for firms with positive operating cash flows and two panels on manufacturing (panel B1) and non-manufacturing (panel B2) sub-samples for firms with negative operating cash flows.

For firms with positive operating cash flows we find that dollar increases in operating cash flow are associated with additions to cash balances and increases in investment expenditures across both manufacturing and non-manufacturing firms. For every dollar increase in operating cash flow, manufacturing firms add between $0.427 to $0.719 to cash balances over 2006-2010 while non-manufacturing firms add between $0.511 to $0.697 to cash balances over the same period. While both types of firms spend on capital expenditures and other investments out of positive cash flow shocks, on average non-manufacturing firms spend a higher amount on capital expenditures than manufacturing firms over the sample period. Sample statistics show that the capital expenditures in general are higher in the non-manufacturing firms in our sample (mean = 0.070, median = 0.044) than manufacturing firms (mean = 0.043, median = 0.029). Manufacturing and non-manufacturing firms also pay similar dividends during the crisis and recovery periods. For manufacturing firms, increases in cash flow are associated with increases in dividends of 1.3 cents in 2008, 2.5 cents in 2009 and 3 cents in 2010 compared to non-manufacturing firms where increases in cash flow are associated with increases in dividends of 2.2 cents, 3.2 cents and 5.1 cents in 2008, 2009, and 2010, respectively.

On the financing side we find that in general, in both cases, positive increases in cash flow are associated with increases in equity issuances and decreases in short-term debt during the crisis and recovery periods. In the pre-crisis period, a $1 increase in cash flow is associated with reduction in short-term debt of 2.5 cents, reduction in other financing of 1.1 cents and increase in share repurchases of 7 cents for manufacturing firms. By contrast, for non-manufacturing firms,

a $1 increase in cash flow is associated with reduction in short-term debt of 4.5 cents, increase in long-term borrowing of 7.6 cents, increase in equity issuances of 13.9 cents and increase in share repurchases of 4.3 cents. In 2008, a $1 increase in cash flow is associated with increase in equity issuances of 9.8 cents, increase in share repurchases of 8.8 cents and decrease in other financing of 1.7 cents for manufacturing firms. For non-manufacturing firms in 2008, $1 increase in cash flow is associated with increase in long-term debt of 6.5 cents, decrease in short-term debt of 6.1 cents, increase in equity issuances of 10.2 cents, decrease in other financing of 1.2 cents and increase in share repurchases of 3.8 cents. In 2009, the non-manufacturing firms reduce their short-term debt by 4.5 cents, increase their equity issuances by 10 cents and reduce share repurchases by 3.2 cents while manufacturing firms reduce short-term debt by 3.7 cents and increase equity issuances by 6 cents. During the recovery period in 2010, manufacturing use their positive cash flow shocks to repay long-term debt (10 cents), repay short-term debt (2.7 cents) and issue new equity (15.6 cents) while non-manufacturing firms use their positive cash flow shocks to repay short-term debt (2.3 cents), reduce other financing (1.7 cents) and issue new equity (6.9 cents) without any significant change in their long-term debt positions.

As explained before, the interpretation of the coefficients in the negative cash flow sample is such that a negative sign indicates an increase and a positive sign indicates a decrease.

Focusing on the firms facing adverse cash flow shocks in B1 and B2, we find that both manufacturing and non-manufacturing firms have increases in long-term debt and equity issuances over the entire period. They also have substantial addition to their cash balances and increases in capital expenditures and other investments suggesting that these firms may not be very financially constrained. Focusing on the differences between manufacturing and non-manufacturing firms we find that decreases in cash flow are associated with significant increases in dividend payments (although very small and ≤ 2 cents) only in the case of manufacturing firms in the pre-crisis period, 2009 and 2010 but not in the case of non-manufacturing firms. Manufacturing firms also have significant asset sales of 0.2 cents and 0.5 cents in 2008 and 2009 while non-manufacturing firms do not. On the financing side, we find that manufacturing firms reduce short-term debt 2.1 cents in 2010 while non-manufacturing firms borrow 4.9 cents of short-term debt and 2.1 cents of other financing in 2010.

5.2.2   Miracle Firms vs. Non-Miracle Firms

In this section we examine the differences in cash flow sensitivity between firms that were identified as candidate miracles or non-miracles in section 5.1. That is, we first identify the firms that had a zero/positive change in sales in 2010 while the change in short-term debt was zero/negative (i.e. candidate phoenix miracles). We next identify the cash flow sensitivities of these firms during the whole period. We also further split the miracles and non-miracles into those that had positive operating cash flows and those with negative operating cash flows.

When we compare miracles and non-miracles that had positive operating cash flows in panels A1 and A2 of Table 8, we find that in both cases, increases in cash flow are associated with additions to cash balances, increases in capital expenditures and other investments, and increases in dividends over the crisis and recovery periods. On the financing side, we find that in the case of miracle firms, increases in cash flow are associated with increase in long-term debt of 9.1 cents in the pre-crisis period and a decrease in long-term debt of 7.9 cents in 2010 while there are no significant changes in the non-miracle sample. When we look at short-term debt, we find that increases in cash flow are associated with reduction in short-term debt in all years for the non-miracle sample but in the case of the miracle sample there is no significant reduction in short-term debt in 2010, as expected. In both cases, increases in cash flow are associated with increase in equity issuances through the entire sample period. However, there are some differences in the share repurchases. For miracle firms, increases in cash flow are associated with increase in share-repurchases only in the pre-crisis period where as for non-miracle firms, increases in cash flow are associated with increases in share-repurchases in the pre-crisis period and in 2008 and a reduction in share repurchases in 2009. Increases in cash flow are associated with a reduction in other financing in the pre-crisis years, 2008 and 2010 only for the miracle firms where as there are no significant changes in the non-miracle sample.

When we look at firms with negative cash flows in panels B1 and B2, we find that miracles and non-miracles have similar increases in cash, capital expenditures and equity issuances. We also find that both miracle and non-miracles facing adverse cash flow shocks have increases in long-term borrowing over the period. We do find some differences in the short-term borrowing and other financing between miracles and non-miracles. Miracle firms facing a $1 decrease in cash flow decrease their short-term borrowing by 1.7 cents in 2008 and 2.9 cents in

2010 with insignificant changes in other years where as the non-miracles facing a $1 decrease in cash flow shock increase their short-term borrowing by 2.3 cents in 2010 with insignificant changes in other years. Decreases in cash flow are also associated with decreases in other financing in the case of miracle firms of 0.7 cents in the pre-crisis period, 2.1 cents in 2008, 2.1 cents in 2009 and 2.8 cents in 2010 where as decreases in cash flow seem to be associated with increases in other financing (although insignificant and ≤ 0.5 cents for non-miracle firms.

Overall, we find no evidence that the candidate miracle firms are substantially different from the non-miracle firms in their investment and financing patterns. The miracle firms do not seem to be particularly more financially constrained than the non-miracle firms.

Overall, the experience of US firms during the one-year recovery from the 2008 US financial crisis suggests the following: First most firms in our sample increase their equity issuances during the crisis and recovery periods. Second, increases in cash flow are associated with decreases in short-term leverage during the crisis and recovery period while decreases in cash flow are associated with increases in long-term debt. Third, while the cash savings of firms are lower compared to pre-crisis levels, there is still substantial addition to cash holdings during the recovery period among firms facing both positive and negative cash flow shocks. Fourth, it parallels the emerging market experience in that the recoveries do not appear to be credit-less since the firms facing adverse cash flow shocks and presumably the most financially constrained, are able to access external borrowing and issue equity.

6.   **Conclusion**

We provide empirical evidence on the effect of Systemic Sudden Stops (3S) 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 financial sector and outline a theoretical model of this recovery. 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.

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 micro data shows that even in these countries only a small fraction of firms (<31%) follow this pattern. Moreover, most of these firms continue to spend on capital expenditures and other investments and have positive operating cash flow.

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 9% of the firms in our 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 and the cash from operating activities, only 2.8% of the firms in our sample appear to have a recovery in sales not accompanied by credit. Furthermore, we find that even the firms facing adverse cash flow shocks are able to issue equity and borrow in the long-term debt market during the recovery process. The seeming continuing reliance on long term financing and equity issuance during crises episodes, as uncovered in our analysis, has implications for public policy on the role of credit in recovery from crises.

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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
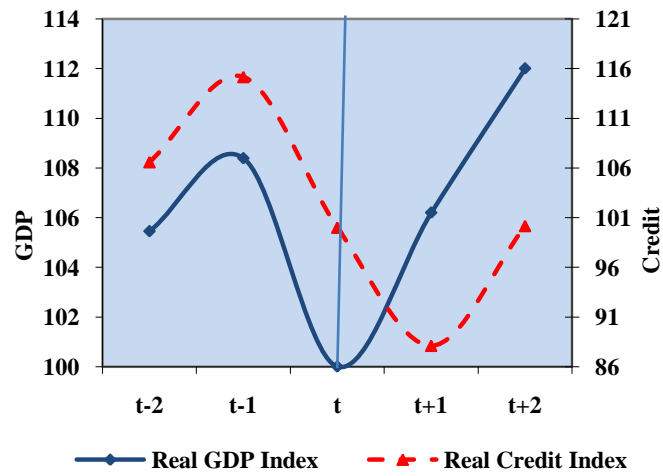
Figure 2: Macro Evidence - Heterogeneity across 3S episodes

2A: Phoenix Miracles

Argentina

Indonesia

Mexico

Malaysia

Russia

Thailand
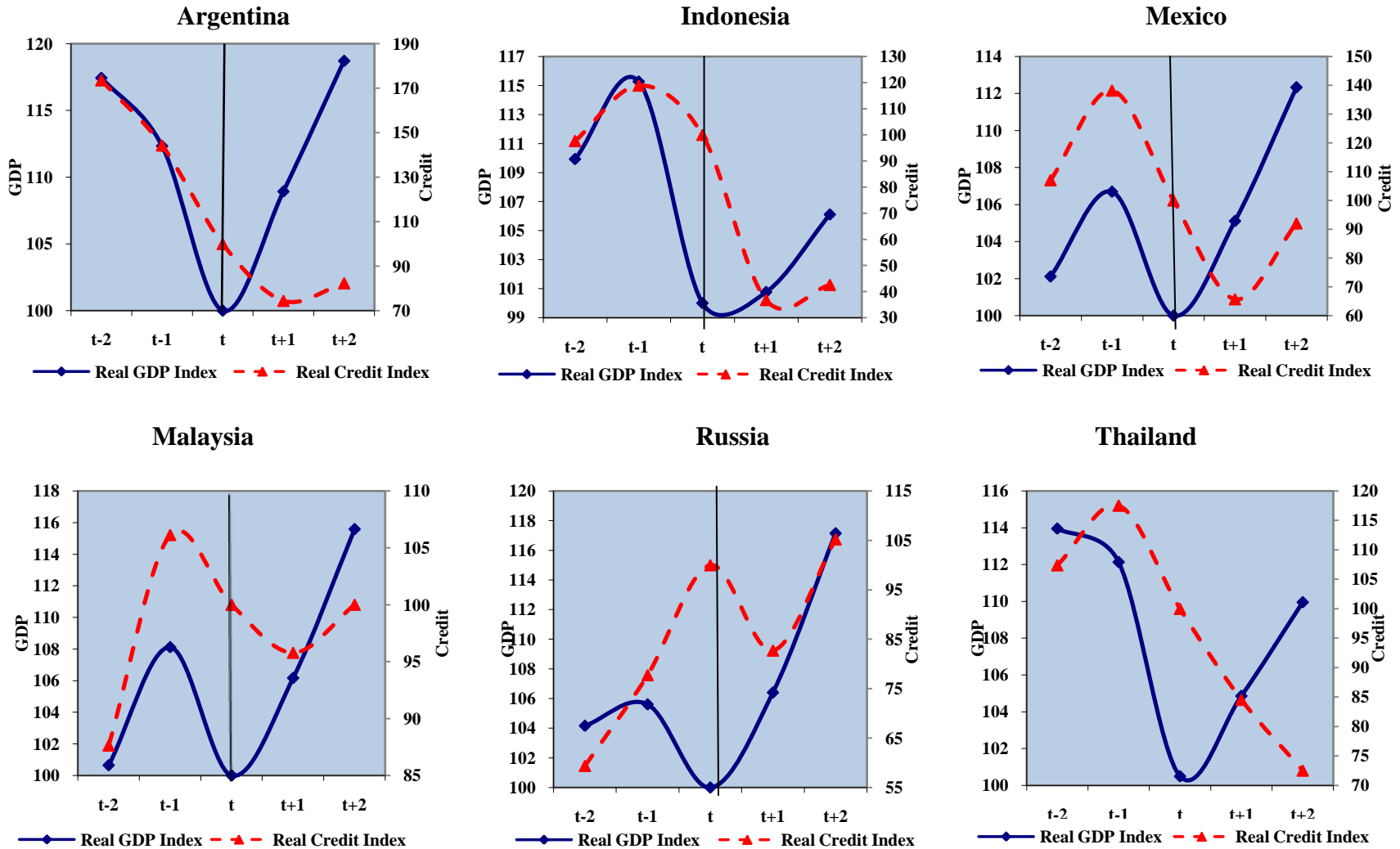
2B: No Miracles

Korea
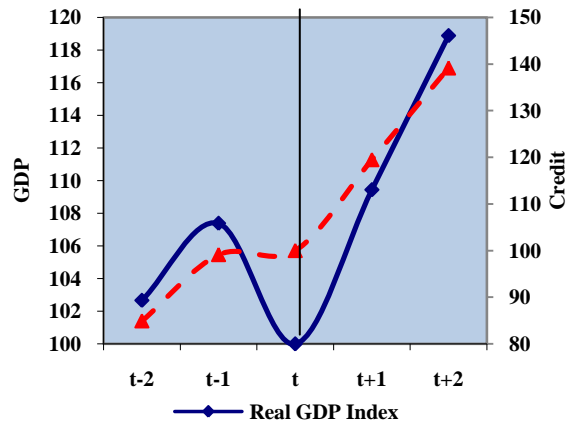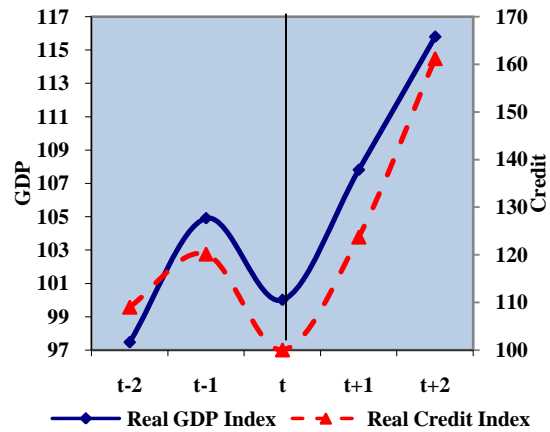
Turkey 1994

Turkey 1999
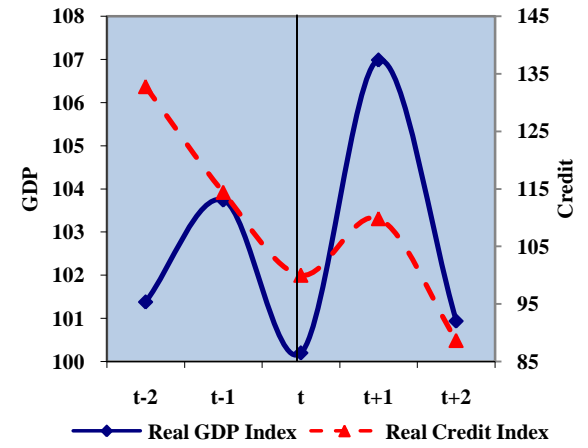
Figure 3: Recovery in Corporate Sales versus GDP

(A) Average across all countries

(B) From t-6 to t+4
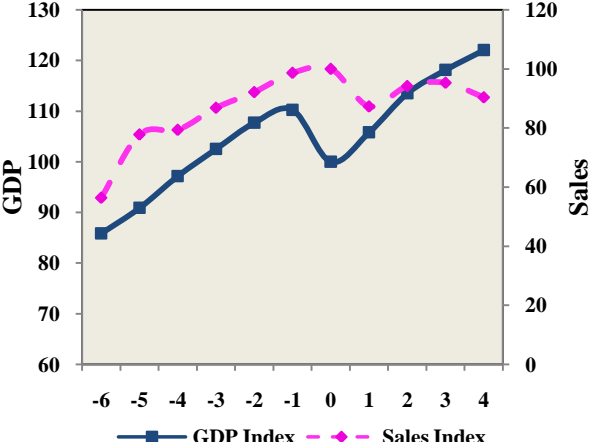
(C) Alternate Measures of Output
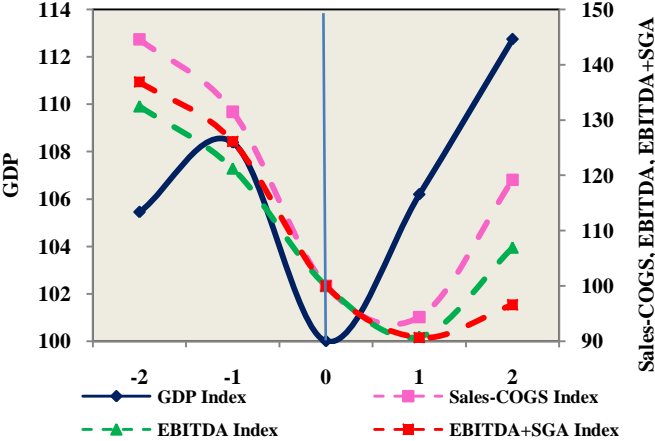
(D) Private Firms in Argentina

41
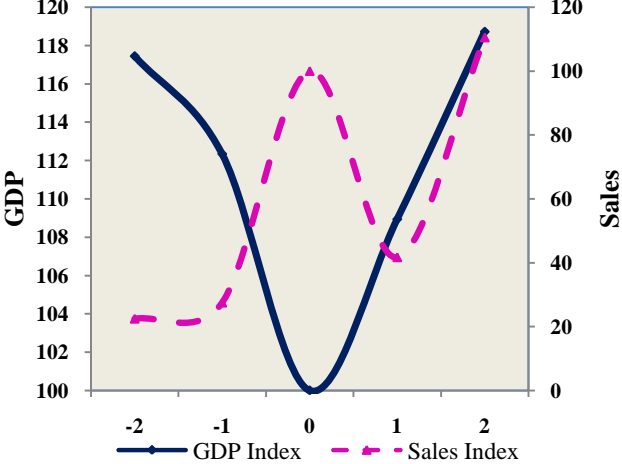
Figure 4: Recovery in Corporate Sales versus GDP – Heterogeneity across Crises

4A – Phoenix Miracles
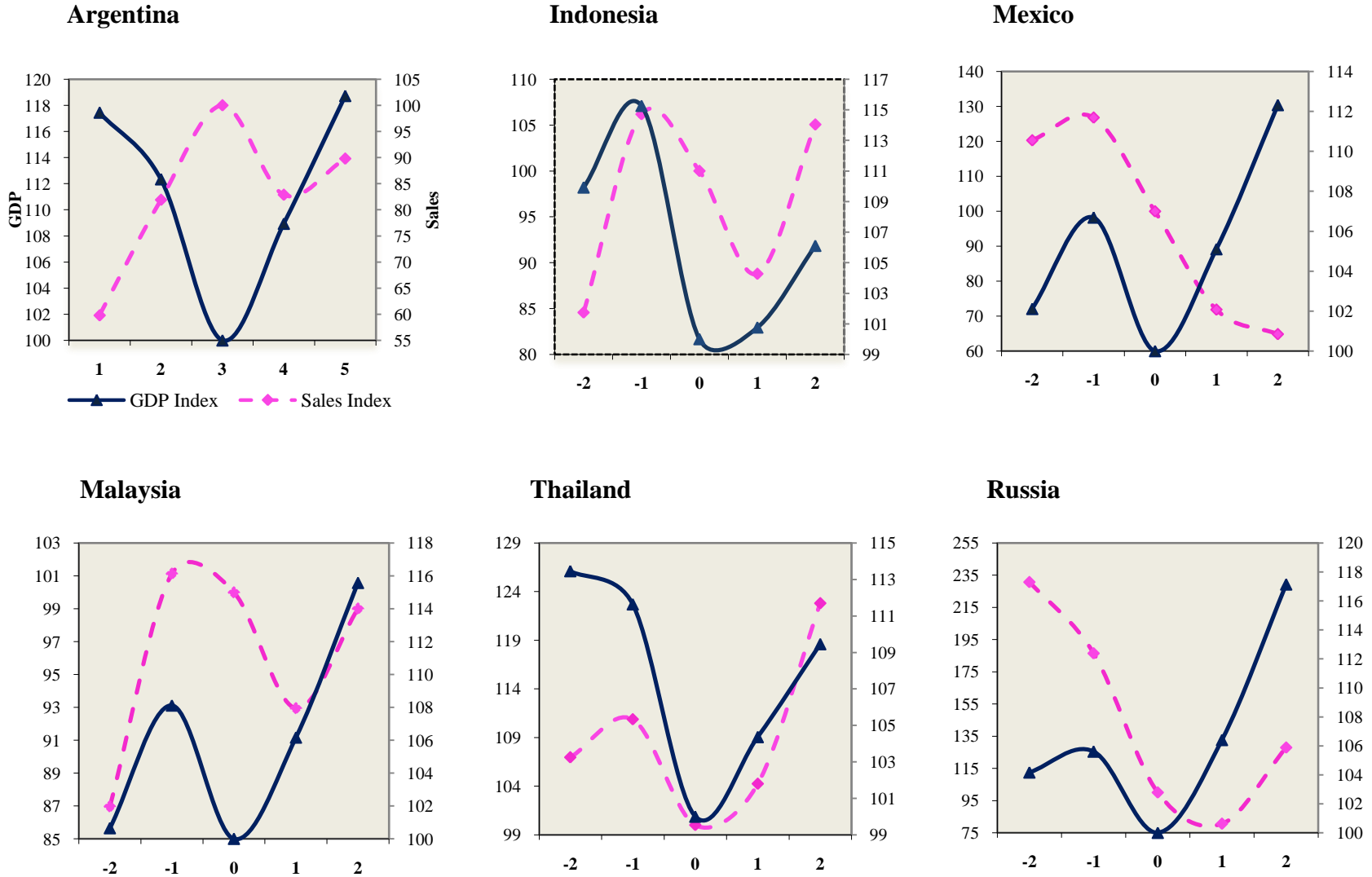
4B – No Miracles

Korea
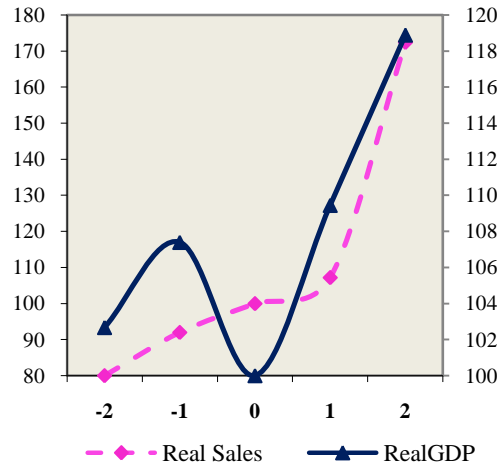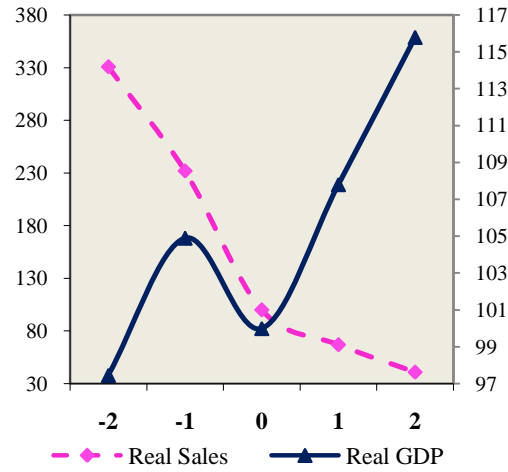
Turkey 1994

Turkey 1999
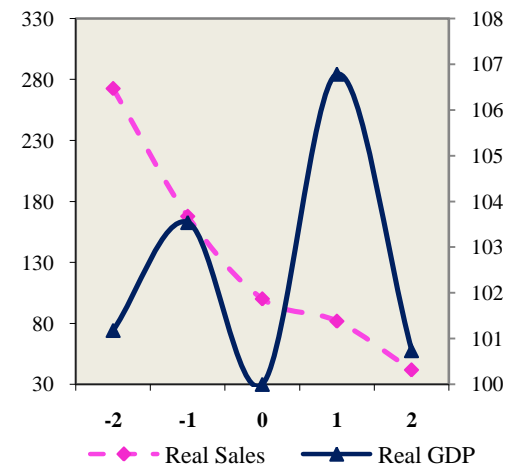
Figure 5: Recovery in Corporate Sales versus Short Term Credit – Phoenix Miracles at the Micro Level

(A)   Average across 9 episodes
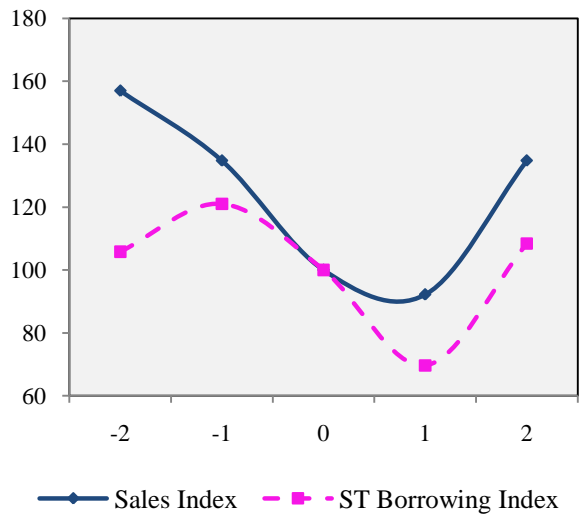
(B) Phoenix Miracles at the Macro and Micro Level

Argentina

Sales (Thousands)

ST Borrowing (Thousands)

50
45
40
35
30
25
20
15
10
5

25

20

15

10

5

0

t-2   t-1   t   t+1   t+2

Malaysia

Sales (Thousands)

ST Borrowing (Thousands)

320
310
300
290
280
270
260
250
240
230

160

140

120

100

80

60

40

20

0

t-2   t-1   t   t+1   t+2

Thailand

Sales (Thousands)

ST Borrowing (Thousands)

1355

1305

1255

1205

1155

1105

1055

1005

1000
900
800
700
600
500
400
300
200
100
0

t-2   t-1   t   t+1   t+2

Korea

Sales (Millions)

ST Borrowing (Millions)

140

120

100

80

60

40

20

0

35

30

25

20

15

10

5

0

t-2   t-1   t   t+1   t+2

45

(C) Phoenix Miracles only at the Macro Level but not at the Micro-Level

Mexico

Sales (Thousands) — 4005, 3505, 3005, 2505, 2005, 1505, 1005, 505, 5

ST Borrowing (Thousands) — 700, 600, 500, 400, 300, 200, 100, 0

t-2 t-1 t t+1 t+2

——— Real Sales   - ■ - Real STB

Indonesia

Sales (Millions) — 300, 250, 200, 150, 100, 50, 0

ST Borrowing (Millions) — 250, 200, 150, 100, 50, 0

t-2 t-1 t t+1 t+2

——— Real Sales   - ■ - Real STB

Russia

Sales (Thousands) — 7005, 6005, 5005, 4005, 3005, 2005, 1005, 5

ST Borrowing (Thousands) — 500, 450, 400, 350, 300, 250, 200, 150, 100, 50, 0

t-2 t-1 t t+1 t+2

——— Real Sales   - ■ - Real STB

(D) No Phoenix Miracles at the Macro or Micro Level

Turkey (1994)

Sales (Thousands) — 4005, 3505, 3005, 2505, 2005, 1505, 1005, 505, 5

ST Borrowing (Thousands) — 250, 200, 150, 100, 50, 0

t-2 t-1 t t+1 t+2

——— Real Sales   - ■ - Real STB

Turkey (1999)

Sales (Thousands) — 355, 305, 255, 205, 155, 105, 55, 5

ST Borrowing (Thousandas) — 25, 20, 15, 10, 5, 0

t-2 t-1 t t+1 t+2

——— Real Sales   - ■ - Real STB

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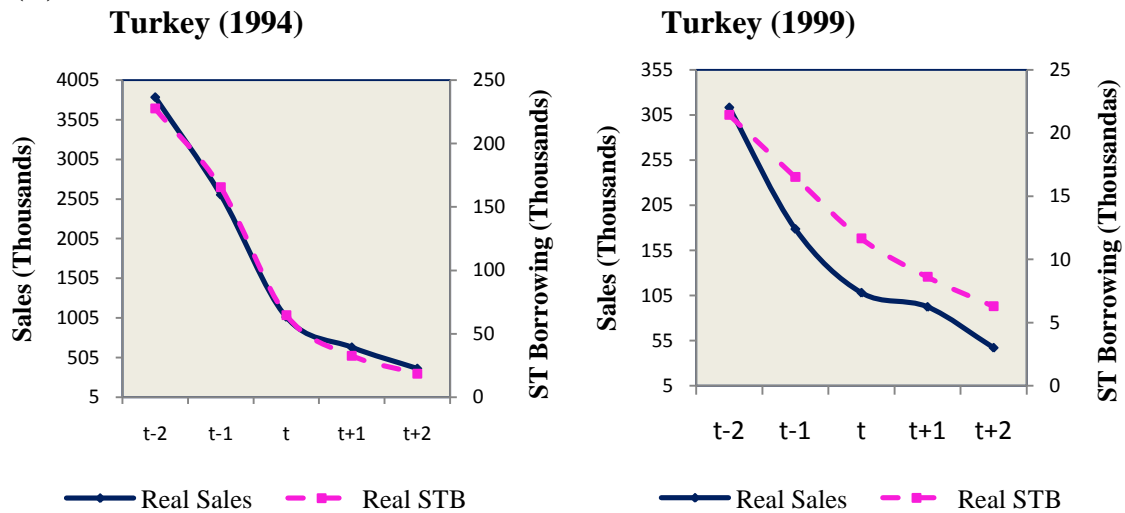
Figure 6: The US Financial Crisis

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 Debt in Current Liabilities. 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.

6A: GDP and Bank Credit
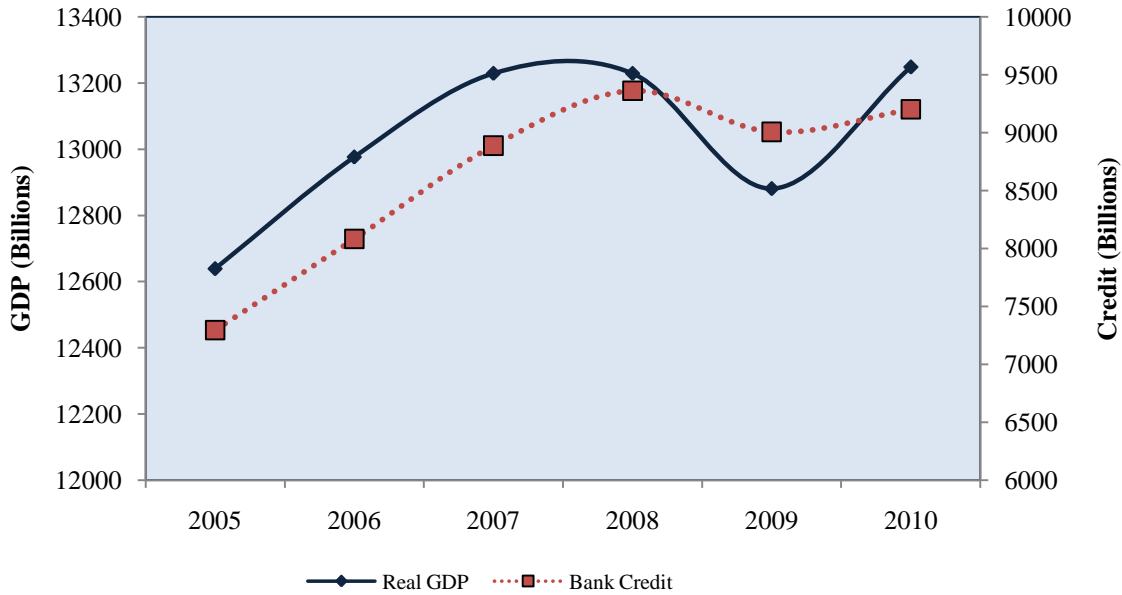
6B: Sales and Short-Term Borrowing
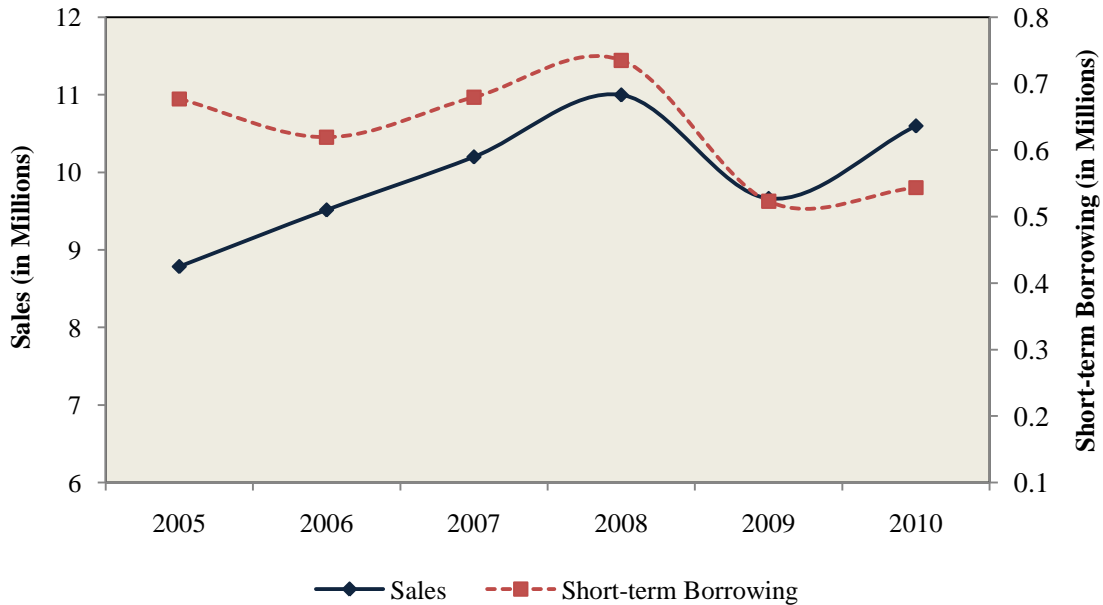
Table 1: 3S Collapse Episodes over the 1990s

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.

#	Country	Dating of Output Collapse from Calvo et al. (2006)		
		Pre-Crisis Peak	**Trough**	**Recovery 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 change 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).

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	1	2	3	4
	Recovery of GDP	Recovery of Credit	Change in GDP (%)	Change in Credit (%)
Phoenix Miracles				
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%
Non- Miracles				
South Korea	T	T	-7%	-
Turkey (1992-1996)	T	T	-5%	-17%
Turkey (1997-2001)	T	T	-3%	-33%

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

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 or 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 two other definitions 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. In panel C2, we use the definition in C1 plus cash from operating activities.

Panel A: Recovery of Firms

Country	Macro Classification	Micro Classification	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	Miracle	No (Recovery)	214	50.47	49.53
Mexico	Miracle	No (No Recovery)	76	9.21	90.79
Korea	No	Miracle	289	73.36	26.64
Malaysia	Miracle	Miracle	474	51.90	48.10
Thailand	Miracle	Miracle	273	65.20	34.80
Micro Miracle Countries			1036	61.39	38.61
Non-Micro Miracle Countries			290	39.66	60.34
Total			1326	56.64	43.36

Panel B: Identifying Phoenix Miracles

Country	Micro Classification	Recovery in Sales and Credit	Recovery in Sales Only (PHOENIX)	No Recovery in Sales but Recovery in Credit	No Recovery in Sales or Credit
Panel B1: Credit is defined as Short-Term Borrowing					
Indonesia	No (Recovery)	10.75%	39.72%	8.41%	41.12%
Mexico	No (No Recovery)	1.32%	7.89%	35.53%	55.26%
Korea	Miracle	28.03%	45.33%	13.49%	13.15%
Malaysia	Miracle	20.89%	31.01%	11.60%	36.50%
Thailand	Miracle	20.51%	44.69%	13.19%	21.61%
Total		*19.61%*	*37.03%*	*13.20%*	*30.17%*

Country	Micro Classification	Recovery in Sales and Credit	Recovery in Sales Only (PHOENIX)	No Recovery in Sales but Recovery in Credit	No Recovery in Sales or Credit
Panel B2: Credit is defined as Short-Term, Long-Term Borrowing, Net Capital Stock Issuance and Other Financing Activities					
Indonesia	No (Recovery)	18.22%	32.24%	14.02%	35.51%
Mexico	No (No Recovery)	6.58%	2.63%	44.74%	46.05%
Korea	Miracle	39.10%	34.26%	12.11%	14.53%
Malaysia	Miracle	27.64%	24.26%	17.72%	30.38%
Thailand	Miracle	23.44%	41.76%	10.99%	23.81%
Total		*26.55%*	*30.09%*	*16.06%*	*27.30%*

Panel C: Examining Other Sources of Credit

Country	Micro Classification	Recovery in Sales and Credit	Recovery in Sales Only	No Recovery in Sales but Recovery in Credit	No Recovery in Sales or Credit
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	No (Recovery)	36.45%	14.02%	34.11%	15.42%
Mexico	No (No Recovery)	9.21%	0.00%	76.32%	14.47%
Korea	Miracle	68.86%	4.50%	24.22%	2.42%
Malaysia	Miracle	45.99%	5.91%	40.51%	7.59%
Thailand	Miracle	53.11%	12.09%	24.18%	10.62%
Total		*48.79%*	*7.84%*	*34.62%*	*8.75%*
Panel C2: 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, and Cash from Operating Activities					
Indonesia	No (Recovery)	48.60%	1.87%	47.20%	2.34%
Mexico	No (No Recovery)	7.89%	1.32%	90.79%	0.00%
Korea	Miracle	72.32%	1.04%	25.95%	0.69%
Malaysia	Miracle	49.58%	2.32%	41.56%	6.54%
Thailand	Miracle	63.74%	1.47%	32.23%	2.56%
Total		*54.90%*	*1.73%*	*39.97%*	*3.39%*

Table 4: Cash Flow Sensitivities

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_1 Operating Cash Flow + b_2 Operating Cash Flow x Dummy for crisis year T (trough) + b_3 Operating Cash Flow x Dummy for year (T+1) + b_4 Operating Cash Flow x Dummy for year (T+2) + b_5 Dummy for year (T) + b_6 Dummy for year (T+1) + b_7 Dummy for year (T+2) + b_8 Q + b_5 Firm Size + e. The dependent variable is any one of the following variables – 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. 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 values. The system is estimated as a seemingly unrelated regression model subject to the constraints that the operating cash flow coefficients across the system sum to one while the other coefficients sum to 0. Panel A presents results for the firms with positive cash flows and Panel B presents results for the firms with negative cash flows. Panel C presents the sum of cash flow coefficients across the sources and uses variables in panels A and B. The Data Appendix provides detailed definitions of each of the variables.

Panel A: POSITIVE CASH FLOWS (Number of firm-years = 3201)

	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 (T-2, T-1)	0.407***	0.107***	0.189***	0.006	-0.001	-0.006	-0.089***	-0.211***	0.040*	-0.027***
	(0.027)	(0.027)	(0.024)	(0.005)	(0.001)	(0.004)	(0.030)	(0.024)	(0.022)	(0.008)
Crisis (T)	0.445***	0.095***	0.157***	-0.018***	-0.000	-0.012**	-0.086**	-0.191***	0.006	-0.037***
	(0.032)	(0.032)	(0.028)	(0.006)	(0.001)	(0.005)	(0.035)	(0.028)	(0.026)	(0.010)
Recovery (T+1)	0.420***	0.156***	0.176***	0.013*	0.003**	-0.014***	-0.032	-0.187***	0.026	-0.025**
	(0.034)	(0.034)	(0.030)	(0.007)	(0.001)	(0.005)	(0.037)	(0.030)	(0.028)	(0.010)
Recovery (T+2)	0.488***	0.260***	0.154***	0.054***	0.003**	0.007	0.023	-0.079**	0.025	-0.018
	(0.037)	(0.037)	(0.033)	(0.007)	(0.001)	(0.006)	(0.041)	(0.033)	(0.031)	(0.011)

Panel B: NEGATIVE CASH FLOWS (Number of firm-years = 977)

	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 (T-2, T-1)	0.103**	-0.098***	0.080**	-0.015**	0.001	-0.004	-0.207***	-0.460***	-0.218***	-0.040***
	(0.040)	(0.035)	(0.037)	(0.006)	(0.001)	(0.007)	(0.051)	(0.043)	(0.050)	(0.014)
Crisis (T)	0.238***	-0.047	0.044	0.003	-0.000	-0.007	-0.264**	-0.244**	-0.260**	0.014
	(0.089)	(0.077)	(0.081)	(0.014)	(0.003)	(0.015)	(0.113)	(0.095)	(0.111)	(0.031)
Recovery (T+1)	0.198*	-0.033	0.132	-0.016	0.003	0.006	-0.544***	-0.260**	0.134	-0.053
	(0.107)	(0.092)	(0.097)	(0.016)	(0.003)	(0.018)	(0.135)	(0.114)	(0.133)	(0.037)
Recovery (T+2)	0.376***	-0.057	0.061	0.030*	0.002	-0.041**	-0.156	-0.069	-0.242*	-0.081**
	(0.102)	(0.088)	(0.093)	(0.016)	(0.003)	(0.018)	(0.129)	(0.109)	(0.127)	(0.036)

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Panel C: Sum of Cash Flow Coefficients

	Across Sources of Cash	Across Uses of Cash	Across Investment Regressions	Across Financing Regressions
In Panel A:				
Pre-Crisis (T=-2, T=-1)	-0.293	0.707	0.302	-0.286
Crisis (T=0)	-0.32	0.679	0.264	-0.308
Recovery (T=1)	-0.232	0.768	0.346	-0.221
Recovery (T=2)	-0.042	0.959	0.407	-0.052
In Panel B:				
Pre-Crisis (T=-2, T=-1)	-0.929	0.071	-0.014	-0.926
Crisis (T=0)	-0.761	0.238	0.004	-0.754
Recovery (T=1)	-0.717	0.284	0.093	-0.276
Recovery (T=2)	-0.589	0.412	0.045	-0.55

Table 5: 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 sales, a positive change in sales and a negative change in sales over the years 2008 to2009 and 2009 to 2010 respectively. In Panel B, we identify four categories of firms based on their sales recovery and credit recovery over 2009 to 2010 - the percentage of firms that had a zero or 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: 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 two other definitions of credit. First, we use the expanded definition in panel B and further include 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. Next, we expand it further to include cash from operating activities.

Panel A: Recovery of Firms

	2008-2009		2009-2010	
	Number of firms	**%**	**Number of firms**	**%**
Zero change in sales	109	3.27	115	3.45
Positive Change in Sales	1090	32.65	2316	69.38
Negative Change in Sales	2139	64.08	907	27.17
Total	3338	100.00	3338	100.00

Panel B: Identifying Phoenix Miracles

Measure of Changes in Credit	Recovery in Sales and Credit	Recovery in Sales Only (PHOENIX MIRACLES)	No Recovery in Sales but Recovery in Credit	No Recovery in Sales or Credit
Changes in Short-term Debt	27.20%	45.63%	9.29%	17.88%
Changes in Short-Term Debt, Changes in Long-Term Debt, Net Capital Stock Issuance, and Other Financing	63.87%	8.96%	24.18%	3.00%

Panel C: Alternate Sources of Credit

Measure of Changes in Credit	Recovery in Sales and Credit	Recovery in Sales Only	No Recovery in Sales but Recovery in Credit	No Recovery in Sales or Credit
Changes in Short-Term Debt, Changes in Long-Term Debt, Net Capital Stock Issuance, Other Financing, Dividends, and Cash from Investing Activities	67.29%	5.54%	25.25%	1.92%
Changes in Short-Term Debt, Changes in Long-Term Debt, Net Capital Stock Issuance, Other Financing, Dividends, Cash from Investing Activities and Cash from Operations	70.07%	2.76%	25.76%	1.41%

Table 6: Cash Flow Sensitivities – 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 = $a + b_1$ Operating Cash Flow + b_2 Operating Cash Flow x Dummy for year 2008 + b_3 Operating Cash Flow x Dummy for year 2009 + b_4 Operating Cash Flow x Dummy for year 2010 + b_5 Dummy for year 2008 + b_6 Dummy for year 2009 + b_7 Dummy for year 2010 + b_8 Q + b_5 Firm Size + e. The dependent variable is any one of the following variables – 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. 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 values. The system is estimated as a seemingly unrelated regression model subject to the constraints that the operating cash flow coefficients across the system sum to one while the other coefficients sum to 0. Panel A presents results for the firms with positive cash flows and Panel B presents results for the firms with negative cash flows. Panel C presents the sum of cash flow coefficients across the sources and uses variables in panels A and B. The Data Appendix provides detailed definitions of each of the variables.

Panel A: POSITIVE CASH FLOWS (Number of firm-years = 10407)

	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 (2006, 2007)	0.538***	0.172***	0.317***	0.004	0.053***	-0.000	0.050**	-0.038***	0.081***	-0.009***
	(0.022)	(0.009)	(0.023)	(0.003)	(0.008)	(0.001)	(0.020)	(0.006)	(0.017)	(0.003)
Crisis (2008)	0.581***	0.144***	0.295***	0.017***	0.055***	-0.001	0.050**	-0.040***	0.097***	-0.015***
	(0.029)	(0.012)	(0.030)	(0.004)	(0.011)	(0.002)	(0.026)	(0.007)	(0.022)	(0.004)
Crisis (2009)	0.709***	0.072***	0.237***	0.028***	-0.023**	-0.000	-0.014	-0.040***	0.080***	-0.002
	(0.029)	(0.012)	(0.030)	(0.004)	(0.011)	(0.002)	(0.026)	(0.007)	(0.022)	(0.004)
Recovery (2010)	0.562***	0.102***	0.316***	0.041***	0.017	0.001	-0.034	-0.023***	0.108***	-0.013***
	(0.029)	(0.012)	(0.031)	(0.004)	(0.011)	(0.002)	(0.026)	(0.008)	(0.023)	(0.004)

Panel B: NEGATIVE CASH FLOWS (Number of firm-years = 2972)

	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 (2006, 2007)	-0.185***	-0.018***	-0.100***	-0.001	0.000	-0.000	-0.093***	-0.001	-1.209***	0.000
	(0.024)	(0.004)	(0.016)	(0.001)	(0.001)	(0.001)	(0.012)	(0.005)	(0.030)	(0.003)
Crisis (2008)	-0.200***	-0.018***	-0.062***	-0.000	0.001	-0.001*	-0.096***	0.001	-1.190***	0.006**
	(0.028)	(0.005)	(0.018)	(0.001)	(0.002)	(0.001)	(0.014)	(0.005)	(0.034)	(0.003)
Crisis (2009)	-0.236***	-0.022***	0.007	-0.003***	-0.003	-0.004***	-0.161***	-0.000	-1.099***	0.007*
	(0.034)	(0.006)	(0.022)	(0.001)	(0.002)	(0.001)	(0.017)	(0.007)	(0.041)	(0.004)
Recovery (2010)	-0.233***	-0.030***	-0.124***	-0.002**	-0.003	-0.001*	-0.161***	0.001	-1.241***	0.010**
	(0.035)	(0.006)	(0.023)	(0.001)	(0.002)	(0.001)	(0.018)	(0.007)	(0.043)	(0.004)

Panel C: Sum of Cash Flow Coefficients

	Across Sources of Cash	Across Uses of Cash	Across Investment Regressions	Across Financing Regressions
In Panel A:				
Pre-Crisis (2006, 2007)	0.084	1.08	0.489	0.031
Crisis (2008)	0.091	1.09	0.44	0.037
Crisis (2009)	0.024	1.02	0.309	0.047
Recovery (2010)	0.039	1.04	0.417	0.021
In Panel B:				
Pre-Crisis (2006, 2007)	-1.303	-0.3	-0.118	-1.303
Crisis (2008)	-1.28	-0.28	-0.079	-1.28
Crisis (2009)	-1.257	-0.26	-0.011	-1.25
Recovery (2010)	-1.392	-0.39	-0.153	-1.388

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 = $a + b_1$Operating Cash Flow + b_2 Operating Cash Flow x Dummy for year 2008+ b_3 Operating Cash Flow x Dummy for year 2009 + b_4 Operating Cash Flow x Dummy for year 2010+ b_5 Dummy for year 2008 + b_6 Dummy for year 2009 + b_7 Dummy for year 2010 + b_8 Q + b_5Firm Size + e. The dependent variable is any one of the following variables – 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. 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 values. The system is estimated as a seemingly unrelated regression model subject to the constraints that the operating cash flow coefficients across the system sum to one while the other coefficients sum to 0. Panel A1 presents results for the manufacturing firms with positive cash flows and A2 presents results for non-manufacturing firms with positive cash flows. Panel B1 presents results for the manufacturing firms with negative cash flows and B2 presents results for non-manufacturing firms with negative cash flows. The Data Appendix provides detailed definitions of each of the variables.

Panel A: POSITIVE CASH FLOWS

	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
A1: Manufacturing Firms (Number of firm-years=4786)										
Pre-Crisis (2005-2007)	0.427***	0.076***	0.389***	0.002	0.070***	0.001	0.007	-0.025***	-0.007	-0.011***
	(0.033)	(0.011)	(0.036)	(0.004)	(0.013)	(0.002)	(0.030)	(0.009)	(0.025)	(0.004)
Crisis (2008)	0.608***	0.084***	0.301***	0.013**	0.088***	0.000	0.028	-0.015	0.098***	-0.017***
	(0.042)	(0.014)	(0.046)	(0.005)	(0.017)	(0.002)	(0.038)	(0.012)	(0.032)	(0.005)
Crisis (2009)	0.719***	0.030**	0.247***	0.025***	-0.009	-0.001	-0.006	-0.037***	0.060*	-0.004
	(0.040)	(0.014)	(0.044)	(0.005)	(0.016)	(0.002)	(0.036)	(0.011)	(0.031)	(0.005)
Recovery (2010)	0.615***	0.068***	0.310***	0.030***	0.000	0.001	-0.100***	-0.027**	0.156***	-0.006
	(0.042)	(0.014)	(0.045)	(0.005)	(0.016)	(0.002)	(0.037)	(0.012)	(0.032)	(0.005)
A2: Non-Manufacturing Firms (Number of firm-years=5621)										
Pre-Crisis (2005-2007)	0.608***	0.246***	0.257***	0.006	0.043***	-0.001	0.076***	-0.047***	0.139***	-0.007
	(0.030)	(0.014)	(0.031)	(0.004)	(0.011)	(0.002)	(0.027)	(0.007)	(0.023)	(0.004)
Crisis (2008)	0.564***	0.201***	0.266***	0.022***	0.038***	-0.002	0.065*	-0.061***	0.102***	-0.012**
	(0.039)	(0.019)	(0.041)	(0.005)	(0.014)	(0.002)	(0.035)	(0.009)	(0.030)	(0.006)
Crisis (2009)	0.697***	0.124***	0.216***	0.032***	-0.032**	-0.000	-0.019	-0.045***	0.100***	0.001
	(0.041)	(0.019)	(0.042)	(0.005)	(0.015)	(0.003)	(0.036)	(0.010)	(0.031)	(0.006)
Recovery (2010)	0.511***	0.142***	0.310***	0.051***	0.033**	-0.000	0.018	-0.023**	0.069**	-0.017***
	(0.041)	(0.020)	(0.043)	(0.005)	(0.015)	(0.003)	(0.037)	(0.010)	(0.032)	(0.006)

Panel B: NEGATIVE CASH FLOWS

	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
B1: Manufacturing Firms (Number of firm years=1854)										
Pre-Crisis (2005-2007)	-0.175***	-0.015***	-0.124***	-0.001*	-0.000	-0.001	-0.070***	-0.007	-1.235***	-0.002
	(0.032)	(0.004)	(0.022)	(0.001)	(0.002)	(0.001)	(0.014)	(0.006)	(0.039)	(0.003)
Crisis (2008)	-0.183***	-0.017***	-0.077***	-0.000	0.002	-0.002**	-0.095***	-0.007	-1.177***	0.004
	(0.035)	(0.004)	(0.024)	(0.001)	(0.002)	(0.001)	(0.016)	(0.006)	(0.042)	(0.003)
Crisis (2009)	-0.278***	-0.014***	0.008	-0.002***	-0.004**	-0.005***	-0.095***	-0.007	-1.190***	0.006
	(0.043)	(0.005)	(0.029)	(0.001)	(0.002)	(0.001)	(0.019)	(0.008)	(0.052)	(0.004)
Recovery (2010)	-0.255***	-0.022***	-0.161***	-0.002**	-0.001	-0.001	-0.141***	-0.021**	-1.284***	0.005
	(0.047)	(0.006)	(0.032)	(0.001)	(0.002)	(0.001)	(0.021)	(0.008)	(0.056)	(0.004)
B2: Non-Manufacturing Firms (Number of firm years=1118)										
Pre-Crisis (2005-2007)	-0.163***	-0.028***	-0.033	-0.000	0.001	0.002	-0.150***	0.009	-1.091***	0.007
	(0.036)	(0.009)	(0.021)	(0.002)	(0.003)	(0.001)	(0.022)	(0.009)	(0.044)	(0.005)
Crisis (2008)	-0.286***	-0.017	-0.061**	0.000	0.003	0.001	-0.075**	0.023**	-1.321***	0.010
	(0.047)	(0.012)	(0.027)	(0.002)	(0.004)	(0.002)	(0.029)	(0.011)	(0.058)	(0.007)
Crisis (2009)	-0.091*	-0.053***	-0.003	-0.004	0.001	0.001	-0.388***	0.021	-0.789***	0.006
	(0.054)	(0.014)	(0.031)	(0.002)	(0.004)	(0.002)	(0.033)	(0.013)	(0.066)	(0.008)
Recovery (2010)	-0.140***	-0.052***	-0.060**	-0.002	-0.006	-0.002	-0.218***	0.049***	-1.109***	0.021***
	(0.051)	(0.014)	(0.030)	(0.002)	(0.004)	(0.002)	(0.032)	(0.013)	(0.063)	(0.008)

Table 8: Cash Flow Sensitivities – US firms: Miracles vs. Non-Miracles

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_1Operating Cash Flow + b_2 Operating Cash Flow x Dummy for year 2008+ b_3 Operating Cash Flow x Dummy for year 2009 + b_4 Operating Cash Flow x Dummy for year 2010+ b_5 Dummy for year 2008 + b_6 Dummy for year 2009 + b_7 Dummy for year 2010 + b_8 Q + b_5Firm Size + e. The dependent variable is any one of the following variables – 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. 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 values. The system is estimated as a seemingly unrelated regression model subject to the constraints that the operating cash flow coefficients across the system sum to one while the other coefficients sum to 0. Panel A1 presents results for the miracle firms with positive cash flows and A2 presents results for non-miracle firms with positive cash flows. Panel B1 presents results for the miracle firms with negative cash flows and B2 presents results for non-miracle firms with negative cash flows. Miracle firms are identified as those that had a zero/positive increase in sales but a zero/negative increase in short-term borrowing. The Data Appendix provides detailed definitions of each of the variables.

Panel A: POSITIVE CASH FLOWS

A1: Miracles (Number of firm-years = 4937)

	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 (2005-2007)	0.624***	0.181***	0.337***	-0.000	0.028**	0.002	0.091***	-0.039***	0.129***	-0.012***
	(0.034)	(0.014)	(0.036)	(0.004)	(0.013)	(0.002)	(0.028)	(0.008)	(0.025)	(0.004)
Crisis (2008)	0.646***	0.131***	0.320***	0.014***	0.014	-0.001	0.043	-0.029***	0.131***	-0.020***
	(0.043)	(0.017)	(0.044)	(0.005)	(0.016)	(0.002)	(0.035)	(0.010)	(0.031)	(0.005)
Crisis (2009)	0.784***	0.052***	0.218***	0.021***	-0.024	0.003	-0.021	-0.032***	0.108***	-0.007
	(0.043)	(0.017)	(0.045)	(0.005)	(0.016)	(0.002)	(0.036)	(0.010)	(0.032)	(0.005)
Recovery (2010)	0.550***	0.078***	0.374***	0.042***	0.013	0.004*	-0.079**	-0.007	0.158***	-0.020***
	(0.044)	(0.018)	(0.046)	(0.006)	(0.016)	(0.002)	(0.037)	(0.010)	(0.033)	(0.005)

A2: Non-Miracles (Number of firm-years = 5470)

	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 (2005-2007)	0.463***	0.162***	0.299***	0.009**	0.079***	-0.002	0.017	-0.036***	0.038*	-0.005
	(0.028)	(0.013)	(0.030)	(0.004)	(0.011)	(0.002)	(0.028)	(0.008)	(0.023)	(0.004)
Crisis (2008)	0.499***	0.161***	0.271***	0.020***	0.098***	-0.001	0.038	-0.047***	0.064**	-0.006
	(0.039)	(0.018)	(0.042)	(0.005)	(0.015)	(0.003)	(0.038)	(0.011)	(0.031)	(0.006)
Crisis (2009)	0.630***	0.090***	0.263***	0.035***	-0.031**	-0.003	-0.011	-0.054***	0.054*	0.002
	(0.038)	(0.017)	(0.041)	(0.005)	(0.015)	(0.002)	(0.037)	(0.011)	(0.030)	(0.006)
Recovery (2010)	0.589***	0.125***	0.275***	0.035***	0.015	-0.003	0.023	-0.031***	0.058*	-0.006
	(0.039)	(0.018)	(0.042)	(0.005)	(0.015)	(0.003)	(0.038)	(0.011)	(0.031)	(0.006)

Panel B: NEGATIVE CASH FLOWS

	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
B1: Miracles (Number of firm-years = 1250)										
Pre-Crisis (2005-2007)	-0.159***	-0.009	-0.098***	-0.000	0.000	-0.000	-0.038**	0.007	-1.241***	0.007**
	(0.036)	(0.005)	(0.024)	(0.001)	(0.002)	(0.001)	(0.017)	(0.006)	(0.044)	(0.003)
Crisis (2008)	-0.187***	-0.006	-0.101***	0.000	-0.001	0.001	-0.070***	0.017**	-1.263***	0.021***
	(0.051)	(0.008)	(0.034)	(0.001)	(0.002)	(0.001)	(0.024)	(0.009)	(0.062)	(0.004)
Crisis (2009)	-0.226***	-0.025***	0.019	-0.003***	-0.002	-0.002*	-0.099***	0.001	-1.159***	0.021***
	(0.049)	(0.008)	(0.034)	(0.001)	(0.002)	(0.001)	(0.023)	(0.008)	(0.060)	(0.004)
Recovery (2010)	-0.226***	-0.031***	-0.121***	-0.002	-0.002	-0.002	-0.085***	0.029***	-1.351***	0.028***
	(0.057)	(0.009)	(0.039)	(0.001)	(0.002)	(0.001)	(0.027)	(0.010)	(0.070)	(0.005)
B2: Non-Miracles (Number of firm-years = 1722)										
Pre-Crisis (2005-2007)	-0.218***	-0.031***	-0.103***	-0.001	-0.000	0.000	-0.157***	-0.011	-1.178***	-0.007*
	(0.034)	(0.006)	(0.022)	(0.001)	(0.002)	(0.001)	(0.017)	(0.007)	(0.041)	(0.004)
Crisis (2008)	-0.214***	-0.028***	-0.046**	-0.000	0.002	-0.002**	-0.126***	-0.010	-1.144***	-0.004
	(0.033)	(0.006)	(0.021)	(0.001)	(0.002)	(0.001)	(0.017)	(0.007)	(0.040)	(0.004)
Crisis (2009)	-0.269***	-0.016*	-0.017	-0.003**	-0.004	-0.007***	-0.223***	0.006	-1.077***	-0.009
	(0.048)	(0.009)	(0.030)	(0.002)	(0.003)	(0.001)	(0.025)	(0.010)	(0.057)	(0.006)
Recovery (2010)	-0.262***	-0.029***	-0.133***	-0.003**	-0.004	-0.001	-0.227***	-0.023**	-1.175***	-0.005
	(0.045)	(0.008)	(0.029)	(0.001)	(0.003)	(0.001)	(0.023)	(0.010)	(0.054)	(0.006)

Data Appendix: Variable Construction and Definitions

Panel A: Emerging Market Sample

Variable	*Bloomberg Mnemonic*

Table 3

All variables below are deflated by Consumer Price Index to obtain real values

Variable	*Bloomberg Mnemonic*
Sales	Change in sales (SALES_REV_TURN)
Short-term debt	Increases/Decreases in short-term borrowing (CF_INCR_ST_BORROW) Increases in long-term borrowing (CF_INCR_LT_BORROW)+ Reimbursement of long-term
Long-term debt	Borrowing (CF_REIMB_LT_BORROW)
Net Capital Stock Issuance	Increases in capital stock (CF_INCR_CAP_STOCK) + Decreases in capital stock (CF_DECR_CAP_STOCK)
Other Financing	Other financing Activities (CF_OTHER_FNC_ACT)
Dividends	Cash dividends (CF_DVD_PAID)
Cash from Investing Activities	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) + Disposal of fixed assets(CF_DISP_FIX_ASSET) + Capital Expenditures/Property Additions (CF_CAP_EXPEND_PRPTY_ADD)+ Other Investing Activities (CF_OTHER_INV_ACT)
Cash from Operations	Cash from Operating Activities (CF_CASH_FROM_OPER)

Table 4

Variable	*Bloomberg Mnemonic*
Tobin's Q	(Total Assets (BS_TOT_ASSET) + Last Price(PX_LAST)*Common Shares Outstanding(BS_SH_OUT)- Total Common Equity(TOT_COMMON_EQY))/ Total Assets (BS_TOT_ASSET)

All variables below are deflated by lagged Total Assets (data6)

Variable	*Bloomberg Mnemonic*
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)
Equity Issuances	Increases in capital stock (CF_INCR_CAP_STOCK)
Other Financing	Other financing Activities (CF_OTHER_FNC_ACT)
Cash from Operations	Cash from Operating Activities (CF_CASH_FROM_OPER)

Panel B: U.S. Sample

Variable	*Compustat* Item # (Cash Flow Format 7)
Table 5	
Sales	change in sales (data12)
Short-term debt	change in debt in current liabilities (data34)
Long-term debt	change in long-term debt (data9)
Net Capital Stock Issuance	change in book equity – change in retained earnings (data36), where book equity is measured as total assets (data6) – total liabilities (data181) – preferred stock (data10) + deferred taxes (data35) + convertible debt (data79). When preferred stock is missing, redemption value of preferred stock (data56) is used instead
Other Financing	financing Activities-other (SCF data312)
Dividends	cash dividends (SCF data127)
Cash from Investing Activities	sale in investments(data109) - increase in investments (data113) + sale of property, plant, and equipment (data107) + changes in short-term investments (SCF data309) + capital expenditures (SCF data 128)+ acquisitions (SCF data129) + other investing activities
Cash from Operations	operating activities (SCF data 308)
Table 6	
All variables below are deflated by lagged Total Assets (data6)	
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)
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)