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**Puzzling over the Anatomy of Crises:  
Liquidity and the Veil of Finance**

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## **Puzzling over the Anatomy of Crises: Liquidity and the Veil of Finance**

**Guillermo Calvo\***

### **Abstract**

The paper claims that conventional monetary theory obliterates the central role played by media of exchange in the workings and instability of capitalist economies; and that a significant part of the financial system depends on the resiliency of paper currency and liquid assets that have been built on top of it. The resilience of the resulting financial tree is questionable if regulators are not there to adequately trim its branches to keep it from toppling by its own weight or minor wind gusts. The issues raised in the paper are not entirely new but have been ignored in conventional theory. This is very strange because disregard for these key issues has lasted for more than half a century. Are we destined to keep on making the same mistake? The paper argues that a way to prevent that is to understand its roots, and traces them to the Keynes/Hicks tradition. In addition, the paper presents a narrative and some empirical evidence suggesting a key channel from Liquidity Crunch to Sudden Stop, which supports the view that liquidity/credit shocks have been a central factor in recent crises. In addition, the paper claims that liquidity considerations help to explain (a) why a credit boom may precede financial crisis, (b) why capital inflows grow in the run-up of balance-of-payments crises, and (c) why gross flows are pro-cyclical.

**Keywords:** Financial Crises; Bubbles; Sudden Stop

**JEL classification:** E32, E65, F32

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## I. Introduction

General equilibrium theory and monetary theory are strange bedfellows. General equilibrium theory can achieve Olympian heights without any reference to money. Monetary theory, in turn, cannot run on its own without some reference to the “real economy,” which is the realm of general equilibrium theory. The secondary role traditionally attributed to money is best portrayed by the classical expression “veil of money.” Money is just there to determine nominal prices, and no more than that. Of course, that extreme view has been debunked by Irving Fisher’s “money illusion” – i.e., the tendency of some economic agents to confuse nominal with real variables – and “price stickiness” emphasized in Keynesian models. However, money still plays a second-fiddler role. Whenever possible theorists prefer to work in terms of models in which money is absent. This state of affairs among theorists contrasts sharply with the current macroeconomic policy debate in which “liquidity” – a quality that money exhibits but is not alone in that respect – has taken center stage. Several observers attribute the real estate boom to a liquidity mirage and deep crisis following the Lehman 2008 episode to a liquidity crunch. Moreover, it is common to hear that liquidity crunch seriously compromised the health of the financial sector and is behind slow and jobless recovery. None of these issues can be found addressed in a useful manner in conventional general equilibrium or monetary theory.

Part of the reason is that conventional monetary theory ignores crises that stem from the financial sector. This shows another victory of general equilibrium methodology, where, in its pure form, the word credit is replaced by “intertemporal and state-contingent prices,” and market disruption is not highlighted. Thus, conventional theory has acknowledged the fact that money is not neutral but has, unwittingly perhaps, adopted the view of “finance as veil.” It should thus come as no great surprise that the Fed and many other prominent world central banks have ignored a possible malfunctioning credit market in their design of monetary policy (e.g., Inflation Targeting) – and found themselves bereft of ideas and instruments when hit by the current crisis.<sup>1</sup>

Nature abhors a vacuum: bad theory quickly takes the place of no theory – or, at least that is the risk we are running. I do not claim to have the magic key, but in this paper I will try to put forward variables and considerations that I think are central, but ignored by conventional theory, like liquidity and credit crunch (or Sudden Stop). To that end I will bring to bear empirical studies that show the relevance of those variables, and discuss some open puzzles. In addition, I will trace the intellectual roots behind finance as a veil.

Section II will show channels, relevant from a macro point of view, through which a liquidity crisis becomes a Sudden Stop. Section III will briefly discuss some relevant empirical results that highlight the importance and peculiarities of the credit market in crisis episodes. Section IV is, in a manner of speaking, a visit to the shrink in which I try to sort out the reasons why, for a long period of time, most mainstream economists have been oblivious of financial shocks – a feature that still lingers on in the well-trained economist’s subconscious. Section V will discuss three puzzles that empirical research on

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<sup>1</sup> To be fair, the Fed and other G7 central banks displayed great creativity in adopting effective heterodox policies. My guess is that this reflects the high quality and admirable courage of their economists, despite these banks being institutionally and technically unfit to face the new challenges.

booms and busts has brought to light: (1) that credit booms precede financial crises, (2) that capital flows get exacerbated in the run-up of a balance-of-payments crisis, and (3) that gross capital inflows and outflows (in the Balance of Payments) are pro-cyclical. The answer to these puzzles has important policy implications. Depending on the answer, optimal policies may call for putting severe constraints on financial markets, or just implementing market-friendly regulations to avoid falling into financial traps. The paper is closed with a few concluding remarks in Section VI.

In writing this paper I have made an effort to keep away from formal models. I think we are at the stage of identifying areas that have been ignored in macroeconomics, and design a strategy for filling the gaps.<sup>2</sup> In the process, which turned out to be more arduous than expected, I learned to appreciate the wisdom of Hayek's (1974) dictum: "It sometimes almost seems as if the techniques of science were more easily learnt than the thinking that shows us what the problems are and how to approach them."

## II. From Liquidity Crisis to Credit Sudden Stop: An Analytical Narrative

Monetary theory is a strange field. From birth it has been the odd man out of general equilibrium theory because the market value of paper currency cannot be justified on individualistic (Robinson Crusoe-type) preferences or production functions. From that perspective the output value of paper currency (cash, for short) far exceeds its "intrinsic" value, i.e., its equilibrium value if cash was not a Medium of Exchange (MOE). Frank Hahn (1965), for example, shows that, unless one makes special technical assumptions, one cannot rule out the existence of barter equilibrium, even if money enters utility functions (for a discussion, see Calvo (2012 a)).<sup>3</sup> The proof is straightforward: if the output price of cash is zero, then the demand for cash is undetermined and can be set equal to supply. This implies, by Walras Law, that, assuming existence, equilibrium relative prices of the barter economy clear all real markets when the output price of cash is equal to zero. This proves existence of a barter equilibrium even if there is a MOE. Notice that cash is different from regular goods in that when output price of a regular good is equal to zero, as a general rule it exhibits positive excess demand.

In standard monetary models Hahn's problem is bypassed by simply ruling out barter equilibrium.<sup>4</sup> In contrast, microeconomists have explored several explanations, including *legal tender* and the requirement that taxes be paid by means of (local) cash. These explanations help to rule out the barter equilibrium but are seriously incomplete, a fact that becomes glaringly clear in an international context in which several paper currencies circulate at the same time. Therefore, available microfoundations are not helpful to answer basic and very topical questions like: will the euro survive; will gold replace the US dollar? etc.

In Calvo (2012 a) I argue that if one starts from a situation in which the output value of cash is positive, sticky and staggered prices help to sustain an equilibrium in which cash has a positive output value going forward. Staggered prices, in particular, may rule out the case in which cash prices of regular goods

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<sup>2</sup> Borio (2012) and several BIS economists are opening up fascinating new vistas along similar lines.

<sup>3</sup> In what follows, and to simplify the exposition, I will assume that cash's intrinsic value is zero.

<sup>4</sup> Notice that even a cash-in-advance constraint does not necessarily generate positive equilibrium output price of cash. If the latter is zero, no market transaction will be feasible and the economy reverts to complete autarky.

posted at time  $t$ , say, will be unbounded (i.e., cash price in terms of goods whose prices are posted at  $t$  are equal to zero). This is so, because, if that were the case, the relative price with respect to all regular goods whose prices are *predetermined* at time  $t$  will also be unbounded – implying that the demand for goods whose unbounded prices are set at time  $t$  will be zero, which is unlikely to be an optimal price-setting strategy. In Calvo (2012 a), I have called these value-of-cash foundations the Price Theory of Money (PTM).<sup>5</sup> Notice that the PTM suggests that the euro will not disappear unless Europeans stop quoting their prices in euros, and that despite the large depreciation of the US dollar with respect to gold, the US dollar will keep circulating as long as prices and wages in the US are quoted in US dollars.

Paper currency is not the only MOE. There are “inside monies” that also play that role, e.g., bank deposits. Thus, I think it is more useful to carry out the discussion by starting from a more encompassing concept: *liquidity*. Liquidity, like other monetary concepts, is hard to define in a precise manner.<sup>6</sup> Here I will follow Menger (1892) where liquidity is defined by a central characteristic: *salability*. Few will disagree with the statement that in normal economies, (domestic) paper currency is perfectly liquid. Other assets are less liquid if it takes time to find a customer or the asset’s price is highly sensitive to the quantity being sold by a microeconomic agent. Everybody will agree, for instance, that cash is more liquid than a used car. Going beyond that, however, would bring the discussion into shaky grounds but, fortunately, there are still relevant issues that can be dealt with in this imprecise manner.

In general, a liquid asset can be employed as a MOE<sup>7</sup> or as *credit collateral*, i.e., assets that can be confiscated by the creditor in case of default and, barring systemic shocks, keep their market value relatively constant under those circumstances. Liquidity is important for collateral assets because the main role of those assets is to ensure that the lender will come out whole in case the debtor is unable or unwilling to repay his debt obligations. Therefore, a collateralizable asset must potentially be a MOE. This shows that liquid assets and MOE<sup>8</sup> have a lot in common.

In what follows, and for the sake of simplicity, I will focus on a closed economy with only one type of paper currency in terms of which all prices are set. Extensions will be discussed later. I will also assume that the output value of paper money is positive and stable and, realistically, that it bears no interest. Thus, there is fertile ground for the creation of assets that offer services similar to paper currency and yield a positive interest rate. Bank deposits are a classical example and are standard staple in monetary textbooks. Thus, I will focus the discussion on banks to keep it within familiar grounds and facilitate intuition for those, like myself, who live outside the boundaries of the financial jungle.

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<sup>5</sup> Keynes foreshadows the PTM, as he writes “the fact that contracts are fixed, and wages are usually somewhat stable in terms of money, unquestionably plays a large part in attracting to money so high a liquidity-premium” Keynes (1961, Chapter 17, p. 236). “Liquidity premium” in Keynes’s lingo is the difference between the market output value of cash and its intrinsic value.

<sup>6</sup> ‘Money’ is a popular variable in macroeconomic models, but the corresponding empirical variable is typically not well defined. Should it be the ‘monetary base’, M1, M2?

<sup>7</sup> In what follows, MOE will stand for both Medium and Media of Exchange.

<sup>8</sup> MOE stands for both Medium and Media of Exchange.

Familiar bank deposits illustrate how additional MOE that dominate cash can be created. The “formula” consists of setting up deposit accounts denominated in terms of cash – that under our assumptions is firmly rooted in output – in such a way that they can be utilized as MOE. This is the hard part. In practice, setting up deposit accounts that can be utilized as MOE could be helped by government support (e.g., a Lender of Last Resort), or the reputation of the issuing financial institution (e.g., Goldman Sachs). The next step is selling the new MOE to the public and investing the proceeds in illiquid assets yielding a positive rate of return, allowing the bank to pay interest on deposits. This arrangement works to the extent that deposit withdrawals do not exceed bank reserves, e.g., the stock of paper currency held at banks. However, as illustrated in the seminal paper by Diamond and Dybvig (1983), there exists an equilibrium in which all depositors attempt to withdraw their deposits at the same time: a bank run. This is akin to Hahn’s example discussed above. In addition, Diamond and Dybvig (1983) illustrate the role of “securitization,” risk pooling, in this context. Diamond-Dybvig model assumes that depositors’ liquidity needs are random and independently distributed across depositors. Barring a bank run, those conditions –thanks to the Central Limit Theorem – allow the bank (or banking system) with a large number of depositors to have a fairly precise assessment of the amount of deposit withdrawals, which allows the bank to confidently invest a large share of deposits in highly illiquid projects that yield a positive rate of return. It is worth noting, though, that despite this age-old securitization arrangement, it has not been enough to prevent bank runs, a fact that was a major motivation behind the creation of central banks as Lenders of Last Resort (LOLR).

Securitization has mushroomed in the last twenty-odd years. Early and prominent examples are Mortgage-Backed securities (MBS). These are bonds collateralized by a myriad of mortgage contracts. Contrary to bank deposits in the Diamond-Dybvig example, which involves pooling of *lenders’* risks, MBS involves pooling of *borrowers’* risks. A parallel between these two securitization examples is that they are both subject to runs, because their market values partly depend on their liquidity. The impact of a run on MBS on credit collateral deserves special attention. As carefully discussed in several papers by Gary Gorton and associates (e.g., Gorton (2010)), there has been a revolution in advanced-economies’ banking practices, partly triggered by trying to attract large depositors who are not covered by deposit insurance. The new system is called “securitized banking.” Under securitized banking the lack of deposit insurance is partly offset by the bank entering into repo agreements with depositors, according to which, in exchange for deposits, the bank sells depositors assets that the bank is obliged to repurchase at a predetermined price and date (typically the next day). As a general rule, the market price of repo bonds exceeds the value of the associated deposits (a difference that is called the “haircut,” and is measured in terms of the market value of the repo bond). Let us assume that the bonds involved are MBS. The bank can then utilize the funds associated with the new deposits to extend new mortgage loans, sell them to a securitization agent that packages the new mortgages with many others and pays the bank with new MBS. The bank can then restart the process to get new deposits, etc. This deposit creation mechanism is not very different from the one that textbooks discuss to explain the “money multiplier,” i.e., the process by which old-fashioned banks create deposits by an amount far larger than the stock of paper currency they hold in their vaults. An interesting difference, though, is that under securitized banking the money-multiplication process can be carried out by a *single bank* and an efficient “securitizer” that packages a myriad of mortgages into MBS. The liquidity of MBS substitutes

for the liquidity of paper currency + deposit insurance in traditional banking. However, there is room for a self-fulfilling prophecy in which there is a run on repos (taking the form of an increase in haircuts) that forces a massive liquidation of MBS. Since mortgages that underlie MBS are long-term financial contracts. Hence, a massive liquidation of MBS brings about a fall in their prices, which, as shown during the Lehman episode could be major. This may discredit MBS as liquid assets, but even if MBS keep their liquidity reputation intact, the fall in their market value has a negative impact on the stock of collateralizable (or *safe*) assets. The impact can be huge. Some estimates claim that the Lehman crisis brought about a fall of collateralizable assets equivalent to more than 20 percent world GDP (see Calvo (2012 a)). Therefore, a run on liquid assets may have a severe impact on *gross credit flows*, a phenomenon that, when it is highly unexpected (identified as shocks that exceed two standard deviation from historical mean, for example; more on this below), I have labeled “Sudden Stop” (see Calvo (1998), Calvo, Izquierdo and Mejia (2008)).<sup>9</sup> A large and highly unexpected contraction in credit flows could have deleterious effects on the real sector because these types of shocks are unlikely to be contemplated in state-contingent contracts. They could lead to costly discontinuation of investment projects and generate a large number of bankruptcies, which further deteriorate the credit market. Notice, again, that these real effects can occur even though the financial system could manage to survive in one piece. This is usually forgotten in policy discussions in which keeping financial institutions (especially, large institutions) afloat is tantamount to bringing credit flows going back to normal.

In a system dominated by traditional banks, the central bank can create liquidity that offsets the fall in bank deposits and, occasionally, even nationalize banks in order to prevent credit Sudden Stop. This is very powerful ammunition to quickly get credit flows back to normal. The situation was very different in the subprime crisis. An enormous chunk of the credit market in the US, for example, was dominated by securitized banking, which was out of the Fed’s radar. The Fed (especially Mr. Greenspan) assumed that securitization was safe because it was run by sophisticated financial specialists. What the Fed missed is that when liquidity shocks are involved, bank runs may occur even if banks are managed by highly sophisticated bankers.

Liquidity is a two-edged sword. It helps credit to flow towards socially valuable projects like housing and foreign direct investment in Emerging Market economies (EMs). But, on the other hand, to the extent that finance relies on the attendant financial assets’ liquidity, Sudden Stop will always be lurking in the background, unless there are effective instruments to cushion the shock. This fact has not escaped the attention of EM policymakers, as shown, for instance, by the substantial accumulation of international reserves in EMs and the creation of automatic credit lines in the IMF. These solutions, however, are predicated on the existence of a core of advanced economies to which EMs can moor their ships. The subprime crisis raises the stakes. Now the whole world is in need of an anchor. This is an elusive issue because it calls for new or overhauled institutions that help to coordinate effective monetary, fiscal and regulatory policies. The EU is still struggling to reach workable arrangements in that respect, which does not bode well for equivalent projects that involve a greater number of advanced economies. If we fail to make progress in that direction, we may see the world going back to more autarkic equilibrium. This

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<sup>9</sup> Sudden Stops were originally defined for net capital inflows in the balance of payments. However, it can be equally applied to any other type of credit *flow*.



retrenchment involves efficiency costs but may also have dire consequences for world peace. From this perspective, policymakers should be made conscious that as the subprime crisis recede into the background, a new chapter starts in which it is imperative to find a new global system that makes liquidity work for growth and social objectives, while minimizing the chances of another Great Recession episode. To make progress we can try to learn from history. The next section will summarize some lessons from recent crises that highlight the role of financial factors.<sup>10</sup>

### III. Financial Crisis: Some Evidence on Incidence and Recovery

After a long absence, Sudden Stops reappeared in EMs around the 1990s (Bordo (2006)). Mexico's 1994/5 *Tequila* crisis is the first of a series of crises in which the credit crunch is not associated with an obvious mismanagement of the economy. Up to that point, Mexico had been closely following the Fund's book almost to the letter. Proof of that is that Mexico was featured as the poster boy in the Fund/World Bank Madrid meetings of October 1994. Moreover, prior to crisis the country had signed the NAFTA protocols with the US and Canada, and had become a permanent member of the OECD. Despite these achievements, though, after the crisis became evident, markets were quick in declaring the country a "basket case," and the International Financial Institutions (IFIs) sent their envoys to find out what went wrong. The culprit was shortly found to be a large hidden fiscal deficit, inconsistent with the exchange rate peg. This is not the place to enter into further details about the accuracy of the assessment because, even granting the existence of a large fiscal deficit, one would be hard put in finding an economic rationale for an output collapse exceeding 6 percent in 1995 as a result of unsustainable fiscal deficit. There has to be more to the story. But at the time the conventional view was that crises in EMs were a consequence of not following the Washington Consensus and, thus, fiscal deficit became a primary suspect.<sup>11</sup> The financial sector, particularly the central capital market located in the US and Europe, was not in the list of suspects.

Prior to the Tequila crisis Calvo, Leiderman and Reinhart (1993) showed that external factors and, in particular, the US nominal short-term interest rate can have a sizable impact on capital flows in Latin America. The paper was motivated by the observation that capital had been flowing in all across Latin America, even though countries in the region did not follow similar policies. Econometric analysis suggested that about 50 percent of the variance of net capital flows in Latin American was due to volatility of variables external to the region (the US nominal short-term interest rate being one of them). The paper was circulated when the three authors were at the Fund's Research Department. The

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<sup>10</sup> The following section is not intended to be a comprehensive survey. Most of the literature cited contains papers in which I am one of the authors, although their lists of references cover a wide spectrum of papers dealing with similar issues. Some of the papers broke new ground or dug up forgotten issues when they were written, a fact that helps to illustrate the "dark ages" in which the economic literature was immersed before the outset of the crisis episodes that started in the 1990s. Moreover, I feel that these papers are worth highlighting because there is still a tendency to dismiss EM crises as irrelevant for advanced economies. A prominent exception in this respect is Reinhart and Rogoff (2009).

<sup>11</sup> Another possible reason for the bias is that Mexico had suffered a serious crisis in 1981 associated with large fiscal deficit. The 1981 crisis, however, came right after the 1980s unprecedented increase in US interest rates associated with Volcker's stabilization program – a fact that, again, was out of hand dismissed as a primary cause of the crisis.

negative reaction from the staff was immediate and harsh. We had dared to question the gospel – which held that not only the central capital market can't be the source of EM crises but, if EMs kept their houses in order, capital flows would be countercyclical, e.g., funds would flow in if EMs experienced a financial deficit. The paper was written during a capital inflow episode following the successful Brady plan in the region. According to the gospel, the inflow of capital could be attributed to good deeds – a view that, for obvious reasons, was wholeheartedly joined by the region's policymakers.<sup>12</sup>

Controversy stopped when US increased interest rates in 1994 and Mexico was hit by the Tequila crisis shortly after. The objective of telling this story is not to vilify the old gospel – that is water under the bridge because the Fund has incorporated the Calvo-Leiderman-Reinhart paper in the revised gospel with a host of other even more radical additions – but to illustrate the strong faith in the workings of the financial sector that prevailed in the mid-1990s, and that led policymakers to be oblivious of shocks that stem from the capital market. This is the same view that still prevailed prior to the subprime crisis in advanced economies. The reader may wonder, though, why did advanced economies not pay heed to the Tequila (and later EM crisis) lessons? As I will later elaborate, the view that the capital market is part of the solution, not part of the problem, was deeply ingrained in conventional monetary theory and especially in central bank models. One has to realize that it is very hard to see beyond conventional models because 'reality' is immensely complex. If a variable is not part of the conventional model, chances are that observers – especially well-trained observers – will miss it. Besides, there are always competing explanations that justify ignoring non-conventional points of view. In this case, there was a tendency to dismiss lessons from EM crises on the grounds that the latter were due to *severe domestic financial fragilities* and *exchange rate pegging* – imperfections that most people believed were not shared by advanced economies. In short, EM experience – especially the Russian 1998 crisis that shows serious faults in the global financial system (see Calvo (2002)) – persuaded analysts and policymakers that EM could be very vulnerable to shocks stemming from the central capital market. But advanced economies were believed to be immune to those shocks because of their deep and well-functioning domestic financial sectors. The error is now clear: ignoring liquidity shocks and their possibly severe impact on the credit market.

EMs offer a laboratory where the experiments are more transparent than in advanced economies due to the relative simplicity of their financial systems and that, in many instances, victims lie outside the crisis epicenter. This allows the analyst to observe how buildings resist the strength of the wind, without necessarily having to explain what was the cause that triggered the hurricane. For example, there are a series of recent systemic financial crises, primarily hitting EMs, in which for most individual economies the initial shock is external, allowing to identify internal faulty lines that help to magnify the shock and transform it in a major crisis. This is the research strategy taken in Calvo, Izquierdo and Mejia (2008), the next paper reviewed here.

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<sup>12</sup> Carmen Reinhart and I presented the paper in the Latin American meetings of the Econometric Society held in Mexico in 1994 prior to the start of the Tequila crisis. Our discussant, a prominent Mexican public official, claimed that we were employing wrong data and promised to send us a corrected version. He never did, and our results have since been verified in a number of careful studies.

In Calvo, Izquierdo and Mejia (2008) a set of crises are labeled *Sudden Stop* (SS) and defined as a situation in which international capital flows fall by more than two standard deviations (based on its own historical record).<sup>13</sup> The intuition behind this definition is that those episodes are the result of shocks which are significantly different from shocks hitting the economy on a regular basis. Furthermore, to ensure that the unusual shocks primarily stem from the capital market the empirical implementation selects SS that take place during a global credit squeeze. The latter is identified as periods in which the average EMBI (the J.P. Morgan's emerging markets' bond index) or some alternative global interest-spread yardsticks, rise by more than two standard deviations (in relation to its own historical record). SS that occur during a global credit squeeze are called *Systemic Sudden Stops* (3S). Calvo, Izquierdo and Mejia (2008), constructs a panel of 3S episodes across all economies for which relevant data is available over the period 1990-2004. The paper estimates the probability of SS in a 3S episode as a function of a set of variables motivated by a simple model, and several control variables that are standard in these kinds of studies. The paper shows that the probability increases with the current account deficit (as a share of tradables) and *Domestic Liability Dollarization* (DLD), i.e., foreign-denominated debts vis-à-vis *domestic* banks as a share of gdp – and that, beyond a critical point, the probability declines with the country's integration to the global financial market. Notice that the probabilities are *conditional* on the existence of a global financial squeeze. Therefore, these results would not have helped to, say, predict the subprime crisis – i.e., to predict the “hurricane” in the above metaphor. Rather they help to identify variables that could make it more or less likely that a given economy will suffer a SS *if* there is a global financial squeeze. These results are helpful to design a strategy that cushions the economy from external liquidity shocks. One implication is that it may be advisable to discourage banks from extending foreign-exchange denominated loans.<sup>14</sup> These results, incidentally, were dismissed in the European context with the argument that their association with central Europe put their financial systems in the same league as those in Germany or France.

The theory presented in Calvo, Izquierdo and Mejia (2008), attributes the relevance of the current account deficit and DLD to the fact that, as a general rule, SS is associated with a dramatic shrinking of the current account deficit which, given the real exchange rate, gives rise to a contraction in aggregate demand. Thus, restoring equilibrium under an initially large current account deficit may call for large real currency depreciation (i.e., an increase in the real exchange rate). This, by itself, may not cause major financial trouble. However, trouble arises if DLD is also large, because real devaluation could trigger overindebtedness. Integration to the global financial market may help to rollover the foreign-exchange denominated debt and soften the blow, but empirical results suggest that integration has to be deep enough to work in that fashion. Actually, if integration is less than a critical level it could have opposite results. This makes sense, because the paper's measure of financial integration employs the Lane and Milesi-Ferreti (2006) index, which is defined by the ratio of gross assets + gross liabilities (of FDI and portfolio flows) to gdp. Therefore, low integration could be associated with incipient flows that

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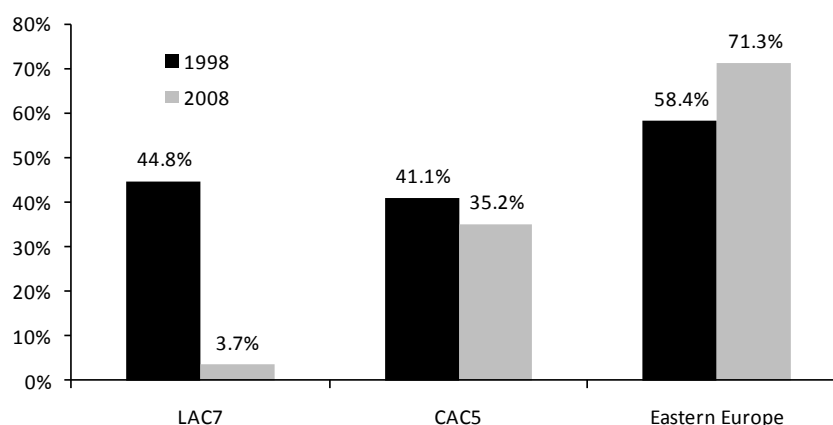
<sup>13</sup> Monthly data for these variables are not available. In the empirical implementation total capital inflows are approximated by the trade balance deficit (plus) accumulation of international reserves.

<sup>14</sup> There is a link with the pioneering Bernanke-Gertler financial accelerator papers (see Bernanke et al (1999)) in which agency problems amplify non-financial shocks. A difference is that in Calvo-Izquierdo-Mejia paper the shocks are financial and external, and amplification is associated with incompleteness of state-contingent markets.

are highly unstable and may call for larger, not lower, current account adjustment during crisis. An extension including International Reserves as an additional factor is presented in Calvo, Izquierdo and Loo-Kung (2013). The paper defines  $Net\ DLD = DLD$  (minus)  $Gross\ International\ Reserves$  (excluding gold). Net DLD is statistically significant and has the same sign as DLD in the previous study, implying that larger international reserves lower the probability of a SS in the context of a global crisis.

Recovery from 3S brings up new interesting phenomena. Calvo, Izquierdo and Talvi (2006) shows that recovery after 3S (associated with output contraction greater than 4% from peak to trough) is not accompanied by an equivalent increase in the stock of domestic bank credit to the private sector, a phenomenon that the paper labels “Phoenix Miracle,” in reference to the mythological bird rising from the ashes. These results suggest that even though a credit crunch poses a strong downward pressure on output, output may bounce back if firms are able to accumulate non-borrowed liquid assets (NBLAs) to substitute for the old credit lines. How the NBLAs are secured depends on the circumstances. For instance, it may result from a sharp fall in real wages, investment contraction or large currency devaluation (all of which, incidentally, take place on average in the Calvo-Izquierdo-Talvi sample). Large devaluation appears to have played an important role, given that in the Calvo-Izquierdo-Talvi sample exports increase, on average, by about 25 percent from peak to recovery.<sup>15</sup> It is worth pointing out, however, that it is common practice to conclude that real devaluation worked through enhancing the demand side (specifically, raising the *demand* for exports). This may be so, but an explanation that is more in line with the liquidity angle stressed here, is that large devaluation may speed up the accumulation of working capital and, thus, increase capacity utilization – a supply-side response.

**Figure 1. Sudden Stop Probabilities**



Research summarized above illustrates the relevance of understanding the channels through which a financial shock could be magnified. Latin America seems to have learned some of those lessons. Figure 1 shows the probability of Sudden Stop based on Calvo, Izquierdo, Mejia (2008) using estimated parameters for 1998 and 2008. For Latin America (LAC7 in the Figure, representing the 7 largest countries in the region), the probability falls from about 45 percent in 1998 to less than 4 percent in 2008. This is due to two factors: improvement in the current account and de-dollarization. These

<sup>15</sup> See Calvo and Loo-Kung (2010).

factors shifted in the opposite direction in Eastern Europe.<sup>16</sup> As a result, the probability of Sudden Stop in Eastern Europe went from less than 58 percent in 1998 to more than 71 percent in 2008.<sup>17</sup>

Another puzzling outcome during output recovery is “jobless recovery,” i.e., output recovery that fails to restore full employment. This phenomenon has been detected since the 1980s (see Gordon and Bailey (1993)) but it has acquired greater prominence in the current crisis due to the size and persistence of unemployment. The issue is explored in Calvo, Coricelli and Ottonello (2012), which offers strong support to the view that joblessness gets exacerbated during financial crises.<sup>18</sup> The paper claims that in the US and Europe financial crises have contributed to increasing the rate of unemployment (at the output-recovery point) by more than 2 percent from peak to (output) recovery. However, for EMs that display high inflation (i.e., episodes that achieve a maximum annual rate of inflation above 35 percent), joblessness tends to disappear and be replaced by a sharp fall in real wages. In the high-inflation sample average the real wage falls by about 17 percent from peak to recovery. All of this implies that labor appears to be a major casualty in financial crises. The jury is still out about the causes behind this phenomenon. However, Calvo, Coricelli and Ottonello (2012) put forward a model where a basic assumption is that physical capital can be much more easily attached by the creditor in case of default than labor. As a result, a tighter collateral constraint (which, as pointed out in Section II appears to be gigantic in the aftermath of the Lehman crisis) associated with financial crisis lowers the demand for labor relative to capital. Evidence from advanced economies offers some support for this conjecture.

Moreover, in ongoing research, Calvo, Coricelli and Ottonello (2013) claim that real currency depreciation may not be enough to restore full employment at the output recovery point, unless real wages suffer a sizable drop. These facts are relevant for the current debate in the euro zone. Abandoning the euro, for example, will help reducing unemployment only insofar as it generates lower real wages, real currency depreciation may not suffice.

#### **IV. Missing Finance: Genesis of the Blind Spot**

The objective of this Section is to trace the roots of the economist’s blind faith in the workings of the financial system. The exercise is like a visit to the shrink to help reveal the hang-ups that impair our daily life and, more to the point, that may drive us into harmful behavior. Understanding our economic subconscious may help us eschewing models that generate dangerous policy strategies.

The Great Depression took place during the lifetime of two giants of the economics profession: Irving Fisher and John Maynard Keynes. For most of the 20<sup>th</sup> century Keynes (per se and later manifestations: Keynesians, Post-Keynesians, New Keynesians) ran far ahead of Irving Fisher. An important reason being that, in addition to his own high-impact personality, Keynes’s academic sway owes a lot to John Hicks’s “*Mr. Keynes and the Classics*” where key features of the *General Theory (GT)* (Keynes (1961)) are put in terms of a general (dis-) equilibrium model, with amiable simplicity. Easy to digest, the model yields the

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<sup>16</sup> Eastern Europe includes Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Turkey.

<sup>17</sup> CAC5 correspond to the five largest Central American countries, a region where the probability of Sudden Stop also went down in 2008, but not as sharply as in LAC7.

<sup>18</sup> This is in line with the finding in Reinhart and Rogoff (2009), and Reinhart and Reinhart (2010).

two best-known implications of the *GT*, namely, (1) fiscal expansion raises output and lowers unemployment, and (2) if the capital market is in a shambles and individuals envision cash as one of the few available safe havens, monetary policy may become completely ineffective (a phenomenon that has come down to us under the label “liquidity trap”).

The main ‘market imperfection’ in Hicks’s model (known as the *IS-LM* model) lies in the labor or product markets, and takes the form of wage or price rigidities. Imperfections in the financial market are completely obliterated. In the original *IS-LM* model, for instance, the financial market is acknowledged through the introduction of an interest rate, which subsumes everything that the model explicitly says about the financial sector. The demand for money and output are assumed to depend on that interest rate. Moreover, in modern versions of the model it is customary to assume that the model’s interest rate coincides with the reference or policy interest rate set by the central bank (e.g., the US Federal Funds Rate).<sup>19</sup> Therefore, it is not unfair to say that the Keynes/Hicks tradition is responsible – unwittingly, no doubt – for the utter disregard of the financial sector as a source of macroeconomic instability in mainstream macroeconomics.<sup>20</sup>

Irving Fisher was less lucky. Firstly, his seminal insight (to be discussed below) came after heavily betting (and losing) that Black Tuesday was not in the cards, and the stock market boom was there to stay. Secondly, his insight was ignored by policymakers until the recent subprime crisis. Fisher published his seminal paper in *Econometrica* in 1933 where he put forward the conjecture that *Debt Deflation* (DD) was a key phenomenon behind the large and persistent collapse in the stock market and the large fall in output and employment during the Great Depression. DD is a phenomenon in which a change (typically large) in relative prices results in overindebtedness in some critical sectors of the economy. During the Great Depression, DD was triggered by a large fall in nominal prices and wages, while most debt obligations remained constant in terms US dollars. Notice that, in contrast with the Keynesian paradigm, DD can occur *even if prices and wages are perfectly flexible*. Therefore, Fisher’s insight offers a completely different perspective on the Great Depression. Actually, the deleterious effects of DD would be *minimized* if the economy displays *GT* characteristics, i.e., complete price/wage inflexibility!<sup>21</sup> Notice that DD may have toxic effects even if bankruptcy is not inevitable. This is so because DD may lower debtors’ “willingness to pay.” This is a common phenomenon in financial crises, and has surfaced in the US during the current one.

Mainstream literature points to price deflation as the major cause for the Great Depression. Friedman and Schwartz (1963) conjecture that without price deflation, the Great Depression would have boiled

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<sup>19</sup> Hicks’s original model does not even distinguish between nominal and real interest rates. This was a natural assumption, given that the model was born during a period of low inflation. Later on, as inflation surged in advanced economies (especially in the US), textbooks made a distinction between nominal and real interest rates (a minor victory for Irving Fisher who is credited with having stressed the distinction), which required inserting “inflation expectation” in the models, an important issue that I will turn to below.

<sup>20</sup> I could not find a single reference to the word ‘finance’ in the *GT*, and neither in Michael Woodford’s (2003) recent magisterial graduate textbook. It is worth noting, though, that the financial sector played a prominent role in Tobin’s writings, see, e.g., Brainard and Tobin (1968). But not as source of financial disarray.

<sup>21</sup> Keynes was aware of DD but failed to push it forward as a significant effect in the *GT*. There seems to be no reference to DD in the *GT*, although the phenomenon is mentioned in Keynes (1924) with no attribution.

down to a run-of-the-mill recession; and Bernanke (2000) agrees, making explicit reference to DD. But DD did not make it into most 20<sup>th</sup> century macro textbooks and, if it did, it did not take center stage. In his highly influential book *Money, Interest and Prices*, Patinkin (1965), for example, recognizes DD as a relevant phenomenon, but ignores it in the book's formal models, which arguably helped to keep DD out of textbooks. However, thanks to the profound impact of Friedman and Schwartz (1963) what remained in our subconscious is that large price deflation should be prevented. Unfortunately, this valid policy lesson was mostly associated with the costs of lowering prices and wages, ignoring DD – a financial issue – as a critical factor.

Mainstream economists were not all cut by the same scissors. In the 50s and 60s, for example, there was constant battle between “freshwater” and “saltwater” schools: the monetarists and the (post-) Keynesians debate centered on whether the cycle is mostly due to monetary or aggregate demand shocks, respectively. Interestingly, however, the financial sector was not a bone of contention. Even a hardline Keynesian like James Tobin (1989), in reviewing Minsky (2008), writes: "Nightmares of 1930s-style financial panics and epidemic bank failures haunt current discussions, even Minsky's, to unreasonable degree. The problem then was massive shift from bank deposits in general to currency. That has not been a problem since 1932 and is not today. But if a generalized bank run, as opposed to a run from one institution to others, were to occur, today's Fed, unlike its 1930-32 predecessors, could and would supply all the currency demanded. There would be no liquidity crunch." Faith in US financial institutions shining through unimpeded!

Minsky (2008) was, thus, not taken very seriously by mainstream economists, even by his presumed friends. Neither did prominent economists like Galbraith (1954) and Kindleberger (1978) – preaching from the Harvard/MIT Olympus – who stressed the importance of financial disarray in the Great Depression. Kindleberger, in particular, felt that bubbles and crashes were not a mere historical curiosity: replays were possible. Moreover, Kindleberger (1978) is fully aware of the disregard of mainstream macroeconomics for financial issues. In commenting about the two-waters' debate mentioned above, he writes: “The debate between the monetarists and the Keynesians ignores the instability of credit and the fragility of the banking system and the negative impacts on production and prices when the credit system became paralyzed because declines in the prices of many commodities and goods caused many borrowers to default on their loans...”<sup>22</sup> This sentence expresses in a masterful way the issues and concerns that I have been raising here. It is quite remarkable that Kindleberger's limpid prose did not succeed in putting a dent on conventional monetary theory!<sup>23</sup>

DD was rediscovered in the EM literature in connection with *Liability Dollarization* or *Original Sin*. These two expressions are used to denote a situation in which economic agents are heavily indebted in terms of foreign currency (see Calvo (2005), Eichengreen et al (2005)). Under those circumstances, a large

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<sup>22</sup> This quotation is taken from the Kindle revised version with Robert Z. Aliber, published in 2005, loc. 1203.

<sup>23</sup> More recently, but still prior to the subprime crisis, Robert J. Shiller sounded the alarm that skyrocketing real estate and stock market prices signaled unsustainable bubbles. But his warnings were unheeded even though they were published in very prominent media. See, for instance, Shiller (2000). A possible reason for this fact, is that Shiller appealed to factors like “animal spirits” that are inimical to conventional theory. Notice, incidentally, that the liquidity explanation pursued here is, in principle, consistent with rational expectations.

devaluation inflates the relative value of debts in terms of local-currency income, possibly resulting in DD. Perhaps the most dramatic EM example of this nature is the 2001/2 crisis in Argentina, an economy in which even private and public *domestic* debt was largely denominated in US dollars. A serious threat of massive bankruptcy arose as the peso/dollar exchange rate (where *peso* was the local currency) increased by a factor greater than 3 soon after the start of the crisis. To avoid major financial catastrophe, dollar debts vis-à-vis domestic banks were redenominated in terms of local currency. This weakened institutions even further and helped to bring about a decline in output comparable to that in the Great Depression.

Liability Dollarization is a major factor explaining the present predicaments in Southern Europe. Despite avoiding CPI deflation several European economies are undergoing a severe bout of DD, as the cases of Ireland, Portugal, Greece and Spain clearly illustrate. These economies are fettered to the euro. Euro debts were not made contingent to a breakdown of the euro area (the *unthinkable*), while monetary policy is geared to euro price stability. Thus, the stage was set for a massive DD effect when the real estate sector collapsed – especially, given that the collapse was not uniform across the euro area, making it difficult to reach political consensus to assuage the effects of DD through high inflation. It is worth noting that abandoning the euro is not a solution, unless countries renege on their euro obligations.

In sum, the above discussion illustrates the strong professional resistance to seriously taking into account potential malfunctioning of the capital market. There is a parallel here between mainstream macroeconomics prior to the subprime crisis and the classical view of money as a veil. The Keynesian revolution did away with the view of money as a veil by showing that it does not hold under sticky wages and prices. But mainstream macroeconomists passed along the veil to the financial sector: money as a veil became finance as a veil (leaving aside micro regulatory concerns). Of course, there were detractors and some of the finance-as-veil supporters occasionally raised some concerns about the possible systemic effects of lifting some banking regulations but, on the whole, the veil was thought to be a good first approximation. Thus, deep financial crisis was declared a thing of the past, at least in advanced economies. Little did we know that we were actually putting a veil on our own eyes and stoppers on our own ears and, thus, failing to see and hear the lightning and thunder that preannounced a major economic upheaval!



## V. Outstanding Puzzles: In the Throes of a Great Schism?

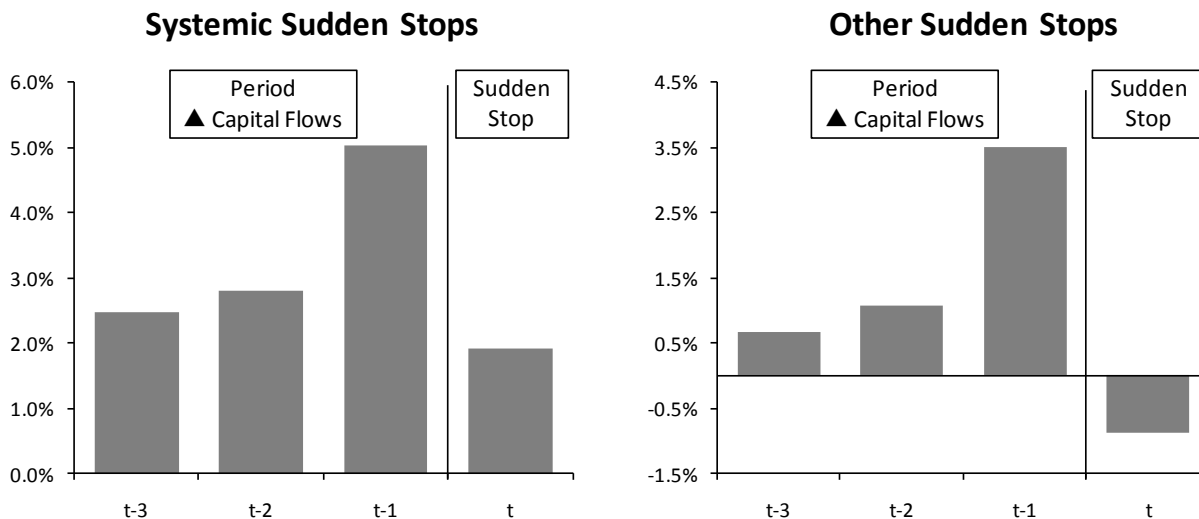
A central message from the above discussion is that financial issues, starting with liquidity issues, should not be ignored. Otherwise, a financial crisis can spring up from a dark corner of the economic system causing major damage. The EM experience and the still partial one we are garnering from the subprime crisis, teach us about the existence of mechanisms that might help to amplify a liquidity shock. The discussion also gives some ground to the conjecture that a financial crisis can erupt much unexpectedly and without being triggered by conventional *fundamentals*. In particular, crisis in one part of the economy can spread to the rest of the economy by the mere fact that it shows that a certain type of crisis is possible: contagion. And all of that follows without necessarily having to drop the *rationality assumption*.

However, there are still several critical puzzles that require our attention. I will start the discussion by centering on two of them:

**Critical Puzzle 1.** There is a growing empirical literature purporting to show that financial crises are preceded by credit booms (Mendoza and Terrones (2008), Schularik and Taylor (2012), Agosin and Huaita (2012), Borio (2012)). This was a central theme in the Austrian School of Economics (see Hayek (2008), Mises (1952)).

**Critical Puzzle 2.** As a general rule, net capital inflows increase, sometimes sharply, in the run-up of a Sudden Stop. See, e.g., Figure 2.

**Figure 2. Net Capital Flows in the Run-Up of Sudden Stop**



\*Includes sudden stop episodes identified with the methodology in Calvo et al. (2009), from 1996 to 2009 in a set of 35 emerging economies included in the EMBI with available data.

I call them puzzles because one can find rationales that are radically different from each other; and I call them critical because depending on the explanation, the policy implications are also radically different –

does this herald a Great Schism among economists and policymakers in the offing, exacerbating the current acrid debates? One explanation for the two puzzles listed above is that individuals do not satisfy the standard rationality assumptions and, say, fall prey to a counterproductive herding effect. This amounts to a damning comment on the efficiency of the market mechanism. Another explanation is that those puzzles are a consequence of the fact that credit flows are strongly dependent on the liquidity of collateralizable assets which, as noted above, can evaporate in the spur of a moment. This explanation could be made consistent with rationality and regulation could help to prevent and manage financial crises by helping to coordinate a 'good' equilibrium. I will elaborate on these two radically different lines of explanations in the rest of this Section.

Policy Mistakes and Imperfect Information: The Austrian School of the Trade Cycle Was on the Right Track. I will argue that the Austrian School offered valuable insights – disregarded by mainstream macro theory – that help to rationalize Puzzle 1 without resorting to irrationality. Over-extension of credit was at center stage of the Austrian School theory of the trade (or business) cycle, but authors differed as to the factors responsible for excessive credit expansion. Mises (1952), for instance, attributed excessive expansion to central banks' propensity to keeping interest rates low in order to ensure full employment at all times. As inflation flared up, interest rates were raised causing recession. Thus, under his view the cycle is triggered by pro-cyclical monetary policy with a full-employment bias which was not consistent with inflation stability. Hayek (2008), on the other hand, dismissed von Mises explanation, not because it was not a good depiction of historical events, but because he thought that instability is something inherent to the capital market and, in particular, it is related to what might be called the *banking money multiplier mirage*. His discussion conjures up contemporary issues, like securitized banking, for example. At the risk of oversimplifying Hayek's views, a phenomenon that seems central to his trade cycle theory is that credit expansion by bank A induces deposit expansion in bank B who, in turn, has incentives to further expand credit flows, etc. If bank A makes a mistake, the money-multiplier mechanism amplifies it. This is reminiscent of misperception phenomena stressed in Lucas (1972). Hayek's discussion does not exhibit the same degree of mathematical sophistication but focuses on a richer set of highly relevant issues. For example, that credit expansion is not likely to be evenly spread across the economy, partly because of imperfect information or principal-agent problems. This implies that credit expansion is likely to have effects on relative prices which are not justified by fundamentals. Shocks that impinge on relative prices are hardly discussed in mainstream close-economy macro models.<sup>24</sup> Hayek's theory is very subtle and shows that even a central bank that follows a stable monetary policy may not be able to prevent business cycles and, occasionally, major boom-bust episodes. Unfortunately, Hayek does not quantify the impact of perception errors (he was philosophically averse to quantification along modern standards, see Hayek (1974)), and although I find the argument persuasive for regular business cycles, I think it would be quite a stretch to claim that they help to explain episodes like the subprime crisis, unless we bring into the picture the hand of the central bank, as postulated by Mises. Thus, I think the Hayek/Mises mix have a better chance of being close to the mark – with the emphasis on Mises for the

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<sup>24</sup> Close-economy macro models are the gold standard of macroeconomic theory. In contrast, relative prices play a key role in most open-economy macro models, e.g., the real exchange rate. But although there is a large literature showing that real-exchange-rate volatility is harmful for growth, the topic never made it to the top ranks in gold standard macroeconomics. This situation is likely to change after the recent real estate bubble.

current event. As I will argue below, though, the Hayek/Mises mix becomes more appealing when liquidity issues are brought to bear.

Whatever one thinks of the power of the Hayek/Mises mix as a positive theory of the business cycle, an insight from the theory is that once credit over-expansion hits the real sector, rolling back credit is unlikely to be able to put “Humpty-Dumpty together again.” Inflation may subside but the credit contraction is likely to have severe real effects. No hard proof is offered, but their conjecture is not easy to reject. Sudden Stop episodes discussed above are clear examples that seem to confirm the conjecture. Hayek’s explanation, in particular, can be summarized in one word: Complexity; implying the inability of policymakers to know the inner workings of a mechanism that went awry by excessive credit in such a way that when the boom reaches its peak, the policymaker cannot possibly know where to operate due to the complexity of the situation, even leaving aside political considerations. Moreover, when account is taken of the fact that the policymaker has only a limited set of blunt instruments to operate, it is not hard to conclude that countercyclical policy may be largely ineffective – in the lucky case in which it is not outright counterproductive.

Borio and associates are carrying forward a research program that contains several elements akin to the Hayek/Mises mix. One intriguing conjecture is that there exists a slow-moving insidious financial cycle behind booms and busts, which is easily missed if policymakers do not keep their eyes on balance sheets (see, e.g., Borio (2012)).

In sum, the Austrian School has made important inroads into solving puzzle 1 above, although a modern reader will probably like to see additional “micro-foundations.” However, puzzle 2 is a bit out of their purview. This is probably due to the fact that the Sudden Stop phenomenon had not been identified at the time. The next subsection will claim that liquidity issues can help to give more solid grounds to the Austrian School theory and address Puzzle 2.

Liquidity and All That. It should be clear by now that *liquidity* is a feature that exists or vanishes as a function of an asset’s role as a MOE. The latter, in turn, depends on an explicit or implicit compact among economic agents by which the MOE is accepted/rejected as a form of payment without major delay or discount. This is admittedly imprecise but it highlights the fact that the market value of a liquid asset will depend, beyond standard *fundamentals*, on arrangements that are subject to *self-fulfilling prophecies*. Non-liquid assets are also subject to those kinds of prophecies but in the case of liquid assets they are par for the course. It is hard to find a fairly liquid asset which liquidity is not subject to the types of runs illustrated in Diamond and Dybvig (1983), for example. Moreover, these runs can take place with the speed of light and, as discussed above, have severe implications on the credit channel.

Acknowledging the lability of liquidity is an important first step in understanding its characteristics. A second important step is to realize that liquidity can arise by mechanisms that are polar opposite to each other. There are situations in which an asset’s liquidity is established top-down, like when the government defines a new legal tender and unit of account to stop hyperinflation, e.g., the *Rentenmark*. But there are many other instances in which assets become liquid from the ground up, as is illustrated by Asset Backed Securities (ABS), Brazil’s C-bonds, and securitized banking. Ground-up liquidity will be

the focus of our discussion in what follows. Ground-up liquidity is unlikely to happen in the blink of an eye; it is a process that involves many economic agents who are not deliberately coordinated by a central authority like the government. There will be a *penetration phase* in which a few agents will take the lead in the creation and marketing of potentially new liquid assets and then the market will slowly expand. As the asset's recognition grows, its liquidity is likely to increase. Greater liquidity translates in higher price. Hence, investors that are ahead of the game and can foresee the liquidity potential of the asset will have incentives to buy it, further raising its price. Therefore, the penetration phase attracts new funds to the new liquid asset, channeling new investment funds to the sectors where the assets originate. For example, the real estate sector in the case of MBS discussed above. This illustrates two phenomena: (1) the possibility that the penetration phase generates a credit boom, and (2) the lopsided nature of credit booms: not all sectors benefit in the same degree, a fact that could give rise to a boom of relative prices in the sectors where new investible funds are directed – reinforcing Hayek's view that credit expansion has effects on the *real* sector. Point (1) helps to give an answer to Puzzle 1. But this explanation would be more satisfactory if one was able to argue that the penetration phase increases the probability of a run on the assets in question.

Take the case of MBS. This is an asset class “fed” by many mortgage originators. The situation is not radically different from a currency that can be printed by many banks, e.g., the 19<sup>th</sup> century bank notes that circulated in the US. If there is no regulator controlling the total supply of bank notes, chances are that hyperinflation will arise – or, if the bank notes are backed by, say, gold, a run on bank notes will eventually take place. The reason for this is that individual issuers do not take full account of their joint impact on the characteristics of the asset class. However, liquidity creation from the ground up, especially in securitized banking, is ridden by deeper externalities. The liquidity of bank notes depend, to a large extent, on the characteristics of the bank of issuance and, thus, there can be a run against a bank of issuance without necessarily involving other banks. Securitized banking, in contrast, gives rise to a system like one in which, say, bank notes from bank A are indistinguishable from bank notes from bank B. Thus, the systemic effect of expanding bank notes are less likely to be internalized.<sup>25</sup>

A formal model following up on the above observation could proceed by assuming that the probability of a run on MBS, say, is increasing with the *total* supply of MBS. This might be so, because as the MBS become more liquid, the share of MBS holders that have a high probability of being hit by a liquidity shock (requiring selling their MBS holdings) goes up. Thus, there are more states of nature in which a run against MBS may end up in a liquidity crisis. In addition, one could introduce considerations like those discussed in Morris and Shin (1998) to show that the above weakening of *fundamentals* may increase even further the probability of self-fulfilling MBS runs. These effects are not internalized by MBS holders and, hence, the probability of a run or crisis will be larger than if total supply was centrally regulated. Therefore, beyond a certain point, a credit boom associated with the penetration phase will move the system closer to a socially-costly liquidity crisis. This does not imply that *every penetration phase* will end up in crisis. It rationalizes the case in which the penetration phase is conducive to crisis, which market participants, as individuals, do not have the incentives (or even the wherewithal) to stop,

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<sup>25</sup> Pecunary externalities have recently been discussed in, e.g., Rodrik and Velasco (1999), Lorenzoni (2008), Mendoza (2010), Bianchi (2011).

even if they completely understand the process.<sup>26</sup> This helps to explain why a credit boom during the penetration phase increases the chances of a liquidity crunch. But why are investors unfazed by higher risk and even increase the flow of funds in the run-up of financial crisis (puzzle 2)?

There are two forces at play. One force is that penetration of new financial instruments increases their liquidity – thus increasing the attractiveness of the new financial instruments. The higher probability of a liquidity crunch, highlighted above, pushes in the opposite direction – but need not be dominant. Actually, there may be penetration phases that do not end up in crisis because investors stop well before the probability of a liquidity crunch becomes critical or the "run" random shock does not materialize. These would be booms that are not followed by busts. More research is necessary to be able to tell the difference between booms that fizzle out without causing major damage, and booms that end up in costly Sudden Stops. But, in the meantime, I think this goes a long way to answering Critical Puzzles 1 and 2.

A point worth stressing is that the boom/bust literature that I am aware of relies on the existence of collateral constraints that become binding partly as a result of exogenous shocks, which are exacerbated by pecuniary externalities. In contrast, the key component in a liquidity model is that liquidity itself is vulnerable to runs à la Diamond and Dybvig (1983) and, thus, multiple equilibria cannot be ruled out in general. The switch from "good" to "bad" equilibria is the central mechanism behind a bust. Pecuniary externalities help the generation of realistic booms (e.g., critical puzzle 2) but are less central for rationalizing deep busts, because the latter critically depend on the *distance* between "good" and "bad" equilibria.

To summarize, bringing in liquidity into the discussion shows the possibility that liquidity may be responsible for the fragilities revealed in recent crises, and offers an appealing complementary explanation to the growing boom/bust literature. Moreover, it gives some ground to the conjecture that financial liberalization could be breeding ground for future crises, and it opens up the possibility that monetary policy induces the creation of liquid assets subject to runs, giving some fodder to those that claim Greenspan's low interest rates were responsible for the subprime crisis (for a formal model bearing out this result, see Calvo (2012 b)). However, none of these implications necessarily depend on deep-seated irrationality that cannot be remedied by thoughtful regulatory policy. These are accidents that can happen in the context of perfectly well-run financial machinery under imperfect financial regulation.

Before closing, I will show another piece of evidence that, in my view, reinforces the conjecture that financial crises are closely linked to liquidity creation/destruction episodes. I will list this piece of evidence as

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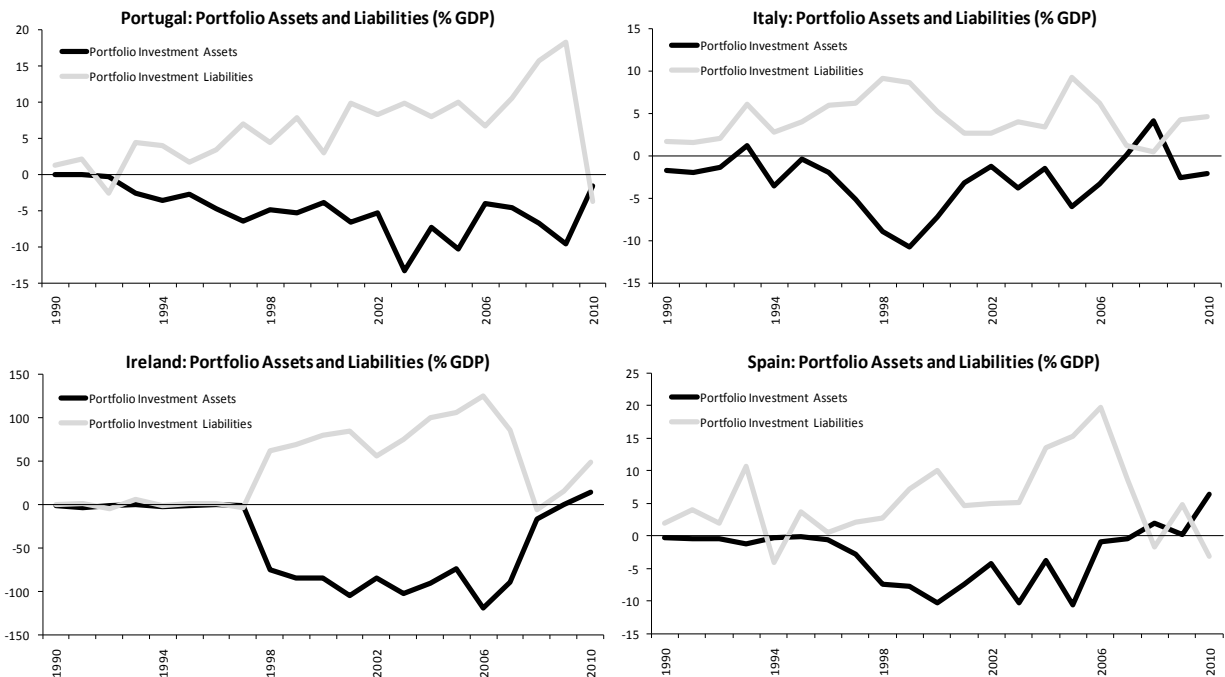
<sup>26</sup> Maybe this is what Citigroup's Chuck Prince meant by saying (Financial Times (2007)): "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing."

**Critical Puzzle 3.** In an interval of time around a Sudden Stop, gross credit flows move in the same direction. They both increase prior to crisis, and decline afterwards.

This is clearly seen in Figure 3. For systematic evidence supporting Puzzle 3, see Dvorak (2003), and Broner et al (2013). A view in these papers is that the evidence supports the assumption of asymmetric information. This may be so, but casual evidence suggests that, given today's financial sector, it is unlikely that information asymmetry or shocks play a central role. Research departments in the leading investment banks and hedge funds are brimming with economists from around the world, which detracts from the appeal of the information asymmetry assumption, for example.

In contrast, liquidity offers a much more straightforward rationale, free from asymmetric information or shocks. As Figure 3 shows for four economies that played a critical role in the current European drama, portfolio flows from the creation of the eurozone until the subprime crisis shot up in both directions, and collapsed as crisis started. It is hard to argue that residents in these countries were privy to information not available to the rest of the eurozone. Much more plausible is to conjecture that the creation of the eurozone gave rise to instruments that traveled in both directions, like repos, for example. This is, after all, a salient feature of MOE in financially integrated economies. The eurozone crisis seriously interfered with financial integration as deposits in all of the countries stopped being perfect substitutes with deposits in German banks, for example – putting a break on the flow of MOE across those economies.

**Figure 3. Bi-Directional Portfolio Flows in the Eurozone**



Source: IFS, IMF

## VI. Final Words

Recent crises show that the capitalist system is less resilient than conventional wisdom implied. The big challenge going forward is to repair the system without impairing its proven potential for creating wealth and speeding the pace of poverty reduction. The paper shows that general equilibrium models should be extended in a substantive way to incorporate the critical role of the payments system. Devices like the veil of money and finance, and the representative individual leave critical aspects out sight. This is dangerous.

The paper shows that one can start understanding the nature of liquid assets by going back to basics, bringing to bear the literature about the value of money and the vulnerabilities of traditional banks – and, then, appending to the analysis instruments that are new but that bear some features common to age-old instruments and institutions. The paper shows that the financial tree that has been created over the years has flimsy foundations. A prominent example is paper currency and commercial banking. Paper currency – it is suggested in the paper – partly owes its resiliency to price stickiness. I will not repeat what has already been said in Section II, but it is worth noting that the conventional theory pictures price stickiness as a weakness in a monetary economy, and the main imperfection requiring the close attention of central banks. In contrast, the paper suggests that price stickiness makes central bank policy more powerful (the Price Theory of Money). However, the buttresses that secure the real value of paper currency are not available for the rest of the financial tree except, to some extent, for commercial banking. Thus, the subprime debacle can be traced to the fragility of the upper branches of the tree.

There are many important related issues that have not been touched upon in the paper. International aspects have been mentioned but only in regard to financial contagion. But the challenges posed by the existence of a multiplicity of units of account and currencies have been purposely ignored. This is a major issue that acquires greater significance when one recalls the flimsy foundations of the financial tree. With that in mind, floating exchange rates sound like sheer nonsense. Recalling the Price Theory of Money, they might undermine the resilience of national currencies, because not all prices are set in units of the domestic currency, a phenomenon that is especially prevalent in emerging market economies (e.g., "currency substitution"). This restricts the ability of central banks for stabilizing the domestic price level. And, moreover, it could make price stickiness more costly. For instance, liquidity shocks that have little to do with *fundamentals* may give rise to gigantic swings in exchange rates and have real effects. Central banks in a sea of currencies may be at a loss to offset these swings, unless they resort to pegging the exchange rate and, at least momentarily, abandoning floating exchange rates (see Calvo and Reinhart (2002)). These considerations are not enough to make a case in favor of fixed exchange rates. There are many attendant issues that will have to be sorted out before doing so. But once liquidity issues are brought to bear, it becomes clear that arguments put forward by Friedman (1953) in favor of floating exchange rates, for example, may need to be critically revised.

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