Financial crises and coordination failure: A comment

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Abstract

The three papers of this session link financial crises (explicitly or implicitly) to *coordination failure*. In Bryant (Journal of Banking and Finance, 2002), the possibility of coordination failure is due to complementarity in the productive technology. In Chui et al. (Journal of Banking and Finance, 2002), foreign lenders to a small country fail to coordinate on the optimal strategy rolling over short-term loans. Finally, Amable et al. (Journal of Banking and Finance, 2002) implicitly introduce coordination failure through a production function with external increasing returns to scale. This sort of "thick markets" externality can be viewed as a reduced form that stands for coordination problems in a non-Walrasian economy. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

A common theme linking the three papers in this session on Liquidity, Stability, and Growth is that financial instability can be viewed as an

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equilibrium multiplicity. In particular, all of these papers link financial crises (explicitly or implicitly) to *coordination failure*. Coordination failure can arise whenever there are strategic complementarities across agents. [1] For example, capital investment by different firms would be strategic complements if the marginal product of a given firm's capital were increasing in the aggregate capital stock. If firms expect *other* firms to under-invest, it becomes optimal for *all* firms to under-invest, fulfilling the original expectation. In this way, coordination failure models formalize the notion of self-fulfilling expectations. It is well known that strategic complementarities can lead to multiple equilibria, which often can be Pareto-ranked. A suboptimal equilibrium would prevail if agents fail to coordinate on the socially optimal strategy. One could model a financial crisis as a particular suboptimal equilibrium in a financial market where coordination problems are present.

The coordination-failure paradigm is useful for modeling financial crises because it allows abrupt switches between coordination states without a corresponding change in economic fundamentals. Arguably, sudden transitions between non-crisis and crisis modes characterize financial crises. Consider the events in East Asia in 1997. The onset of this crisis was sudden and unforeseen. If financial markets foresaw the devaluations that initiated the crisis, both forward exchange rates and nominal interest rates would have responded as soon as the information forecasting the devaluations became public. As it happened, neither of these market rates moved until the beginning of the crisis itself. [2] Furthermore, there was no sudden change in economic fundamentals in July 1997 commensurate with the scale of the crisis. To take a second example, consider the abrupt ending of the liquidity crisis of fall 1998. The evidence is clear that this crisis ended abruptly when the Federal Reserve cut the federal funds rate by 25bp in an intermeeting action on October 15. [3] It is unlikely that the direct effect of a mere 25bp cut in interest rates could have changed economic fundamentals so profoundly as to end the crisis.

These abrupt shifts between crisis and non-crisis states without a commensurate change in economic fundamentals are difficult to reconcile with models that focus exclusively on fundamentals as the sole determinants of crises. In contrast, coordination failure models allow a given state of fundamentals to be consistent with both crisis and non-crisis states. The shift between these states could be caused by a shift in investor beliefs, which then becomes self-fulfilling. Since these two types of models (fundamentalist vs. coordination failure) have rather different implications for policy, it is im-

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[1] See Cooper (1999) and the references therein.
[2] See Halcomb and Marshall (2001).
[3] See Marshall (2001).

portant to explore both types of models as we attempt to understand and fully characterize the phenomenon of financial crisis.

The papers in this session all touch on the issue of coordination failure. In Bryant (2002), the possibility of coordination failure is due to complementarity in the productive technology. Chui et al. (2002) explore the possibility of a massive withdrawal of foreign capital from a small country, analogous to a Diamond and Dybvig (1983) bank run. In this sort of crisis, foreign investors fail to coordinate on the Pareto optimal strategy rolling over short-term loans. Finally, Amable et al. (2002) have a rather different focus. They study the optimal structure of the banking sector. They implicitly introduce coordination failure through a production function with external increasing returns to scale. This sort of "thick markets" externality can be viewed as a reduced form that stands for coordination problems in a non-Walrasian economy (such as one where transactions occur via bilateral matching).

2. Bryant

Bryant (2002) builds on the model introduced in Bryant (1983). Strategic complementarity results from a Leontief production technology: *all* intermediate goods are needed to produce the final good. This implies extreme complementarity. A different firm produces each intermediate good. If any of these firms fail to produce, the output of the economy (in terms of final goods) is zero. Furthermore, each intermediate good producer must be paid in goods produced on his own island, implying an absence of double coincidence of wants. As a result, if it is believed that *any* payment will fail, the entire economy devolves to autarky. A coordination problem of this sort may well characterize the collapse in output associated with economic depression.

Now, an alert graduate student might ask, "If there is a shortage of a particular intermediate good (say, because its producer believes that payments to him from purchasers might fail), why does not the price of this good rise, giving an incentive to increase production?" This question highlights an important feature of the model: It is fundamentally non-Walrasian. There is no "Walrasian auctioneer" to increase the price in response to excess demand. Prices are set through bilateral bargaining between individual parties. I believe that this non-Walrasian feature characterizes coordination failure models more generally. The Walrasian auctioneer is a coordination mechanism. The intuition that "prices will adjust" presumes the existence of a coordination mechanism that may or may not be present in reality.

To resolve the absence of coincidence of wants, the model introduces an elaborate two-level system of banks. Merchant banks represent final goods producers on foreign islands, while deposit banks extend lines of credit to all

agents on a given island. The author shows that this system is sufficient to facilitate the trades needed to support the optimal outcome. Furthermore, a policy of bank indemnification (e.g., deposit insurance) rules out the no-coordination equilibrium. However, it is not clear to me that this elaborate banking system is necessary at all. All that is needed to resolve the lack of double coincidence of wants is to have each producer of final goods issue negotiable claims to its output. To fully motivate this model, it would be useful to model explicitly the sorts of frictions that require claims to be traded through this two-level banking system.

In this paper, the fundamental source of coordination failure is in the production technology. Coordination problems in the financial system are induced by these coordination problems in production. Does this capture the essential nature of financial crises? That is, are the coordination problems that lie at the heart of financial crises located in production, or do financial crises emerge from coordination problems essential to the process of intermediation itself? This distinction is important for policy purposes. If the coordination problem originates among financial intermediaries, steps to encourage intermediation (for example, policies designed to encourage banks to make more loans [4]) may be the correct policy. However, if the coordination problem resides in the productive sector, simply encouraging financial intermediation may be insufficient. It does little good to encourage lending when few firms want to borrow (''pushing on a string''). In this case, Keynesian ''pump-priming'' policies may be justified.

3. Chui, Gai, and Haldane

The paper by Chui et al. (2002) models the capital flow reversals that characterized the Asian crisis of 1997. In their model, there are many foreign lenders to a small country. Any lender who withdraws short-term capital imposes a deadweight cost, which reduces the resources of borrowing country. Furthermore, when the borrower defaults, all lenders receive *zero*. That is, lenders have no claim to residual output. These features (deadweight costs of withdrawal and all-or-nothing repayment) induce a strategic complementarity in investors' decisions: if it is believed that enough lenders will withdraw, it is optimal then for *all* foreign lenders to withdraw. In other words, coordination failure in the form of a ''run'' on the country is possible. For certain parameter ranges, both full coordination and ''run'' equilibria exist. That is, both crisis and non-crisis states are compatible with the same fundamental conditions.

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[4] Marshall (2001) interprets the Federal Reserve's low interest rate policy from mid-1992 through the beginning of 1994 in this way.

Unlike Bryant (2002), the coordination problem is in the process of financing, not production.

I found it unclear how to interpret the two key driving assumptions of this model. Consider first the deadweight cost that is imposed when a lender withdraws funds. This deadweight cost implies an increasing returns feature: a withdrawal of one unit of short-term capital reduces productive capacity by more than one unit. If a sufficient fraction of foreign lenders withdraw, insufficient resources remain to repay remaining lenders. This deadweight cost is a key driver of the paper's results. If this cost equals zero, there is no coordination problem. [5] Thus, it is important to clarify what real-world features are captured by this deadweight cost. Similarly, I found the all-or-nothing repayment assumption to be puzzling. If the borrower's net output is epsilon short of the amount owed to the creditors, the creditors do not just take an epsilon-haircut; they get nothing at all. What happens to the residual output? Does it simply vanish? The paper does not say. It is not clear why this all-or-nothing repayment is a realistic way to model default.

This paper makes a valuable methodological contribution on a more general question: What triggers coordination failure? The usual procedure in the literature on dynamic multiple-equilibrium models is to have agents coordinate on an exogenous "sunspot variable". If "sunspots" occur, all agents coordinate on the suboptimal equilibrium; otherwise, they coordinate on the optimal equilibrium.

The sunspot paradigm was originally introduced in macroeconomic theory to explore whether exogenous uncertainty has a role in generating business cycles. [6] While it may be useful for these sorts of applications, it is not well suited for the study of financial crises (although I confess to having used it on more than one occasion). The sunspot approach is a shamelessly ad hoc way of rendering determinate the equilibrium in a dynamic multiple-equilibrium model. Furthermore, the sunspot paradigm makes the probability of crisis completely exogenous. Therefore, a key question for students of financial crises, "What determines the probability of a crisis occurring?" cannot be addressed.

The Chui et al. (2002) paper provides a nice alternative to the sunspot approach. In this paper, a given investor's decision to run depends on his private signal about fundamentals. If the signal is below a certain trigger value (determined in equilibrium), then it is optimal for him to run. If a sufficient number of lenders have signals below this trigger value, enough lenders run to

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[5] Actually, for coordination problem to exist we need the deadweight cost parameter k to exceed $r_L - r_A$, where r_A denotes the return to liquid assets and r_L denotes the promised return to the lenders. But, presumably $r_A < r_L$, in which case $k = 0$ is sufficient to rule out coordination failure.

[6] See Farmer (1999) and the references therein.

trigger default. Seeing that default is imminent, all remaining lenders presumably run as well.

I found this feature to be the most interesting aspect of the paper. It represents a fundamentals-based explanation for the onset of coordination failure that can replace the justly derided sunspot approach. In the approach of Chui et al. (2002), the cross-sectional ex-post distribution of signals plays a role similar to the sunspot. As with sunspots, an empirical economist cannot directly observe these private signals, so abrupt shifts can occur from full coordination to low coordination without any change in *observable* fundamentals. Unlike the sunspot approach, however, the probability of crisis is now endogenous, and can potentially be affected by policy decisions. It thus allows a rich set of policy alternatives to be analyzed.

Let us consider some of these policy implications. First, how does domestic monetary policy affect the probability of crisis? The authors characterize this question as "IMF vs. Stiglitz". A characterization (or perhaps, a caricature?) of the IMF's policy recommendations is that domestic interest rates should be raised to prevent or reduce currency devaluation, thereby making it easier to repay foreign loans. In contrast, a characterization of Joseph Stiglitz's position is that raising domestic interest rates fundamentally damages economic productivity, leading to a suboptimal outcome. In the Chui et al. (2002) model, raising domestic interest rates has two opposite effects. It increases the probability of fundamental insolvency ("Stiglitz") but reduces the probability of illiquidity due to capital flight ("IMF"). Under the benchmark parameterization, "Stiglitz" wins, in that the former effect dominates the welfare calculus. However, it should be noted that the "IMF vs. Stiglitz" debate really focuses on ex post policy: what to do *after* a crisis occurs. The calculation in this paper is ex ante: how policy affects the probability of a future crisis. So the discussion in this paper does not really address the actual arguments over the proper response to the Asian crisis, although the analysis may still be relevant at some level.

Second, increased liquidity reserves (not surprisingly) reduce the probability of a run. The authors assert that this unambiguously enhances welfare. However, increasing reserves is costly, since it reduces funds available for investment. This cost is not taken into consideration in the welfare calculus, so this result is not particularly informative. Third, the authors find that lower leverage (i.e., reduced dependence on foreign loans) improves welfare. This result is difficult to interpret. Is the optimal policy then to set foreign lending to zero (an extreme version of capital controls)? What drives this result? Are total investable funds held constant? If not, does this result then say that autarky is best? What features of the model account for this rather striking implication?

Fourth, the authors find that a tax on lenders who withdraw funds prematurely is welfare enhancing. Again, this is not surprising, since cost of this policy is not modeled. Presumably, higher exit taxes would reduce the inflow of

investment or increase the cost of such funds. In the exercise of this paper, however, both the quantity of investment and the interest rate on foreign investment are held constant. As a result, this exercise is uninformative.

Finally, the most surprising result of the paper's calibrated model is that increased transparency (more informative productivity signals) yields only a minimal welfare improvement. Given the prominence of the transparency issue in debates on the causes of the Asian crisis, this result should be developed. What drives the result? How robust is it to the calibration used? In particular, the calibration of deadweight cost parameter k is crucial. How should we think about this parameter? What data can guide us in parameterizing k? If this transparency result proves robust to a range of plausible parameters, it could cause us to rethink the importance of transparency in the design of international financial standards.

4. Amable, Chatelain, and De Bandt

Amable et al. (2002) focus on the optimal structure of the banking industry. In particular, how much market power is optimal? Increased market power reduces welfare due to usual deadweight costs of monopoly, but it can also increase welfare by reducing the probability of financial crisis.

There is a pre-existing literature related to this question. Many theories of bank regulation focus on the perverse incentives of deposit insurance. [7] Deposit insurance without appropriately risk-based premiums effectively gives the bank a free put option. If bank shareholders do not have a sufficient stake in the value of the bank as a continuing enterprise ("franchise value"), they have an incentive to maximize the value of this put option by taking excessive risk. These perverse incentives can be offset by increasing the bank's market power, thereby increasing the bank's franchise value. Hellman et al. (2000) provide a particularly cogent explication of this logic.

In the paper by Amable et al. (2002), however, a different mechanism is at work. If bank have more market power, they promise to the depositors a smaller fraction of the return on the underlying assets. This in turn reduces the threshold return that triggers default, reducing the probability of bankruptcy.

Why, then, does the reduced probability of bankruptcy improve welfare? That is, why does not the Modigliani–Miller theorem hold? The answer lies somewhere in the numerous capital market imperfections in the model. First, there is a spatial friction: It is costly for households to do business with banks

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[7] The classic papers on the incentive distortions induced by deposit insurance are Merton (1977) and Kareken and Wallace (1978). For a recent summary of this problem, see Marshall and Prescott (2000) and the references therein.

that are further away. This implies a degree of market power for banks. Second, there is an overlapping generations structure: The generations currently living cannot trade with generations not yet born. (This raises the usual question of whether the length of a time period in this model is 25 years.) Third, there is a fixed cost of bank operation, which introduces a nonconvexity that breaks the optimality of the competitive equilibrium. Fourth, the model uses a production function with external increasing returns to scale. This feature induces a multiplicity of equilibria. The role of these many imperfections is unclear. In particular, which of these many capital market imperfections drives the result that greater monopoly power may be welfare enhancing?

The paper has strong policy implications. If increased market power in banking is welfare improving, then deregulation of financial markets may, by increasing competition, reduce welfare. Hellman et al. (2000) develop this idea explicitly, arguing that deregulation of interest rates may be harmful. Presumably, a similar result would emerge in this paper as well. In addition, there is a hint (in the introduction only) that financial crises may work to reduce over capacity in the banking sector. (There may be an analogy here to "cleansing recessions".) While this idea is not developed in the paper, it is intriguing. Is it possible that there may be costs of *preventing* financial crises in an economy with overcapacity? Presumably, the model of this paper could be used to make this idea more precise.

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