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KEYNOTE ADDRESS

The Spillovers from Easy Liquidity and the Implications for Multilateralism

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Abstract

Exchange rate appreciation in capital-receiving countries, induced by easy monetary policy in funding countries, increases the expected net worth of firms in receiving countries and their ability to buy assets. Anticipating this higher liquidity for their assets, corporations in capital-receiving countries lever up, and neglect alternative sources of debt capacity such as maintaining the pledgeability of their cash flows. When monetary policy in source countries tightens, receiving country exchange rates depreciate, and liquidity dries up in their corporate sector even if country prospects are sound. Since pledgeability has been neglected, debt capacity plummets, leading to a sudden stop in funding and subsequent financial distress. Exchange rate intervention by recipient countries to slow appreciation (and depreciation) may improve outcomes.

JEL Classification E52 · E58 · F33 · F34 · G34 · G38 · O16

A vast body of research since the Global Financial Crisis of 2007–2008 suggests that easy monetary policy in source funding currencies appears to be transmitted to receiving countries via currency appreciation, a rise in borrowing, and an increase in asset prices. [1] This then sets in place the conditions that lead to financial fragility. Nevertheless, if

[1] See, for example, Avdjiev and Hale (2018), Baskaya et al. (2017), Borio (2014), Brauning and Ivashina (2017, 2018), Bruno and Shin (2015, 2017), Cesa-Bianchi et al. (forthcoming), Cetorelli and Goldberg (2012), Gabaix and Maggiori (2015), Han and Wei (2016), Ioannidou et al. (2015), Ivashina et al. (2015), Jiang et al. (2018), Jiménez et al. (2014), Jordà et al. (2018), Kalemli-Ozcan et al. (2018), Obstfeld and Taylor (2017), Prasad (2014), Rey (2013), and Schularick and Taylor (2012).

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borrowing and lending are rational, why do market participants lever up under these conditions? Why do financing conditions change so suddenly – is this about fundamentals? What can country authorities do to reduce the associated systemic risks?

To shed further light on these issues, we describe a model of domestic corporate financing based on Diamond et al. (forthcoming), which we will subsequently use to discuss the effects of monetary policy, capital flows, and exchange rates on the corporate sector.[2] The key element in the model is that sustained expectations of high future liquidity [in the Shleifer and Vishny (1992) sense that potential asset buyers are wealthy and can pay high prices for corporate assets] can incentivize the corporate sector to lever up. The combination of high leverage and high expected liquidity reduces corporate incentives to maintain high levels of corporate governance. The fall-off in governance is not a problem when high liquidity is sustained, but does become problematic when liquidity falls off, since there is then very little supporting the ability of corporations to borrow. Put differently, high expectations of liquidity create the conditions where corporations become dependent on liquidity to roll over their debt. When it does not materialize, they experience a sudden stop. Note that this can occur even if economic prospects for corporations are still bright.

Let us be more specific about this model, after which we will explain the role of source country monetary policy, capital flows, and exchange rates. Consider an economy where expert managers are needed to produce cash flow from assets we call firms. A number of existing firms are run by expert incumbents. There are also other experts around (those have the knowledge to run firms as efficiently as the incumbents), and there are financiers who do not really know how to run firms but have funds.

Financiers have two sorts of control rights: control through the right to repossess and sell the underlying asset being financed if payments are missed, and control over the cash flows generated by the asset. The first right only requires the frictionless enforcement of property rights in the economy, which we assume. This right is particularly valuable when a large number of capable potential expert buyers are willing to pay a high price for the firm's assets. Greater wealth among experts (which we term *liquidity*) increases the availability of this *asset-sale-based* financing.

The second type of control right is conferred on creditors by the firm's incumbent manager as she makes the firm's cash flows more appropriable by, or pledgeable to, creditors over the medium term – for example, by improving accounting quality or setting up escrow accounts so that cash flows are hard to divert. We assume enhancing pledgeability takes time to set up but is also semi-durable (improving accounting quality is not instantaneous because it requires adopting new systems and hiring reputable people; equally, firing a reputable accountant or changing accounting practices has to be done slowly, perhaps at the time the accountant's term ends, if it is not to be noticed). So the incumbent manager sets pledgeability one period in

[2] Related papers include Borio (2014), Dow et al. (2005), Eisfeldt and Rampini (2006, 2008), Gennaioli et al. (2015), Krishnamurthy and Muir (2017), Rampini and Viswanathan (2010), and Shleifer and Vishny (1992, Shleifer and Vishny 2011).

advance, and it lasts a period. Higher pledgeability enables future incumbent managers to borrow more against cash flows from financiers.

In general, an increase in experts' prospective wealth (that is, liquidity) as well as in their ability to borrow against the future cash flows of the firm (that is, pledgeability) will increase their bids for the firm. In turn, higher prospective bids will increase debt recovery, and thus the willingness of creditors to lend up front. It therefore follows that *higher liquidity and pledgeability increase debt capacity*.

However, pledgeability is endogenously determined. Consider the incentives of an incumbent firm manager while choosing cash flow pledgeability for the next period. We assume that she may need to sell some or all of the firm next period with some probability, either because she is no longer capable of running it or because she needs to raise capital for new investment. If she owned the firm and had no debt claims outstanding, she would undoubtedly want to increase pledgeability, especially if the direct costs of doing so are small – this would simply increase the amount that she would obtain by selling the firm to experts if she lost the ability to run the firm. If she has taken on debt, however, enhancing *cash flow pledgeability* is a double-edged sword. Higher bids from experts also allow existing creditors to collect more if the incumbent stays in control because creditors have the right to seize assets and sell them when not paid in full. In such situations, the incumbent has to "buy" the firm from creditors by outbidding experts (or paying debt fully). The higher the probability that the incumbent retains ability and stays in control, lower her incentives to raise pledgeability. *Also*, *the higher the outstanding debt, the lower the incumbent's incentives to raise pledgeability.*

Now consider the effect of future liquidity on pledgeability choice. If experts are rational, they will never pay more for the firm than its fundamental value. When future liquidity turns out to be very high, experts will have enough wealth to buy the firm at full value without needing to borrow more against the firm's future cash flows. If so, higher pledgeability has no effect on how much experts will bid to pay for the firm. In other words, *high future liquidity crowds out the need for pledgeability* in enhancing debt repayments. We therefore have two influences on pledgeability – the level of outstanding debt and the anticipated liquidity of experts. Now consider the interaction between the two.

Suppose that booms, during which where experts will have plenty of wealth, are anticipated with high probability. Repayment of any corporate borrowing today is enforced by the potential high resale value of the firm – at the future date, wealthy experts will bid full value for the firm as in Shleifer and Vishny (1992), without needing high pledgeability to make their bid. The high anticipated resale value increases the promised payment that a firm can credibly repay and thus the amount it can borrow today [see Acharya and Vishwanathan (2011)].

Since pledgeability is not needed to enforce repayment in a future highly liquid state, a high probability of such a state encourages creditors to lend large amounts to the incumbent up front, even though they know that doing so crowds out the incumbent's incentives to enhance pledgeability, and even if there is a possible low-liquidity state in which pledgeability is needed to enhance creditor rights. *Prospective liquidity thus encourages borrowing, which can crowd out pledgeability.* Consequently, if the low-liquidity state is realized, the enforceability of the firm's debt, as well as its borrowing capacity, will fall significantly because pledgeability has been

set low. Experts, also hit by the downturn, no longer have much personal wealth, nor does the low-cash-flow pledgeability of the firm allow them to borrow against future cash flows to pay for the firm. Unable to raise funds to repay debt, the firm gets into financial distress even if the firm's earning potential is still high. Credit spreads rise substantially, and they will stay high till the firm raises pledgeability, which will take time, or liquidity rises again in the economy, which could take even longer. The neglect of pledgeability because of high leverage taken on anticipating high liquidity makes the recovery difficult and drawn out.

So far, so domestic. Let us summarize the ingredients. There is up-front competition for assets, and experts with limited wealth borrow as much as possible (against the firm's assets) to successfully bid for the asset. Lenders get their debt paid via two channels: the pledgeability that successful bidders will set after taking over the firm and the anticipated liquidity of possible future bidders. A sharp increase in anticipated liquidity both enhances up-front borrowing, as well as depresses the pledgeability that is set. The firm's debt capacity becomes more dependent on continued liquidity, which makes it subject to sudden stops in borrowing when that liquidity dries up, even if revenue generating prospects are sound.

Let us now situate this firm in an emerging market (or a peripheral European country). We add three more ingredients which we justify later based on the vast emerging evidence. First, domestic companies in the emerging market, even those with limited foreign revenues, have a substantial amount of outstanding borrowing from source countries, or denominated in the currency of those countries even if sourced elsewhere. The source country is typically the USA and the currency the dollar, though our point is more general [see, for example, Gopinath and Stein (2018) for why domestic companies may take on foreign currency debt]. Second, easier (tighter) monetary policy in the source country gets transmitted into domestic currency appreciation (depreciation) in the capital-receiving emerging market [see Eichenbaum and Evans (1995), Bruno and Shin (2015)]. To the extent that experts are domestic firms in the emerging market that already have foreign currency borrowing, this means their net worth, and hence their liquidity, will be anticipated to increase as the domestic currency value of foreign borrowing diminishes. To the extent that monetary policy in source countries reacts aggressively to low domestic growth but normalizes only after extended periods, especially in an era of low inflation [see Borio and White (2004)], the capital flows to, and currency appreciation in, the emerging market could be substantial [see Cesa-Bianchi et al. (forthcoming) for the detailed evidence on currency appreciation and asset price growth around an international credit supply shock]. Anticipated liquidity in the emerging market could be enhanced significantly, facilitating higher borrowing, higher domestic asset prices, and resulting in neglected pledgeability. Indeed, as lenders rely on clearly observable liquidity rather than pledgeability for debt recovery, more lending will be at arm's length or cross-border, and more traditionally poorly governed firms will be financed.

At some point, source country's monetary policy will normalize – the third ingredient. Tighter source country policy will lead the emerging market currency to depreciate, and thus lead to lower rather than higher corporate liquidity. Moreover, leverage is much higher at the onset of tightening, because lenders have been anticipating a high probability of continued liquidity. Repayment and

the capacity to roll over debt will fall, not only because liquidity is lower, but also because pledgeability has been neglected. The combination of high outstanding leverage and a plunge in debt capacity will mean net borrowing potential (= debt capacity – outstanding debt) can turn negative. If there is substantial preexisting short-term borrowing, the fall in debt capacity can precipitate a run, and thus force the firm into immediate distress. All lenders, both domestic and foreign, will be reluctant to lend given the sharply diminished borrowing potential.

In sum, while the collapse in prospective liquidity may originate with a change in the source country monetary stance, it need have nothing to do with macroeconomic policies in the emerging market, and the credibility or lack thereof. Put differently, the boom and bust in the emerging market could be a genuine spillover from the source country policy. Of course, it is also possible that the domestic credit boom in the emerging market contains the seeds of its own destruction [see, for example, Kiyotaki and Moore (1997)]. Our effects would then exacerbate the credit cycle.

Standard nostrums – let the domestic exchange rate adjust, for example – do not work as well here. Indeed, the fluctuations in the exchange rate are the predominant reason for the fluctuations in corporate liquidity. Instead, our model suggests why the "fear of floating" among EM policy makers described by Hausmann et al. (2001) and Calvo and Reinhart (2002) is rational, and why EM central banks lean against the wind of exchange rate fluctuations, trying to slow currency appreciation by building reserves, and slow depreciation by supporting the currency. Hofmann et al. (2019) offer evidence showing that such intervention also smooths the growth of corporate borrowing, a fundamental prediction of our model. Of course, such intervention exacerbates moral hazard (corporations face a lower risk of borrowing in foreign currency once the central bank smooths currency volatility) which is why some emerging markets like China and India try and control corporate foreign borrowing also. All this suggests why capital account openness has not been an unmitigated blessing for emerging markets [see Prasad, Rajan, and Subramanian (2007)].

Could we do better? Could there be a way of mitigating spillovers, and reducing their consequences? Industrial countries tend to blame emerging markets for their poor policies and their inability to use capital well, whereas emerging markets accuse industrial countries of being focused on resolving domestic problems through aggressive monetary easing while ignoring the resulting international spillovers. In an integrated world, we need policies that work for all, which allow industrial countries to address domestic problems while limiting adverse international spillovers. This probably requires shifts in both sending and receiving country policies, and a role for the IMF as an arbiter. We describe how we might get policies that embed the true spirit of multilateralism.

The rest of the paper is as follows: In Sect. 1, we lay out the framework for the model, followed by two motivating examples in Sect. 2. In Sect. 3, we solve the model formally. In Sect. 4, we examine how greater ex ante liquidity would affect the implications of the model, as also how intermediation might affect results. In Sect. 5, we examine the scope for multilateralism, and then conclude in Sect. 6.

1 The Framework

1.1 The Economy and States of Nature

Consider an open economy with three dates (0, 1, 2) and two periods between these dates, with date t marking the end of period t. We assume the underlying economic conditions in the economy do not vary with source country monetary policy – this is a strong assumption, but only made to focus attention on spillovers from monetary policy.[3] The state s_1 is determined by the stance of source country monetary policy set in period 1, being accommodative A with probability q and tight T with probability $1-q$. This stance continues into period 2.

1.2 Agents and the Asset

There are two types of agents in the economy. *Experts* (E) have high ability to produce with an asset, which we call the firm. Some mutual specialization is established over the period between the incumbent manager and the firm, which creates a value to incumbency. Therefore, in period t, only the expert manager in place at the beginning of that period can produce cash flows C_t with the asset over the period. *Financiers* cannot produce cash flows but have funds to lend provided they break even. All agents are risk neutral. We ignore time discounting, which is just a matter of rescaling cash flows.

A high-ability expert manager retains her ability into the next period with probability $\theta < 1$; otherwise, she loses her ability and cannot produce cash flows in the future. Think of θ as the degree of firm stability. Intuitively, the critical capabilities for success are likely to be stable in a mature firm, or in a firm in an economy with little technological innovation. However, in a young firm that has yet to settle into its strategic niche or in an economy with significant innovation, the critical capabilities for success can vary over time. A manager who is appropriate in a particular period may be ineffective in the next. This is the sense in which an incumbent can lose ability which occurs with higher probability in a young firm or a changing economy. An alternative interpretation is that $(1-\theta)$ is the probability of arrival of an investment opportunity or a funding need, in which case stability θ under that interpretation would be the degree to which the firm has no future funding needs.

The incumbent's loss of ability in the next period becomes known to all shortly before the end of the current period. Loss of ability is not an economy-wide occurrence and is independent across managers. So even if a manager loses her ability, a large number of other experts are equally able to take her place next period. If a new expert takes over at the end of the current period, she will shape the firm according to her idiosyncratic management style, producing cash flows with the firm's assets in future periods in good states.

[3] See Diamond et al. (forthcoming) for the more general analysis.

1.3 Financial Contracts

Manager can raise money from financiers against the asset by writing one-period financial contracts. We focus on debt contracts with promised payments at the end of period t, denoted by D_t.

Having acquired control of the firm, the incumbent manager would like to keep the realized cash flow for herself rather than share it with financiers. Two types of control rights force the manager to repay the external claims. First, the financier automatically gets paid the "*pledgeable*" portion of the cash flows produced over the period, up to the amount of the financier's claim. Second, just before the end of the period, the financier has the right to seize and auction the firm to the highest bidder if he has not been paid in full. As in Hart and Moore (1994), giving financiers this right in case of default can induce the borrower to pay more than the pledgeable cash flow this period. Below, we describe these two control rights in more detail.

1.4 Control Rights over Cash Flow: Pledgeability

Let us define cash flow *pledgeability* as the fraction of realized cash flows that are automatically directed to an outside financier. The incumbent chooses pledgeability this period. It is then embedded by next period, and persists for the entire period. Thus, *pledgeability* γ_{t+1} set in period t is the fraction of period $t+1$'s cash flows that can be automatically paid to outside financiers.

A manager can tunnel cash flows out of the firm and into her pocket in a number of ways. Increasing pledgeability means closing off tunnels for cash flows generated by a future manager. For example, by moving to a simpler corporate structure today, or by making contracts under more transparent and stricter rules on dealing with counterparties, the incumbent ensures future cash flows cannot be diverted to some nontransparent entity [see, for example, Rajan (2012)]. By improving the quality of the accounting systems in place, including the detail and timeliness of disclosures, and by hiring a reputable auditor, the incumbent restricts the scope for future managers to play accounting games to hide cash flows. Any rapid shift from transparent accounting procedures to less transparent procedures, or from a reputable auditor to a less reputable auditor, would be noticed and invite closer scrutiny, defeating the objective of tunneling. Similarly, by taking on debt with strict financial covenants, such as minimum liquidity ratios, minimum collateral requirements, or sinking fund requirements, the incumbent ensures that the firm is positioned to raise new debt with similar tough covenants when the current debt matures, giving future lenders the confidence that cash flows will not be tunneled. More broadly, any structure that enhances future corporate governance and cannot be fully reversed quickly increases future pledgeability.

The range of feasible pledgeability levels is $\gamma_{t+1} \in [\underline{\gamma}, \bar{\gamma}]$, where $\underline{\gamma}$ and $\bar{\gamma}$ satisfy $0 \leq \underline{\gamma} < \bar{\gamma} \leq 1$. While the laxity of the general governance environment in a country determines $\underline{\gamma}$, the scope for an individual corporation to improve on it determines $\bar{\gamma}$, which in turn is determined by the economy's institutions supporting corporate

governance (such as regulators and regulations, investigative agencies, laws, and the judiciary). Setting $\gamma_{t+1} > \underline{\gamma}$ costs $\varepsilon \geq 0$. We present results primarily for the case in which $\varepsilon \to 0$; positive ε only alters the results quantitatively. While any level of pledgeability between $\underline{\gamma}$ and $\bar{\gamma}$ is feasible, in equilibrium the incumbent will choose either $\gamma_{t+1} = \underline{\gamma}$ or $\gamma_{t+1} = \bar{\gamma}$ because, as will be clear shortly, the incumbent's payoff is always linear in pledgeability γ_{t+1}. To keep the analysis simple, we will assume the date-1 pledgeability set in an un-modeled period 0 is $\gamma_1 = 0$, so none of C_1 can be pledged to lenders. Our attention will focus on how the period-1 incumbent sets γ_2.

1.5 Control Rights over Assets: Auction and Resale

If creditors have not been paid in full from the pledged cash flows and any additional sum the incumbent voluntarily pays, then they get the right to auction the firm to the highest bidder at date t. One can think of such an auction as a form of bankruptcy. The incumbent manager who has failed to make the full payment may also bid in this auction. Therefore, the incumbent can retain control by either paying off the creditors in full (possibly by borrowing once again against future pledgeable cash flows) or by paying less than the full contracted amount and outbidding other bidders in the auction. The precise format of the auction does not matter, so long as what the incumbent is forced to pay rises with what other bidders are willing to bid. We assume that the incumbent can always bid using other proxies, so contracts that ban the incumbent from participating in the auction after nonpayment are infeasible. Essentially by doing so, as in Hart and Moore (1994), we rule out "take-it-or-leave-it" threats from the lender that would allow him to extract all the cash the incumbent has without invoking the outside option of selling the asset to others.

1.6 Wealth or Liquidity

Let ω_1^{E,s_1} and ω_1^{I,s_1}, respectively, be the wealth levels of the experts and incumbent in monetary state s_1 (Fig. 1), with the former also termed *liquidity* [in the Shleifer and Vishny (1992) sense]. We assume that nonincumbent experts own firms that have outstanding debt denominated in the source country currency. So an easier monetary stance in the source country (e.g., the USA) leads the domestic currency to appreciate, and thus the date-1 net worth of experts to increase. The experts have more net worth/wealth/liquidity with which to bid when the source country monetary policy is accommodative in period 1 than when it is tightened, so $\omega_1^{E,A} \geq \omega_1^{E,T}$. This will be critical in our analysis. The wealth of the incumbent at date 1 is augmented by the unpledged cash flows she generates within the firm C_1. To simplify the cases we need to examine, we assume that the wealth the incumbent has access to in each state exceeds that of the expert so $\omega_1^{I,s_1} = C_1 \geq \omega_1^{E,s_1}$. Diamond et al. (forthcoming) study the full model under other assumptions on wealth.

We assume that at date 0, the firm is put together by a founder who has to sell. The reason for this sale is unimportant – the founder may want to retire, may have lost ability, or may be bankrupt in which case the firm is being sold by the receiver. All that matters is she sells out entirely and thus wants the highest price. To simplify

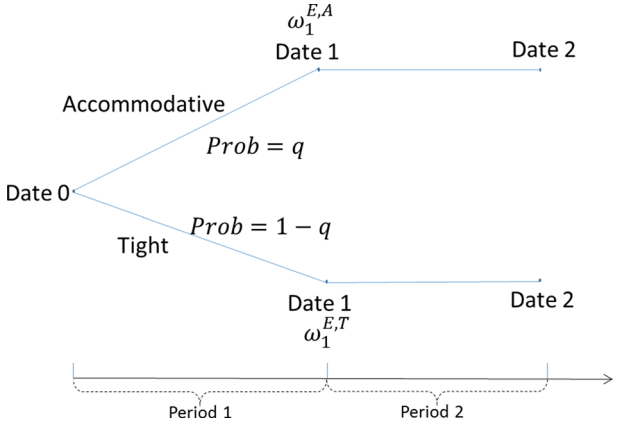

Fig. 1 Monetary stance in source country and expert liquidity in receiving country

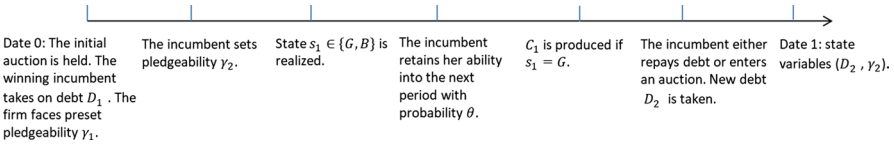

Fig. 2 Timing and decisions in period 1

notation, we for now assume that each bidder must always raise the largest amount from financiers to avoid being outbid. A sufficient condition to guarantee this is that all potential bidders have no wealth at date 0 and compete by promising creditors the largest possible payment that is credible. We will come back to this issue later.

1.7 Timing

The timing of events is described in Fig. 2. After the initial auction, the incumbent takes on debt D_1 that is due at date 1. We assume that the incumbent sets pledgeability γ_2 only knowing the probability of monetary states A and T. Next, the state is realized, and her ability in period 2 is known. Production then takes place. The incumbent either pays the remaining balance due or enters the auction. The period ends with a new incumbent potentially in place.

2 Two Motivating Examples

In this section, we develop two examples where we illustrate three effects that together constitute the core of our results. First, both high pledgeability and higher anticipated liquidity weakly enhance enforceable debt repayment. Second, higher outstanding debt reduces the incumbent's incentives to set high pledgeability. Third,

higher anticipated liquidity reduces the need for high pledgeability in enforcing debt repayment. Taken together, these three effects imply that higher anticipated liquidity may incentivize the incumbent to take so much debt that she neglects pledgeability, but this may be the debt level that allows her to borrow the most up front. Thus, higher anticipated liquidity enhances leverage and crowds out pledgeability.

Let the parameters for the examples be given as follows: $C_2=1$, $\theta=0.5$, $\underline{\gamma}=0.3$, $\bar{\gamma}=0.6$, $\omega_1^{I,A}=C_1=\omega_1^{I,T}=0.8$, $\omega_1^{E,T}=0$, $\gamma_1=0$, $q=0.8$, and $\varepsilon \to 0$.

Example 1 Low anticipated liquidity: $\omega_1^{E,A}=0.2$.

Debt repayment at date 1 is enforced by the lender, who can seize the firm and auction it to experts. The incumbent has to either pay the amount due or match the auction price, and will choose to pay the lower of the two, defaulting strategically if the anticipated auction price is less than the debt payment. Of course, if the incumbent loses ability, she has no option but to sell in an auction since she cannot run the firm. She will use the auction proceeds to pay debt.

Raising the pledgeability of date-2 cash flows can increase the amount that experts can borrow against the firm at date 1 and (weakly) increase their bids for the firm's assets. Similarly, higher realized expert wealth or liquidity at date 1 will also increase expert bids. In state A, an expert can bid using her personal wealth 0.2 and the amount that she can borrow against date-2 cash flows. If period-2 pledgeability has been set high (this is set earlier in period 1 before the state is known), then she can borrow 0.6 times the date-2 cash flow of one and therefore will bid up to 0.8 in total. If pledgeability has been set low, the amount she can borrow against date-2 cash flows falls to 0.3, in which case she can only bid up to 0.5. In state T where her wealth is zero, the expert can bid only up to 0.6 if pledgeability has been set high and 0.3 if set low. In sum, *both higher liquidity and higher pledgeability increase expert bids, and thus enforce greater repayment*. Note that all of these bids fall below one, the value of the future (date-2) cash flows from the asset, which means that the asset is underpriced and an expert who acquires the asset will enjoy some positive rents.

Now let us examine the effect of higher debt on the incumbent's pledgeability choice. Consider first an incumbent manager's choice when she owns the entire firm and has no debt due at date 1. In this case, since the incumbent who retains ability pays nothing to retain control of the firm, the pledgeability choice will have no effect on how much she has to pay to remain in control of the firm. On the other hand, if the incumbent manager loses ability and needs to sell the firm, higher pledgeability will increase expert bids by 0.3 and thus the selling price in both state A and state T by 0.3. If the cost of increasing pledgeability is small, as assumed, the incumbent will invariably choose to increase pledgeability.

Consider next the case in which the incumbent manages an identical but highly levered firm with payment of 0.8 due on date 1. In this case, the incumbent does not benefit from high pledgeability when she loses ability, because the proceeds from selling the asset must first be used to repay the outstanding debt. Since expert bids never exceed 0.8 (the bid in state A with high pledgeability), debt consumes all

of the auction proceeds. However, since higher pledgeability will increase expert bids by 0.3, it will increase by 0.3 the amount that the incumbent manager has to pay to stay in control when she retains ability. To see this, note that the incumbent can retain control either by fully repaying the outstanding debt of 0.8 or by defaulting strategically and outbidding other experts in the auction. High pledgeability increases experts' bids by 0.3 in both states A and T, implying that the incumbent has to pay 0.3 more in either state. Given she retains ability with probability $\theta = 0.5$, raising pledgeability reduces her expected payoff by 0.15.

In subsection IIIB, we formally show that there is a maximum level of date-1 debt payment (between 0 and 0.8) that still leaves the incumbent with incentives to increase future pledgeability. We will see that this intermediate debt payment allows the borrower to commit to repay the most to financiers and thus allows them to raise the most up front. The point, however, is that *higher debt reduces the incumbent's incentives to raise pledgeability*.

Example 2 High anticipated liquidity $\omega_1^{E,A} = 0.8$.

Suppose now that the anticipated liquidity in state A increases to 0.8. The increased net worth enables the expert to bid up to 1.4 in state A when pledgeability has been set high and 1.1 when pledgeability has been set low. In either case, she will bid no more than one, the full value of the future cash flows, C_2, generated by the asset. Given that the expert can bid that amount even if pledgeability were set low, higher pledgeability has no effect on the expert bid and hence on debt recovery at date 1 in state A. In effect, *high anticipated liquidity crowds out the need for pledgeability*. Ex ante, when the incumbent manager chooses pledgeability in period 1 prior to the aggregate state being realized, her incentives for setting higher pledgeability can come only from state T.

We will see later that at the promised date-1 debt payment in state T of 0.45, the incumbent is indifferent between setting pledgeability low or high: when she loses ability, she is able to receive $0.6–0.45 = 0.15$ if she set pledgeability high but gets nothing if she set it low, whereas when she retains ability, she has to pay 0.45 if she had set pledgeability high but only 0.3 if she had set it low. The expected benefits and costs balance when promised debt is 0.45, since the probability that she loses ability is 0.5. At any higher debt she would set pledgeability low. In sum, when anticipated liquidity $\omega_1^{E,A}$ is high, 0.45 is the highest level of debt that incentivizes high pledgeability.

Unlike in Example 1, this is no longer the debt level that enables the incumbent to commit to repay financiers the most and thus raise the most up front. If the incumbent borrows at date 0 by setting date-1 debt payment at one, she will set pledgeability low, fully repay the debt in state A (which happens with probability 0.8), but default in state T, in which case creditors will only recover 0.3. Expecting this, risk-neutral creditors will be willing to extend a risky loan amount of 0.86, with face value one. By contrast, by setting the face value at 0.45, the incumbent can only borrow 0.45 up front. Thus, *high anticipated liquidity enhances leverage, which crowds out pledgeability*. In the next section, we analyze all this more formally.

3 Solving the Model

We now analyze the model formally. Because the economy ends after date 2, both the high-ability expert as well as the incumbent who retains ability can commit only to repay $D_2 = \gamma_2 C_2$ at date 2, where γ_2 is the pledgeability set by the incumbent in period 1. As a result, they can borrow up to $D_2 = \gamma_2 C_2$ when bidding for control at date 1. In subsection IIIA, we impose parametric assumptions that resemble the economy after a period of sustained prosperity (as in Example 2). We show that if prosperity is likely to continue, high anticipated liquidity supports high leverage and leads to low pledgeability choice. If prosperity does not continue and liquidity falls, access to finance will drop more than proportionally.

3.1 The Economy after a Period of Prosperity

In this subsection, we formalize the analysis highlighted in Example 2 with more general parameters. The following parametric assumptions allow us to focus on a case that highlights a key result of the paper.

Assumption 1

a. $\omega_1^{E,A} + \underline{\gamma} C_2 \geq C_2$

b. $\omega_1^{E,T} + \underline{\gamma} C_2 < C_2$

Assumption 1a ensures that in the accommodative state A, liquidity is high enough that experts can afford to pay the full price of the asset at date 1 even if pledgeability is set as low as $\underline{\gamma}$. Experts have wealth $\omega_1^{E,A}$ and can borrow up to $\underline{\gamma} C_2$. Their maximum bid is therefore $\omega_1^{E,A} + \underline{\gamma} C_2$, which exceeds the full value of the asset C_2. Assumption 1b ensures there is lower liquidity in the tightening state T, so that experts cannot bid the full value of the asset if pledgeability is set low. We now solve the model backwards, having already determined what happens in period 2.

3.1.1 Date 1

Consider now the payments and decisions made in period 1. We focus on a high-ability incumbent's incentive in setting pledgeability and how it is affected by the promised payment D_1. We then solve for the maximum amount a high-ability manager can raise, and therefore bid, at date 0.

Because date 1 pledgeability γ_1 is assumed zero, the incumbent does not make any payment until date 1. In any date-1 auction, to retain control, the incumbent needs to either pay off her debt entirely or outbid experts in the date-1 auction. Next, we show how experts' bids are affected by the incumbent by the choice of pledgeability γ_2.

3.2 Experts' Bid

In any auction for the firm held at date 1 in state $s_1 \in \{A, T\}$, experts bid using their date-1 wealth ω_1^{E,s_1} and the amount of future cash flows $\gamma_2 C_2$ that can be borrowed at date 1. Therefore, the total amount that they each can bid is $\omega_1^{E,s_1} + \gamma_2 C_2$. Of course, they will not bid more than the total value of future cash flows C_2. So the maximum auction bid at date 1 is $B_1^{E,s_1}(\gamma_2) = \min\left[\omega_1^{E,s_1} + \gamma_2 C_2,\ C_2\right]$. To retain control, the incumbent pays the minimum of the debt or outbids experts. That is, she pays $\min\left\{D_1, B_1^{E,s_1}(\gamma_2)\right\} = \min\left\{D_1, \omega_1^{E,s_1} + \gamma_2 C_2,\ C_2\right\}$. Clearly, through the choice of pledgeability, γ_2, the incumbent can potentially affect the amount of payment needed for her to stay in control.

Note that higher pledgeability is valuable only if there is *potential underpricing*, a positive difference between the present value of future cash flows accruing to an expert if he buys the firm and the amount that he can bid if the incumbent has set period-2 pledgeability low. The underpricing equals $C_2 - B_1^{E,s_1}(\underline{\gamma}) = \max\left\{\left(1 - \underline{\gamma}\right)C_2 - \omega_1^{E,s_1}, 0\right\}$ at date 1. By choosing a higher level of period-2 pledgeability, the incumbent can raise the experts' bids above $B_1^{E,s_1}(\underline{\gamma})$, thus reducing underpricing.

3.2.1 Incumbent Bid

The cash that the incumbent has at date 1 is $\omega_1^{I,s_1}=C_1$. If she retains ability, she can also raise funds against period 2's output, $\gamma_2 C_2$. Therefore, the incumbent can pay as much as $B_1^{I,s_1}(\gamma_2) = \min\left\{\omega_1^{I,s_1} + \gamma_2 C_2, C_2\right\}$ to the financier. Comparing $B_1^{I,s_1}(\gamma_2)$ and $B_1^{E,s_1}(\gamma_2)$, we see that the incumbent will outbid experts whenever she has (weakly) more wealth ($\omega_1^{I,s_1} \geq \omega_1^{E,s_1}$), since both parties can borrow up to $\gamma_2 C_2$ if needed. Of course, she will outbid by paying a vanishingly small amount over $B_1^{E,s_1}(\gamma_2)$. The incumbent is always willing to hold on to the asset if she can outbid, since the continuation value of the asset,C_2, is identical for the incumbent and experts.

3.2.2 Pledgeability Choice

Let us now see how the promised payment D_1 affects pledgeability choice. Let $V_1^{I,s_1}(D_1, \gamma_2)$ be the incumbent's payoff in state s_1 when she chooses γ_2. If state s_1 is known to be realized for sure, the incumbent's benefit from choosing high versus low pledgeability is $\Delta_1^{s_1}(D_1) = V_1^{I,s_1}(D_1, \bar{\gamma}) - V_1^{I,s_1}\left(D_1, \underline{\gamma}\right)$. Given the probability of the accommodative state being q, the risk-neutral incumbent will choose high pledgeability for any given D_1 if and only if $q\Delta_1^A(D_1) + (1-q)\Delta_1^T(D_1) \geq 0$. Below, we solve for V_1^{I,s_1} and $\Delta_1^{s_1}$ separately.

3.2.3 State A – Plentiful Liquidity: Pledgeability Does Not Matter for Repayment (No Potential Underpricing)

Assumption 1a guarantees that $B_1^{E,A}(\underline{\gamma}) = \min\left\{\omega_1^{E,A} + \underline{\gamma}C_2, C_2\right\} = C_2$. In this case, liquidity is sufficiently high that high-ability experts can pay the full price of the asset, even if the incumbent has chosen low pledgeability. Therefore, there is no potential underpricing and raising pledgeability does not change enforceable payments, even while resulting in cost ε. External payments are committed through the high resale price of the asset, and high pledgeability is neither needed nor desired by anyone. No incentive to raise pledgeability can emanate from this state – liquidity crowds out pledgeability.

Lemma 1 *Given Assumption 1a and the remaining payment* $D_1 \leq C_2$, $V_1^{I,A}(D_1, \gamma_2) = C_2 - D_1 - \varepsilon \cdot 1_{\gamma_2 > \underline{\gamma}}$ *for* $\gamma_2 \in \left[\underline{\gamma}, \bar{\gamma}\right]$. *Therefore,* $\Delta_1^A\left(D_1\right) \equiv -\varepsilon$ *for any* D_1.

In words, if state A were to occur for sure, the incumbent would lose ε for sure by choosing high pledgeability over low pledgeability. Now consider the incentives arising from state T.

3.2.4 State T – Tightness: Higher Pledgeability Increases Repayment and Reduces Potential Underpricing

Assumption 1b implies that liquidity in state T is limited, so that the firm is *potentially underpriced.* Thus, there are potential rents to high-ability experts in the auction. Moreover, since we assumed $\omega_1^{I,T} \geq \omega_1^{E,T}$, and both the incumbent and experts can borrow up to $\gamma_2 C_2$ in the date-1 auction, the incumbent can outbid the experts regardless of her choice of pledgeability. In this case, if the incumbent retains ability, she receives output C_2 but repays $\min\left\{D_1, B_1^{E,T}(\gamma_2)\right\}$ to stay in control for net continuation payoff $C_2 - \min\left\{D_1, B_1^{E,T}(\gamma_2)\right\}$. By contrast, if she loses her ability and has to sell the firm at price $B_1^{E,T}(\gamma_2)$, her continuation payoff is $B_1^{E,T}(\gamma_2) - \min\left\{D_1, B_1^{E,T}(\gamma_2)\right\}$. The incumbent's payoff in state B is thus $V_1^{I,T}\left(D_1, \gamma_2\right) = \theta\left(C_2 - \min\left\{D_1, B_1^{E,T}(\gamma_2)\right\}\right) + (1-\theta)\left(B_1^{E,T}(\gamma_2) - \min\left\{D_1, B_1^{E,T}(\gamma_2)\right\}\right) - \varepsilon 1_{\left\{\gamma_2 > \underline{\gamma}\right\}}$, which is a weighted average of the payoff if she retains her ability and stays in control and the payoff if she loses ability and has to sell the firm. Note that a higher γ_2 (weakly) increases the amount the incumbent has to pay the financier when she retains ability and control, therefore (weakly) decreasing the first term, while it (weakly) increases the amount the incumbent gets in the auction if she loses ability, thus (weakly) increasing the second term. In choosing to increase γ_2, the incumbent therefore trades off higher possible repayments when she *buys* the firm from the lender against higher possible resale value when she *sells* the firm after losing ability. Clearly, she chooses $\gamma_2 = \bar{\gamma}$ if and only if

$$\theta\left(C_2 - \min\left\{D_1, B_1^{E,T}(\bar{\gamma})\right\}\right) + (1-\theta)\left(B_1^{E,T}(\bar{\gamma}) - \min\left\{D_1, B_1^{E,T}(\bar{\gamma})\right\}\right) - \varepsilon$$
$$\geq \theta\left(C_2 - \min\left\{D_1, B_1^{E,T}\left(\underline{\gamma}\right)\right\}\right) + (1-\theta)\left(B_1^{E,T}(\underline{\gamma}) - \min\left\{D_1, B_1^{E,T}\left(\underline{\gamma}\right)\right\}\right), \tag{1}$$

where the left-hand side is the incumbent's continuation value if she chooses $\gamma_2 = \bar{\gamma}$, while the right-hand side is the continuation value if she chooses $\gamma_2 = \underline{\gamma}$.

Importantly, a higher outstanding promised payment D_1 reduces the incumbent's incentives to choose higher γ_2. This result can be easily seen from inequality (1). When $D_1 \geq B_1^{E,T}(\bar{\gamma})$, the inequality reduces to $\theta\left(C_2 - B_1^{E,T}(\bar{\gamma})\right) - \varepsilon \geq \theta\left(C_2 - B_1^{E,T}\left(\underline{\gamma}\right)\right)$, which never holds. In this case, the incumbent always chooses low pledgeability. When $D_1 \leq B_1^{E,T}\left(\underline{\gamma}\right)$, however, the inequality reduces to $\theta\left(C_2 - D_1\right) + (1-\theta)\left(B_1^{E,T}(\bar{\gamma}) - D_1\right) - \varepsilon \geq \theta\left(C_2 - D_1\right) + (1-\theta)\left(B_1^{E,T}(\underline{\gamma}) - D_1\right)$, which always holds. When $D_1 \in \left(B_1^{E,T}\left(\underline{\gamma}\right), B_1^{E,T}(\bar{\gamma})\right)$, the inequality reduces to $\theta\left(C_2 - D_1\right) + (1-\theta)\left(B_1^{E,T}(\bar{\gamma}) - D_1\right) - \varepsilon \geq \theta\left(C_2 - B_1^{E,T}\left(\underline{\gamma}\right)\right)$ so that high pledgeability $\gamma_2 = \bar{\gamma}$ is chosen if and only if $D_1 \leq D_1^{T,\text{PayIC}}$, where $D_1^{T,\text{PayIC}} = \theta B_1^{E,T}(\underline{\gamma}) + (1-\theta)B_1^{E,T}(\bar{\gamma}) - \varepsilon$. Superscript "PayIC" indicates that the required payment makes the choice of high pledgeability incentive-compatible. Intuitively, with higher debt, more of the pledgeable cash flows are captured by financiers if the incumbent stays in control, and more of the resale value also goes to financiers if the asset is sold. This is the source of moral hazard over pledgeability. Parenthetically, it is easier to incentivize the incumbent, and thus raise the incentive-compatible level of debt, when the probability $(1-\theta)$ with which she loses skill and has to sell is higher. The following lemma thus holds.

Lemma 2 *Given Assumption 1b, it follows that*

$$\Delta_1^T\left(D_1\right) = \begin{cases} -\theta\left[B_1^{E,T}(\bar{\gamma}) - B_1^{E,T}\left(\underline{\gamma}\right)\right] - \varepsilon & \text{if } D_1 > B_1^{E,T}(\bar{\gamma}) \\ \theta B_1^{E,T}\left(\underline{\gamma}\right) + (1-\theta)B_1^{E,T}(\bar{\gamma}) - \varepsilon - D_1 & \text{if } B_1^{E,T}\left(\underline{\gamma}\right) < D_1 \leq B_1^{E,T}(\bar{\gamma}) \\ (1-\theta)\left[B_1^{E,T}(\bar{\gamma}) - B_1^{E,T}\left(\underline{\gamma}\right)\right] - \varepsilon & \text{if } D_1 \leq B_1^{E,T}\left(\underline{\gamma}\right). \end{cases}$$

Moreover, $\Delta_1^T\left(D_1\right) \geq 0$ if and only if $D_1 \leq D_1^{T,\text{PayIC}} = \theta B_1^{E,T}(\underline{\gamma}) + (1-\theta)B_1^{E,T}(\bar{\gamma}) - \varepsilon$.

In Fig. 3, we plot $\Delta_1^T\left(D_1\right)$ against D_1. For $D_1 \leq B_1^{E,T}\left(\underline{\gamma}\right)$, debt repayment is not increased by higher pledgeability because of the low value of outstanding debt.

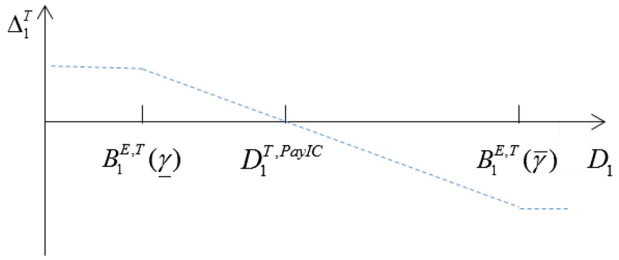

Fig. 3 $\Delta_1^T(D_1)$ as a function of D_1

Instead, higher pledgeability only increases outside bids, which is beneficial when the incumbent loses ability and sells the asset. The benefits of high pledgeability are capped at $(1-\theta)\left[B_1^{E,T}(\bar{\gamma}) - B_1^{E,T}\left(\underline{\gamma}\right)\right] - \varepsilon$. As D_1 rises to $D_1^{T,\text{PayIC}}$, the incumbent has to pay more in expectation to debt holders when she raises pledgeability, so $\Delta_1^T(D_1)$ falls to zero and then turns negative as the face value of debt increases further. When $D_1 > B_1^{E,T}(\bar{\gamma})$, the incumbent has to pay the entire increment in sale price from increasing pledgeability to debt holders when she loses ability – she gets nothing from increasing pledgeability under those circumstances – while she has to pay $B_1^{E,T}(\bar{\gamma})$ instead of $B_1^{E,T}\left(\underline{\gamma}\right)$ if she retains ability. Hence, there is no benefit but only cost to the incumbent by increasing pledgeability, and the cost is capped at $\theta\left[B_1^{E,T}(\bar{\gamma}) - B_1^{E,T}\left(\underline{\gamma}\right)\right] - \varepsilon$.

Given $\Delta_1^A(D_1)$ and $\Delta_1^T(D_1)$, we can check the incumbent's incentive to choose pledgeability for any D_1. Recall that the incumbent will choose high pledgeability if and only if $q\Delta_1^A(D_1) + (1-q)\Delta_1^T(D_1) \geq 0$. Since there is never any incentive to increase pledgeability coming from the future liquid state A, that is, $\Delta_1^A(D_1) \equiv -\varepsilon \approx 0$ for any D_1, the constraint therefore depends on the incumbent's incentive in state T. We thus have the following result:

Proposition 1 *Given Assumptions 1a and 1b, there exists a unique threshold* D_1^{IC} *such that the incumbent manager sets high pledgeability if and only if* $D_1 < D_1^{\text{IC}}$. *Moreover, as* $\varepsilon \to 0, D_1^{\text{IC}} \to D_1^{T,\text{PayIC}}$.

Proof It follows directly from Lemmas 1 and 2. □

The Debt Level that Facilitates the Most Up-front Borrowing

Note that $D_1^{T,PayIC} = \theta\min\left\{\omega_1^{E,T} + \underline{\gamma}C_2, C_2\right\} + (1-\theta)\min\left\{\omega_1^{E,T} + \bar{\gamma}C_2, C_2\right\} - \varepsilon$.

Under Assumption 1b, $D_1^{T,\text{PayIC}}$ is well below C_2, the most that can be paid in state T. As a result, D_1^{IC}, the highest level of debt that provides incentives for high pledgeability, keeping in mind both future states, may not be the face value that allows the

incumbent to borrow the most up front. An alternative choice is for the incumbent to issue debt with face value $B_1^{E,A}(\underline{\gamma}) = C_2$, which she will repay in full in the liquid accommodative state A but only $B_1^{E,T}(\underline{\gamma})$ in the tight state T, because the high face value induces low pledgeability. Even with low pledgeability choice, the incumbent is able to raise $qC_2 + (1-q)B_1^{E,T}(\underline{\gamma})$ at date 0. In contrast, to incentivize high pledgeability, the promised payment cannot exceed $D_1^{\text{IC}} = D_1^{T,\text{PayIC}}$, which will raise $D_1^{T,\text{PayIC}}$ up front. If the difference between C_2 and $D_1^{T,\text{PayIC}}$ is large and if the probability of the good state q is sufficiently high, the incumbent could raise more by setting $D_1 = C_2$. The broader point is that the prospect of a highly liquid future state not only makes greater promised payments feasible, but these payments also eliminate incentives to increase pledgeability that only arises from the low-liquidity state. To restore those incentives, debt may have to be set so low that funds raised are greatly reduced – something the incumbent will not want to do if she is borrowing to bid at date 0 for the firm. Note that this can happen even if the probability of the low state is significant, and even if the direct cost ε of enhancing pledgeability is infinitesimal. Proposition 2 summarizes the results.

Proposition 2 *Given Assumptions 1a and 1b and $\varepsilon \to 0$, and given D_1^{Max} is the face value of the debt that raises the maximum amount at date 0,*

a. *If $qC_2 + (1-q)B_1^{E,T}(\underline{\gamma}) > D_1^{T,\text{PayIC}}$, then $D_1^{\text{Max}} = C_2$. For any promised payment $D_1^{T,\text{PayIC}} < D_1 \leq D_1^{\text{Max}}$, $\gamma_2 = \underline{\gamma}$. For any promised payment $D_1 \leq D_1^{T,\text{PayIC}}$, $\gamma_2 = \bar{\gamma}$.*
b. *If $qC_2 + (1-q)B_1^{E,T}(\underline{\gamma}) \leq D_1^{T,\text{PayIC}}$, then $D_1^{\text{Max}} = D_1^{IC} = D_1^{T,\text{PayIC}}$. For any promised payment $D_1 \leq D_1^{\text{Max}}$, $\gamma_2 = \bar{\gamma}$.*

Interestingly, high debt will not be renegotiated before, or after, the monetary policy state s_1 is realized, even if renegotiation is feasible – it will not be renegotiated before because the level of debt is set to raise the maximum amount possible even if it will result in low pledgeability, and it will not be renegotiated after, because relevant parties will not write down their claims given that pledgeability γ_2 has already been set. Both the fixed promised debt payments across states and the act of choosing pledgeability before the state is known, have the effect of causing a spillover between anticipated states.

3.3 Discussion: The Liquidity Leverage Pledgeability Nexus

In sum, if liquidity is anticipated to be high, the competitive credit market will allow high debt. When borrowers finance with high debt, however, they do not have the incentives to set pledgeability high, even if the direct costs of doing so are small and the probability of a low-liquidity state nonnegligible. Pledgeability is neglected, which nevertheless will be acceptable to lenders who anticipate a high probability of continued high liquidity. Liquidity, asset prices (bids in the auction), and leverage follow each other up, while pledgeability falls. If liquidity does not materialize, access to finance will drop significantly – for debt capacity falls not just because

liquidity has fallen, but because pledgeability has fallen – debt capacity is $B_1^{H,T}(\underline{\gamma})$ instead of C_2. Debt capacity is restored only after a long while, either after liquidity has built back up, or pledgeability is raised which takes time.

Some other points are worth noting. First, in times when prospective liquidity is likely to be high, it is immaterial whether the incumbent being financed has low incentives to raise pledgeability or was incapable of raising it at all. Put differently, when pledgeability is not needed, even poorly governed firms (low and fixed γ) that would not have obtained much financing in times of moderate liquidity, will narrow the financing gap with better governed firms. For the observer, this may look like greater risk taking by lenders or a move to lower quality lending. Lenders may indeed be taking more risk, but they are not making ex ante unprofitable loans.[4] Instead, a rising tide of liquidity lifts all corporate boats.

Another way of thinking about anticipated situations of high liquidity is that the prospect of repaying the high level of debt in full is high enough that both borrowers and lenders neglect the loss given default. Because pledgeability is neglected, the consequences in the low-liquidity state can be much more severe than if initial debt were lower. As a related aside, when the T state is realized, and debt capacity turns out to be low because of low liquidity and low pledgeability, it might seem as if the incumbent neglected the possibility of that state occurring [see, for example, Gennaioli et al. (2015)]. In reality, however, the high level of debt, which optimally taken on in full knowledge of the prospective states, may crowd out pledgeability. There is thus a spillover between states caused by debt, which may subsequently appear as if particular states were neglected. Of course, if participants were behaviorally prone to neglect these states, the effect we document would be further augmented.

Higher anticipated liquidity is not an unmitigated blessing, and can worsen ex post outcomes in less liquid states. Moreover, it can reduce the overall amount raised up front [see Diamond et al. (forthcoming)]. To the extent that government or central bank policies create anticipation of liquidity, these are concerns that have to be kept in mind.

Note also that underinvestment in pledgeability would be more muted if bidders took on less debt at date 0, despite anticipating a high probability of ample liquidity at date 1. Ex ante competition for the underpriced asset forces bidders to fund themselves by borrowing high amounts of debt, and lenders to rationally make these loans, even if this results in higher risk and defaults in some states. Of course, if bidders ex ante had ample amounts of own liquidity with which to bid, they would not need much borrowing to bid the full value of the asset, beyond which they will not further increase the bids. We will explore this more fully in Section IV. This does, however, suggest that sharp increases in anticipated liquidity from current levels tend most to increase bids (asset prices), and leverage to fund these bids.

[4] There is an extensive literature on how easier monetary policy exacerbates risk taking and lending to lower-quality borrowers. See, for example, Bruno and Shin (2015), Ioannidou et al. (2015), Kalemli-Ozcan et al. (2018), Morais et al. (2015), and Paligorava and Santos (2017).

Finally, the link between credit growth, high asset prices, and a higher probability of distress has been noted in the literature starting with the seminal paper by Borio and Lowe (2002). Our model suggests the common driver is anticipated liquidity, which pushes asset prices higher (toward true fundamentals), increases credit growth, and increases the possibility of financial distress by depressing pledgeability.

3.4 Where Does Liquidity Come from: The Case of Cross-Border Lending

The key exogenous variable in the model thus far is ω_1^{E,s_1}, the expert's liquidity in future monetary state s_1. Because "expert" corporations in countries outside the source currency country have currency mismatches – revenues denominated in the domestic currency and significant liabilities denominated in the source currency, these corporations will naturally see their net worth, and hence their liquidity in our definition, wax and wane with source country monetary policy. Specifically, a more accommodative monetary stance in the source country will lead to a steady depreciation of the source currency. This will lead to a steady anticipated rise in the net worth of those who have borrowed in the source currency but have much of their revenues in the domestic currency. To the extent that these constitute most of the experts within a country, it will lead to higher anticipated liquidity in the language of our framework, and therefore an immediate rise in bids for assets/firms financed with increasing amounts of debt. This increase in the availability of finance will also lead to increased investment and growth, though it is not something we focus on in our model.

What is the evidence on experts' liquidity being enhanced by monetary easing in the source country? There is a now vast and growing literature on the effects of source country monetary policies, measures of global risk aversion, and cross-border lending booms. A number of papers (see Claessens and Kose (2018) for a comprehensive survey) make the following points. Lower (higher) US interest rates tend to lead to a persistent depreciation (appreciation) of the dollar both in real and nominal terms, with a maximum impact 24 months after the shock [Eichenbaum and Evans (1995), Bruno and Shin (2015)]. These findings are best documented when the source currency is the US dollar, but similar such results have been noted for other source currencies [see Avdjiev et al. (2018)].[5]

Bruno and Shin (2015) relate the subsequent increase in lending to the receiving "domestic" country (the country of our analysis) to both supply and demand side factors. On the supply side, the fall in risk aversion (as proxied by the decline in the VIX index) that seems to follow a rate cut [see Bekaert et al. (2013)] leads banks to take on more credit risk. On the demand side, domestic firms that already have dollar debt outstanding see a fall in the value of that debt as the dollar depreciates vis a vis the domestic currency. They also experience a reduction in debt service as dollar interest rates fall along with the weakening of the dollar. This gives them unused dollar debt capacity, which they proceed to utilize. In related work, Hofmann et al.

[5] See Bruno and Shin (2017), Cetorelli and Goldberg (2012), Ivashina et al. (2015), McCauley et al. (2015), Shin (2012).

(2019) relate the additional borrowing capacity to domestic exchange rate appreciation: they show that sterilized intervention by the domestic authorities which slows exchange rate appreciation also dampens the expansion in credit to domestic borrowers (they show this is not primarily driven by the crowding out effect of sterilization).

Yet why do domestic "expert" firms in the receiving country borrow in dollars in the first place, even though this exposes many of them to a currency mismatch?[6] An earlier literature [Eichengreen et al. (2007), Goldstein and Turner (2004), Rajan and Tokatlidis (2005)] suggested that when a country frequently relies on inflationary finance, a substantial inflation risk premium is demanded for lending in the domestic currency. To avoid this, firms borrow in dollars. More recently, Gopinath and Stein (2018) argue that trade invoicing in dollars leads households in emerging markets to hold dollar deposits, and banks issuing such deposits may hedge their low-cost dollar deposits by lending to firms in dollars at a discount.[7] Conversely, firms that have access to cheap dollar funding might find it convenient to invoice in dollars, so as to reduce the extent of currency mismatch. Therefore, they argue, dollar invoicing and dollar funding are part of an equilibrium that make dollar assets especially sought after. In a parallel vein, Jiang et al. (2018) build on the special demand for dollar safe assets to argue that foreign firms will issue dollar liabilities, and this will transmit US monetary shocks around the world, as also suggested by Rey (2013).

3.4.1 Spillovers from the Source Country: Exchange Rate, Asset Price, and Credit Booms

Thus far, our model's predictions resemble those of many other models in the literature – models that emphasize the balance-sheet channel or the risk-taking channel of monetary policy transmission [see, for example, Bernanke and Gertler (1995), Borio and Zhu (2012), and Bruno and Shin (2015)]. What is different is that as monetary policy in the source country is likely to remain accommodative, a continued high probability of capital inflows into the receiving country and prospective domestic exchange rate appreciation result in an expectation of high expert liquidity. The conditions encourage greater corporate borrowing to fund projects or acquisitions, and pledgeability gets crowded out. As argued earlier, the differential in access to funding between firms with lower intrinsic governance and those with higher intrinsic governance will also narrow. Lenders' balance sheets will tilt more toward lower quality firms than before, simply as a result of abundant prospective liquidity.

[6] See Brauning and Ivashina (2017) offer evidence suggesting the primacy of dollar-denominated loans in the syndicated cross-border loan market, with much of the dollar borrowing undertaken by firms with modest dollar revenues. Such firms are harmed by dollar appreciation (see Du and Schreger (2014), Kalemli-Ozcan et al. (2016)).

[7] For evidence on trade invoicing in dollars see, for example, Gopinath (2015).

3.4.2 Sudden Stop

Of course, eventually monetary policy in the source country turns to become less accommodative (state T in our example is realized). Certainly, the domestic exchange rate becomes more likely to depreciate, and anticipated continuing capital inflows stop all of a sudden. However, because pledgeability has been neglected, corporate debt capacity also plummets, more so than warranted simply by the fall in liquidity. Debt rollover will become significantly more difficult, and if there is substantial preexisting short-term borrowing, the fall in debt capacity can precipitate an immediate run, and thus force the firm into distress immediately. Therefore, an abrupt cessation of short-term debt rollover, a sudden stop in capital inflows of all maturities, and a sharp forcible reversal in the receiving country's current account deficit will become more probable as the source country's monetary policy tightens (Calvo and Reinhart 2000; Milesi Ferretti and Razin 2000; Edwards 2004; Forbes and Warnock 2012). If the receiving country has not built foreign exchange reserves, which it spends to cushion exchange rate depreciation at this stage, a sharp depreciation will further tighten domestic liquidity, as the net worth of firms that have borrowed in foreign currency erodes further.[8]

There is evidence consistent with this narrative. Gourinchas and Obstfeld (2012) conclude that many crisis episodes were preceded by significant buildups in domestic credit as well as large real appreciations of the currency. They find that across all types of crisis, three variables play a statistically and economically significant role: the ratio of domestic credit to output, the real exchange rate, and the ratio of official reserves to output. Cesa-Bianchi et al. (forthcoming) find that boom–bust episodes are characterized by capital inflows, an appreciation in the domestic exchange rate, rising asset prices, and a large current account deficit just before the peak of the boom, followed by abrupt shifts in all these variables. Kalemli-Ozcan, Liu and Shim (2018) find that firms with higher outstanding foreign debt before an exchange rate appreciation take on yet more debt. Bräuning and Ivashina (2018) show that when US monetary policy tightens, not only does credit from foreign banks to emerging market borrowers tighten, so does credit from local banks, suggesting the problem is about the general creditworthiness of borrowing firms. Of course, the key difference in our narrative relative to other models of crises is the link between exchange rate movements, leverage, and governance or pledgeability. A finding that pledgeability (equivalently, corporate governance, accounting quality, or bank screening and monitoring) in receiving country corporations falls in the face of persistent high liquidity and increasing leverage would be evidence in favor of our model.[9] Note that apart from the interesting exchange rate channel, nothing in our model restricts

[8] Other models could also produce asymmetric reaction to good news and bad news about credit flows. For example, in Veldcamp (2005), the boom phase is slower to pick up because fewer projects are underway and there is therefore less public information about the profitability of projects. The bust is much faster because many projects are underway toward the end of the boom, and information about the emerging bust spreads quickly via its effects on the many projects.

[9] See, for instance, Johnson et al. (2000) for suggestions that governance was lax before the Asian financial crisis.

the phenomenon to capital-receiving countries. Indeed, there is some evidence for the negative correlation between liquidity and pledgeability in the USA after a sustained boom [see the references in Diamond et al. (forthcoming)].

Before we move to possible actions the authorities can take, it is worth noting that none of what we have modeled requires irrationality on the part of either borrowers or lenders. Once we appeal to other models to explain why firms with large domestic revenues borrow in dollars, everything else follows. Competition for assets in the face of rising exchange-rate-induced liquidity pushes up leverage, which eventually crowds out pledgeability, and leaves firms vulnerable to a fall in liquidity. The shift in source country monetary policy eventually delivers that shock. We have also not assumed fire sale externalities whereby borrowers and lenders neglect the effect of large-scale liquidation of assets on asset prices. Both irrationality and externalities could exacerbate the effects we have modeled.

3.4.3 Fear of Floating

Importantly, our explanation of the boom–bust cycle does not rely on excessive optimism about continued liquidity – though that would exacerbate the phenomenon we describe. Therefore, even if countries have experienced this frequently in the past, there is no reason why private sector participants will not be forced by circumstances to repeat it. Intervention may be necessary to disrupt the cycle.

Indeed, emerging markets typically are unwilling to allow sharp nominal exchange rate movements, both on the upside and the downside, which has been termed a "fear of floating" [Calvo and Reinhart 2002; Hausmann et al. 2001)]. The fear of appreciation is sometimes attributed to a fear of de-industrialization and a fall in competitiveness as the exchange rate is allowed to appreciate. The fear of depreciation is attributed to worries about a mismatch in the exchange rate denomination of assets and liabilities. From the perspective of our model, a sustained appreciation lays the seeds for financial fragility, which is then realized in the event of a sharp depreciation. Worries about trade competitiveness need not be the reason receiving country authorities have a fear of floating; attempts to moderate exchange rate movements through exchange rate intervention may be entirely macro-prudential in nature, given the authorities have seen the same movie many times and know how it will end. Certainly, a number of emerging market countries have understood that they should build foreign exchange reserves in the face of a sustained domestic currency appreciation. Since dollar weakness is the typical counterpart of domestic currency strength, such purchases across a number of emerging markets may be seen as a widespread demand for "safe" assets at such times. In reality, it may be an attempt by receiving countries to put sand in the wheels of currency appreciation, even while building a war chest to combat the inevitable depreciation.

Emerging markets therefore acquire financial assets in the source country when interest rates there are low (and asset prices high), only to sell them when rates start moving up (and asset prices fall). This potentially adds to the cost of the "leaning against the exchange wind" strategy, which is why they typically hold short-term financial assets, accepting low interest rates in order to avoid capital losses as they sell when rates rise. Unfortunately, there are few other tools that authorities have

that will not disrupt the domestic economy significantly. Importantly, tighter monetary policy in the receiving country risks shifting the currency composition of corporate borrowing yet further into "cheaper" dollars (and exacerbating the domestic exchange appreciation), while more accommodative policy could encourage excessive domestic credit expansion.

Of course, such "leaning against the wind" can induce moral hazard as corporations, confident that the central bank will moderate currency volatility, take on more unhedged foreign currency-denominated debt. To combat this, some countries limit corporate foreign currency borrowing (India, for example, sets maximum aggregate limits every year).[10] All this goes to say that there are no clean responses to this problem.

The tendency for boom and bust in receiving countries is more pronounced as quiescent inflation makes source country monetary policy accommodative over long periods, as has been the case in recent decades [see, for example, Borio and White (2004)]. From the receiving country's perspective, a commitment to "low for long" in the source country is a commitment to sustained easy liquidity in the receiving country – until it reverses. This implies a substantial build up in leverage and financial fragility. No wonder a variety of emerging market policy makers have expressed concern both at sustained easy policy in source countries, as well as the possibility that these are reversed abruptly. These concerns are not in contradiction, one follows from the other. We will ask in the concluding section whether there is scope for multilateral action here.

4 Ex Ante Liquidity and Intermediary Leverage

Thus far, we have examined the effects of prospective or anticipated liquidity on leverage and pledgeability. We have assumed that experts have little wealth at date 0, and competition forces them to lever up to the hilt as they bid for underpriced corporate assets. Let us now turn to two other issues. First, what if experts had more wealth at date 0? In other words, does the path of liquidity over time matter? To do justice to this question, a full-fledged dynamic model is warranted, but we will try and shed some light on the consequences of ex ante liquidity in our two-period model. Second, most lending is done through financial intermediaries. How does rising liquidity affect intermediation?

4.1 Ex Ante Liquidity

In the previous analysis, we have assumed that the initial bidders always bid less than the present value of future cash flows since moral hazard limits the funds they

[10] Could limitations on leverage obviate the need for exchange rate intervention? Perhaps, but it does place enormous burdens on regulatory authorities to adopt the right regulations. Moreover, there may be many ways in open economies of concealing or evading regulations on foreign currency borrowing. In practice, therefore, some mix of measures will be used so as to avoid overburdening any single one.

can raise against the assets, and they have insufficient wealth up front to make up the difference. A sufficient condition is the initial liquidity,ω_0, equals zero. In this subsection, we relax this assumption and assume $\omega_0 > 0$. We will do comparative static analysis with respect to ω_0. Meanwhile, we keep the earlier assumption that $\omega_1^{E,A} \geq \left(1 - \underline{\gamma}\right) C_2$ so that bidders will pay the full price for the asset in future state A. In this case, $D_1^{IC} = D_1^{T,PayIC}$. Therefore, as discussed earlier, the face value that pledges out the most is either C_2 or $D_1^{T,PayIC}$. Recall that $\underline{l} = qC_2 + (1-q)B_1^{E,T}\left(\underline{\gamma}\right)$ and $\bar{l} = D_1^{T,PayIC}$. The value of the asset to an initial bidder depends on the level of the initial debt D_1. Let it be V. Specifically,

$$V(D_1) = \begin{cases} \bar{V} = q\left(C_1 + C_2\right) + (1-q)\left[C_1 + \theta C_2 + (1-\theta)B_1^{E,T}(\bar{\gamma})\right] & \text{if } D_1 \leq D_1^{T,\text{PayIC}} \\ \underline{V} = q\left(C_1 + C_2\right) + (1-q)\left[C_1 + \theta C_2 + (1-\theta)B_1^{E,T}\left(\underline{\gamma}\right)\right] & \text{if } D_1 > D_1^{T,\text{PayIC}} \end{cases}.$$

Because there is no underpricing in state A, the initial bidder always recoups the full value of the asset $C_1 + C_2$ in the accommodative state A, which is realized with probability q. With probability $1 - q$, state T is realized, and if $D_1 \leq D_1^{T,\text{PayIC}}$, the incumbent sets pledgeability high and will sell the firm for $B_1^{E,T}(\bar{\gamma})$ if she loses ability. The value she collects before debt payment is thus $\bar{V}$. If $D_1 > D_1^{T,\text{PayIC}}$, low pledgeability $\gamma_2 = \underline{\gamma}$ is chosen ex ante. In this case, if state T occurs and if the incumbent loses her ability, she only sells the firm at price $B_1^{E,T}\left(\underline{\gamma}\right)$, so she expects to receive $\underline{V}$ overall. It follows that

Lemma 3

1. If $\underline{V} > \omega_0 + \max[\underline{l}, \bar{l}]$, the asset is underpriced at $t = 0$, and the initial winning bid is $\omega_0 + \max[\underline{l}, \bar{l}]$. If $\bar{l} \geq \underline{l}$, $D_1 = D_1^{T,\text{PayIC}}$, and $V(D_1) = \bar{V}$. Otherwise, $D_1 = C_2$ and $V(D_1) = \underline{V}$.
2. If $\underline{V} \leq \omega_0 + \max[\underline{l}, \bar{l}]$ and
   a. $\bar{l} \geq \underline{l}$, the initial winning bid is $\text{Min}[\bar{V}, \omega_0 + \bar{l}]$, and $D_1 = \text{Min}[\bar{V}, \omega_0 + \bar{l}] - \omega_0$.
   b. $\underline{l} > \bar{l}$, and

   (i) $\omega_0 + \underline{l} > \underline{V} > \omega_0 + \bar{l}$, the initial winning bid is $\underline{V}$ and $D_1 = \left(\underline{V} - \omega_0 - (1-q)B_1^{E,T}\left(\underline{\gamma}\right)\right)/q$.

   (ii) $\omega_0 + \underline{l} > \omega_0 + \bar{l} \geq \underline{V}$, the initial winning bid is $\text{Min}[\bar{V}, \omega_0 + \bar{l}]$, and $D_1 = \text{Min}[\bar{V}, \omega_0 + \bar{l}] - \omega_0$.

In Lemma 3, case (1) suggests (naturally) that if ex ante liquidity ω_0 is low so that bidders cannot bid the full present value of future cash flows to them, the firm is underpriced. The results of the previous section on initial leverage then go through. Debt may go up to levels that inhibit pledgeability since ex post liquidity is high enough. However, if ex ante liquidity is high enough that the asset is no longer underpriced (case 2), higher ex ante liquidity can limit the amount of debt that is taken on. Moreover, even when anticipated ex post liquidity is such that $\underline{l} > \bar{l}$ so that high levels of debt raise more up front (case 2)b. (ii), bidders prefer lower levels of debt that are incentive-compatible because it allows them to receive the higher valuation $\bar{V}$ for the asset. Thus, higher ex ante liquidity mitigates the consequences of high ex post liquidity by reducing the need to take on debt while bidding for assets. This helps avoid the adverse effects of leverage on pledgeability.

This also suggests situations in which high ex post liquidity is problematic. When perception of high future liquidity emerges suddenly – for instance, when the domestic exchange rate is expected to appreciate sharply, thus raising the ability of bidders to borrow significantly, it has a greater effect in encouraging leverage and suppressing pledgeability than when bidders become steadily wealthier over time, and the difference between future wealth and current wealth is not high. To the extent that emerging markets have higher growth prospects and lower current wealth, they may be more subject to the distortions created by higher prospective liquidity than advanced countries.

4.2 Intermediation

While cross-border flows post-Global Financial Crisis have tilted more toward bond financing recently [see, for example, Milesi-Ferretti and Tille (2011) and Lane and Milesi-Ferretti (2017)], Cerutti and Hong (2017) suggest that bank financing continues to play an important part in emerging market financing. How does focusing on intermediation rather than direct lending change our analysis?

Diamond, Hu, and Rajan (2019) study the structure of financial intermediaries whose actions are required to increase the pledgeability of borrowing firms. They focus on banks whose main activities are to screen and separate borrowers: *reliable* borrowers are capable of raising pledgeability as we have modeled in this paper, whereas unreliable borrowers are poorly governed and always have low γ_2. They conclude that such certifying intermediaries will be required to have substantial skin in the game (that is, retain costly capital) when increased pledgeability is valuable and desired by firms, introducing both a benefit and a cost to intermediation. However, both benefit and cost diminish in an environment of high ex post liquidity. More specifically, the value from intermediation (screening and certifying) tends to become negligible at high levels of anticipated liquidity for reasons that we have discussed. As a result, the need for intermediaries to have skin in the game to incentivize or signal proper behavior also diminishes. In periods of high anticipated liquidity, intermediaries thus become highly levered pass-through structures, for similar reasons to ones we have elaborated on in this paper. For banks, this implies increased bank leverage while securitizers become full pass-throughs of the loans they originate (with no claim retained by the securitizer).

The propensity for intermediaries to become more highly levered themselves, even as their borrowers lever up, essentially leaves the system with little shock absorbing buffer, yet another potential cost if the anticipated liquidity fails to materialize.

5 Policy Spillovers: Implications for Multilateralism

Before the financial crisis, there was a perception that the world had arrived at a policy optimum, which contributed to the Great Moderation. As Eichengreen et al. (2011) argue, the sole objective for monetary policy was price stability, and it was achieved by flexible inflation targeting. Indeed, by allowing exchange rate flexibility, the system eliminated the need for exchange rate intervention or reserve accumulation. Inflation targeting plus floating exchange rates, as Eichengreen et al., argue, "could thus be regarded as the triumph of the "*own house in order'* doctrine in the international monetary field. National macroeconomic stability was seen as sufficient for international macroeconomic stability. The domestic and international aspects were essentially regarded as two sides of the same coin."

This view is still echoed. For instance, Bernanke (2017) lays out a two-country model of spillovers to show that a flexible exchange rate can largely insulate emerging markets from both internal and external shocks in the medium run. He argues that even the existence of financial stability spillovers does not invalidate the basic implication of the "trilemma" that exchange rate flexibility can help insulate domestic output from foreign monetary policies, and any remaining spillovers should be tackled by regulatory and macro-prudential measures. Of course, such views have been challenged [see, for example, Rey (2013) or Rajan (2014)].

The point of this paper has been to show that there might be a rationale for countries to limit exchange rate movements so as to avoid spillovers affecting financial stability from accommodative monetary policies in funding countries. In other words, exchange rate intervention may be a macro-prudential measure in its own right, and not intended to gain the country undertaking it a competitive advantage. Of course, such intervention may also need to be accompanied by other measures so as to mitigate any resulting moral hazard. For recipient countries, there may be no clean ways of avoiding spillovers, and it may well be a matter of muddling through. We have made this point drawing on an extensive empirical literature, much of it after the Global Financial Crisis of 2007–2008, which suggests that source country monetary policy does spill over into recipient countries. The phenomenon we describe – liquidity driving leverage and reducing pledgeability – may well occur in the source country also, but could be magnified via balance sheet currency mismatches and exchange rate movements in recipient countries.

The extent to which monetary policy is aggressive in the source country may depend on preexisting conditions. Within the source country, expert liquidity goes up because of traditional effects of monetary policy in pushing up corporate wealth and lowering interest rates. If these channels are muted because of the overhang of preexisting expert leverage, the monetary authorities may have to be

more aggressive if they want to enhance activity. The initial liquidity in the recipient country also matters. If initially low, the country may experience important spillovers as the domestic incentive to increase leverage goes up substantially. Furthermore, source country monetary policy is transmitted to recipient country expert net worth primarily through domestic exchange rate appreciation in the recipient country. Monetary policy that has relatively muted effects in the source country can thus have large effects in the recipient country because it operates not just through transmitted interest rates but also through exchange rates.

This does raise an important question, though. What responsibility do source countries have for these spillovers? The "own house in order" doctrine suggested none – any spillovers are because of improper policies in recipient countries.[11] This is indeed the view that many source country central bankers, focused on their domestic mandates, espouse. It is hard to know whether they would have the same view if their mandates also included some element of international responsibility. Others, such as Blanchard (2016) and Frankel (2016), recognize there may indeed be spillovers, but do not see any possibility of altering the behavior of sending countries. Instead, they focus on macro-prudential policies and even capital flow measures in recipient countries, as does the IMF's Institutional View.[12]

Mishra and Rajan (2019) and Taylor (2017) suggest placing some of the responsibility of adjustment back on source countries through monetary policy rules. For instance, Mishra and Rajan (2019) suggest that certain kinds of monetary policy actions in certain kinds of environments could be ruled out of order because of the adverse spillovers they create, much as sustained unidirectional intervention in the exchange rate used to be frowned upon till recently. Such rules of the game could effectively introduce international responsibility back into central bank behavior, without changing their mandates or requiring international coordination. Indeed, an Eminent Persons Group, tasked by the G-20 with suggesting changes to the global financial architecture, has noted the need for a "rules-based international framework, drawing on a comprehensive and evolving evidence base… to provide policy advice through which countries seek to avoid policies with large spillovers, develop resilient markets, and benefit from capital flows while managing risks to financial stability."[13] It further recommends that the "IMF should also develop a policy framework for sending countries that enables them to meet their domestic objectives while avoiding large international spillovers."

Our paper does raise an additional intriguing possibility. Our model suggests that the cross-border effects of source country monetary policy resemble qualitatively, if not quantitatively, their effects on source country domestic financial stability. Of course, the role of exchange rate changes presents an important additional asymmetry between source countries and the others. However, if source country central

[11] Even this rationale could be debated. To the extent that emerging markets and developing countries have inadequate institutions with limited credibility, their best policy response may fall short of what a developed country would be capable of. Should they be held responsible for spillovers, given they fall short of developed country response, or do sending countries have a duty to recognize their state of development?

[12] https://www.imf.org/external/np/pp/eng/2012/111412.pdf.

[13] https://www.globalfinancialgovernance.org/.

bank monetary policies are driven not just by concerns of price stability but also of domestic financial stability, policy actions may well be altered in a way that will mitigate international spillovers.[14]

Of course, we are still a long way from obtaining the evidence and the understanding that helps us create a rules-based international framework. Yet, we have also come a long way, from blaming emerging markets and developing countries for reacting inadequately to capital inflows. If we are to find ways to utilize capital flows well – to meet the saving needs of rich aging countries while also meeting the financing needs of developing countries and emerging markets, without precipitating periodic crises – we will need a multilateral cooperative solution. Multiple tools exercised by many countries may be the best way of tacking a multifaceted problem.

6 Conclusion

Cross-border capital flows, whether pushed by sending countries or pulled by receiving countries, have been a source of financial fragility. We argue in this paper that even if countries at either end of the flows follow reasonable policies, the nature of the expansion in liquidity in the up-cycle may, by increasing leverage and reducing pledgeability, set the stage for a costly downturn. In a world where nationalism is on the rise, such spillovers create an environment that is prone to misunderstanding and potentially susceptible to engendering conflict. Sending countries may see reserve buildup in receiving countries as unfair exchange rate manipulation, while receiving countries may feel indignant that they have to assume full responsibility for managing the collateral effects of industrial country monetary policies.

Rather than blaming each other, countries should see how they can benefit the most from cross-border flows without incurring the costs. Our paper, building on extensive work by others, suggests there is a genuine problem. There is much scope for further research on what the solutions could be.

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[14] Of course, if macroprudential regulation was sufficient to reduce the financial stability risks associated with accommodative monetary policy, monetary policy would continue to have international spillover effects even if its domestic effects could be mitigated. However, if macro-prudential measures were indeed so effective, perhaps receiving countries could also deploy them to good effect. In the absence of a separate instrument to deal with financial stability, perhaps monetary policy will have to trade off among objectives (see Cesa-Bianchi and Rebucci (2017), Diamond and Rajan (2012) or Farhi and Tirole (2012), for example).

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