Confidence Banking and Strategic Default

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Abstract

Securitization relies on confidence. As a security is tied to a particular asset (or pool of assets), in principle the investor loses when the asset defaults. The issuer of the security, however, could promise to use the proceedings from other of its assets to cover the investor in such an event. Even though the issuer is not legally bound to fulfill its promise, it may have incentives to avoid default strategically to create a reputation of holding high quality assets. Booms and busts of securitization then depends on the determinants of reputation concerns, such as expectations about future profits, what makes it more volatile and more dependent on the issuer’s reputation than other forms of financing. I show this is consistent with historical evidence and suggest new regulations that exploit reputation concerns to stabilize securitization.

Keywords: reputation, securitization, strategic default, confidence

1. Introduction

Securitization is the process of transforming a non-security asset into a security, usually a bond. This innovative form of financing was the most important element behind the exponential growth of the financial architecture that suddenly collapsed during the recent crisis of 2007-09. As the non-security asset is completely removed from the issuer’s balance sheet, its default affects the payments received by the bondholder but has no direct financial effect on the issuer. This is the main reason both the growth and collapse of securitization are usually attributed to regulatory arbitrage (see for example Ordonez (2013b) and Acharya et al. (2013)). The recent experience, however, was not unique.
Securitization, or other closely related financing instruments, has historically also expanded to the brink of collapse in environments with no regulation, both in Europe and in the US.

How can securitization grow so rapidly, with and without regulatory constraints? Given that, by construction, securities do not pose the collective action considerations that rationalize bank runs, what makes them at the same time so fragile? I argue that securitization relies heavily on confidence that financial counterparties behave as expected, even in the absence of contractual provisions or regulatory restrictions. Then, the growth and collapse of securitization critically depends on the growth and collapse of the conditions that determine confidence in the system.

More specifically I claim that securitization is confidence banking and finds a rich environment to emerge and spread out when investors are confident that an issuer of a security is willing to guarantee it, stepping in and covering assets in distress, even without being legally bound to do it. While traditional banking relies on costly bankruptcy procedures to implement such guarantee, confidence banking is composed of security issuers that are self-disciplined by their reputation concerns, that is by their concerns about the market having a high perception of their good quality and behavior. When reputation concerns are strong, confidence banking arises as an alternative to traditional banking, offering the same services but saving on bankruptcy procedures.

Both the disciplining potential and fragility of reputation concerns follow from two premises. First, the value of reputation critically depends on expected economic conditions. If business opportunities in the future are not very promising, the value of having a good reputation is not very valuable. Second, reputation formation creates complementarities across security issuers. If investors believe that “good” firms cover securities in distress under certain conditions, a single firm that allows the security to default generates a signal that leads investors to believe the firm is not good. In contrast, if investors believe that even “good” firms leave securities to default, a security defaulting hardly provides enough information to sever the reputation of the issuer. These two properties create a novel collective action problem through reputation formation: Reputation sustains confidence in securitization only when it is a concern shared by many issuers simultaneously.

In my model, each (financial) firm in the economy runs a project and needs a loan to run a new one. There are two types of firms: Good firms run valuable ongoing projects, which, if successful, generate enough cash flows to cover the loan in the case the new project fails. Bad firms, in contrast, run useless ongoing projects, with no cash flows to cover a failing loan. We call reputation the probability assigned by the market that a given firm is good. We compare two financing alternatives: Debt or Securitization without explicit guarantees.

Debt is on-balance sheet, which implies the firm is subject to costly bankruptcy procedures in case of default. This generates incentives for firms to avoid bankruptcy whenever possible – good firms repay with cash flows from both ongoing and new projects and bad firms only repay with cash flows from new projects, since their ongoing projects are useless. In contrast, securities are off-
balance sheet, which implies that new projects’ proceedings are effectively sold to outside investors. For expositional simplicity I focus on securities channeled through SPVs, which by construction are bankruptcy remote – they can default, but no bankruptcy is involved – and grant privileged information – investors have privileged access to information about the proceedings of the securities composing the SPVs. A SPV is in trouble or distress when cash flows from securitized projects are insufficient to cover the loan.

When acquiring SPVs without guarantees, investors effectively do not have rights over ongoing firms’ projects. Since bad firms cannot cover SPVs in trouble with ongoing projects, good firms have a chance to send a signal to future investors that they manage valuable projects and improve their reputation by channeling funds from successful ongoing projects to cover SPVs in trouble. This incentive, however, exists as long as the expected gains from reputation are large enough. When these incentives are small and investors believe good firms will not cover SPVs in trouble, they do not expect good firms to behave differently than bad firms. In this case repayment is not compensated with a reputation improvement and good firms do not have incentives to cover securities in distress.

This complementarity between firms’ actions and investors’ beliefs about firms’ actions leads to multiplicity – in some equilibria reputation provides self-discipline, in other it does not. When refining the set of equilibria assuming imperfect information about future economic conditions that determine reputation gains (global games selection techniques) the unique equilibrium displays fragility. Promising economic perspectives improves reputation incentives, and good firms prefer to cover securities in distress without relying on costly contractual bankruptcy provisions. The arrival of bad news about economic perspectives degrades reputation incentives and has the potential to create a sudden collapse of self-discipline, and a run away from securitization and towards debt and more traditional financing options.

For given expected economic conditions I characterize the financing decisions of firms. Firms with high reputation tend to issue securities. As investors are confident that those firms hold high quality assets and want to maintain a high reputation, they are willing to buy securities at a high price and then firms would rather issue securities than debt. In contrast, firms with relatively lower reputation prefer to issue debt, as they would rather pay the cost of bankruptcy in expectation than issuing securities that investors are willing to buy at a low price. As economic perspectives improve, reputation incentives increase for all firms, allowing for confidence banking to spread throughout the economy, with less reputable firms also issuing securities.

I revise historical evidence that suggests securitization is an old phenomena, always characterized by large growth in periods of optimism about economic activity and collapses in the wake of bad news about future economic prospects. This evidence also shows that reputable firms have been always at the forefront of the inception of securitization waves. Furthermore, regulatory restrictions were not present in many of these securitization waves, which suggests that even though relevant, regulatory arbitrage is not a prerequisite for the rise of
securitization.

This novel rationale is relevant in identifying the forces behind the success and the failure of securitization beyond regulatory arbitrage, and in designing optimal regulation in financial markets. Securitization is desirable because it leverages on costless reputation concerns to induce efficient allocations, but it faces the possibility of a sudden and costly collapse when bad news about future economic perspectives arise. Confidence is a cheap, but fragile, way to enforce contracts. Any policy intervention that tries to take advantage of, and at the same time maintain, confidence needs to stabilize its roots: Reputation concerns.

I show that one way to achieve this stabilizing goal is by subsidizing firms with good reputations and taxing firms with poor reputations, while maintaining a balanced budget. Subsidies to firms with good reputations have two effects. First, they enhance the incentives to improve and maintain reputations, making confidence more robust to changes in expected economic conditions. Second, they widen the range of firms that self-select into securitization. I argue these subsidies can be financed with taxes on firms with poor reputations, which would not reduce their incentives to repay because they do not use securities in the first place, and thus are still subject to the incentives, and the costs, that bankruptcy procedures involve.

**Related literature:** This paper rationalizes the rise and collapse of securities not explicitly guaranteed by sponsoring issuers, in particular those channeled through SPVs or SIVs. These non-guaranteed securities were an important part of the so called shadow banking in the years leading to the great recession. Acharya et al. (2013) show that extendible asset backed commercial paper and SIVs, which were barely guaranteed, represented 10% of all outstanding asset backed commercial paper held by commercial banks in 2007. This figure reached 50% for structured finance companies and almost 75% for mortgage originators.

In this paper, firms issue non-guaranteed securities to avoid paying expected costly bankruptcy procedures. In Ordonez (2013b) I show financial firms issue guaranteed securities to avoid restrictive regulatory requirements. In both cases, confidence is critical in sustaining self-discipline and making these instruments viable and efficient. In both cases, confidence is a fragile disciplining device and the use of these instruments may suddenly collapse. In this paper, however, I highlight that regulatory arbitrage is not a prerequisite for securitization to raise.

I propose a novel interpretation of confidence in financial markets. In contrast to Morris and Shin (2012), for example, who define “confidence” as approximate common knowledge of an upper bound on expected losses, and then show how small shocks to adverse selection can lead to large breakdown in trade, I define it as the beliefs about the self disciplining effects of reputation concerns in financial markets. This paper rationalizes the source of the collapse in confidence.

I also advance a different interpretation of a “run” or “fly” from securitization to debt. He and Xiong (2012), for example, model runs on non-banks financial institutions, such as SPVs, as a dynamic coordination problem in which rollover
decisions of debt by a creditor depend on believed rollover decisions of other creditors. This is clearly an important aspect of runs. In my paper, however, creditors are concerned about the behavior of financial institutions and such behavior is determined by creditors’ beliefs.

This paper is naturally a contribution to the recent literature on securitization. Gennaioli et al. (2012) show that an increase in investors’ wealth drives up securitization, causing banks to become interconnected and more exposed to systemic risks. In their model the system is stable and welfare improving under rational expectations and the only possibility of crises arise from neglected risks. Here I argue that securitization arises from a spur of confidence in the market and can collapse under rational expectations when the forces that sustain confidence disappear. This difference is critical for a constructive discussion of how to regulate securitization.

Gorton and Souleles (2006) propose that securitization arises as an implicit collusion between firms and investors to save on bankruptcy costs. However, there is no discussion on how the system sustains such collusion or how this collusion can collapse. Here I argue securitization is specifically sustained by confidence and reputation concerns. Hence, its existence and collapse can be modeled as a change of regime. This deeper structure allows for the potential identification of which elements sustain securitization, which lead to its collapse, and which should be regulated.

The importance of using financing choices to signal and/or to screen borrowers’ types has also been highlighted in Ross (1977) in a static setting and Perez Reyna et al. (2016) in a dynamic setting. I apply these insights to provide a rationale for securitization, to relate it with historical evidence and to discuss its implications for regulation.

In the next section I introduce a model that compares debt and securitization, highlighting that securities provide a cheaper, but fragile, alternative to debt. I also discuss how firms choose between these two financing alternatives based on their reputation. In Section 3 I show that historical evidence of securitization is consistent with the interpretation of securitization as confidence banking. In Section 4 I use this rationale of confidence banking to propose a novel regulation with the potential to stabilize securitization. In Section 5 I make some concluding remarks. The Appendix contains all the proofs.

2. Model

Assume a continuum of firms that live for two periods. In period 1 each firm manages an ongoing project (or owns an asset) that may generate cash flows in period 2. There are two types of firms: Good (G) firms’ ongoing projects are successful with probability \( p \), in which case they pay \( z \) in period 2, or nothing otherwise; Bad (B) firms’ ongoing projects always fail and does not pay anything in period 2.

Each firm has also the possibility to manage an additional, new indivisible project, which requires $1 to operate in period 1, paying \( y \) in period 2, also
with probability $p$, and 0 otherwise. Since firms have ongoing projects but no liquid funds in period 1, they need to finance these new projects by borrowing at an (endogenous) rate $R$ from infinitely many, short-lived, risk-neutral, and perfectly competitive lenders, whose outside option is normalized at 0 risk-free interest rate. I assume that only the firm observes its own type in period 1 and its own projects’ cash flows in period 2 for free. Lenders can observe the projects’ cash flows at a cost, but cannot observe the firm’s type. I define as reputation $\phi$ the probability that lenders assign that a particular firm is of type $G$. Firms then differ only on their true type and on the market’s perception about their type.

Finally, firms obtain a non-negative continuation value $V(\phi, \theta)$ at the end of period 2, after projects pay off, which is an exogenous function monotonically increasing both in reputation $\phi$ and in a unidimensional aggregate fundamental $\theta$. The fundamental $\theta$ represents total demand, economic conditions, or any other variable that positively affects the expected prospects of the firms after period 2. I assume $\theta$ is drawn from a normal distribution with known mean $\mu$ and variance $\frac{1}{\gamma^2}$ (i.e., precision $\gamma^2$).

With respect to projects’ cash flows, I assume $py > 1$ (new projects have positive expected net present values), $y > R$ (successful new projects are enough to repay loans, where $R$ is endogenous but expressed in terms of primitives) and $z > R$ (successful ongoing projects are also enough to repay loans). Since the goal of the paper is to study the evolution of securitization, I also assume firms have only two possible ways to finance new projects:

1. Debt (on-balance sheet): As our setting displays costly state verification (i.e., lenders can observe the projects’ cash flows at a cost), in the presence of lenders’ commitment the optimal static contract is a “standard debt contract” – the firm goes bankrupt in case of default. When there is a bankruptcy procedure, lenders seize the projects’ cash flows of the defaulting firm, at a cost $C$. This amount is usually estimated to be quite large, since it includes not only the mere bureaucratic cost of determining the value of the firm and seizing its assets, but also the costs of liquidating the firm.

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3Reputation concerns intrinsically rely on a potentially long repeated game where the continuation value is determined endogenously by the solution of the game in future periods. In our two-period setting, $V(\phi, \theta)$ summarizes such solution and for expositional reasons I assume it exogenous. It is, however, easy to show that continuation values are a positive function of $\phi$ in a full-fledged repeated game (as endogenous interest rates decrease with $\phi$) and that are non-negative under limited liability. These extensions are cumbersome and not needed to illustrate the main point of the paper. For the analysis of how to endogeneize value functions in a similar full repeated reputational game setting, and derive these properties, see Ordonez (2013a).

4For a comprehensive survey of the extensive literature on costly state verification and the role of commitment see Attar and Campioni (2003).

5Altman (1984) estimated bankruptcy costs to be 20% of total asset value, including indirect costs (such as lost sales and lost profits). Alderson and Betker (1995) compared the value of the firm as a going concern with the liquidation value of the firm, raising the esti-
2. Securitization (off-balance sheet): I assume firms can sponsor a special purpose vehicle (SPV) that sells rights to the cash flows of the new project, which is not subject to bankruptcy procedures in case of default (bankruptcy remote) and provide preferential information about the performance of those projects to investors (privileged information). Even though the failure of new projects can be observed by investors holding SPVs, other agents in the economy can only observe whether a given SPV ends up defaulting or not. The institutional details of SPVs that give rise to these two properties are discussed in the Appendix.

In essence, the decision between using debt or securitization boils down to a decision between giving the investor the legal right to monitor and seize the value of all firms assets (in our case the ongoing project) at a cost or just implicitly promising investors to use those assets to repay loans, even when not legally forced to do it. As I focus on the incentives of firms to use proceedings of assets not directly involved on a loan to cover loans in distress, I assume securities are not explicitly guaranteed by assets held in the firm’s portfolio.\(^6\)

Finally, I assume that, regardless of the financing choice, the continuation value from defaulting is zero. This can be interpreted in the repeated game as the firm being unable to re-enter credit markets, and then disappearing. This assumption, which seems extreme, is just a normalization that simplifies the exposition.

To be concrete, the timing in each period is as follows,

1. **Period 1:** All agents know the distribution \(\theta \sim \mathcal{N}(\mu, \frac{1}{\tau^2})\) of fundamentals. A firm of type \(i \in \{B, G\}\) and reputation \(\phi\) finances the new project by issuing debt or securities (confidence banking).

2. **Period 2:** The fundamental \(\theta\) is realized. Ongoing and new projects fail or succeed. Based on this information, a firm of type \(i \in \{B, G\}\) and reputation \(\phi\) decides whether to repay the loan or not in case the ongoing project succeeds (strategic default). If the firm does not repay, it disappears, having a continuation value 0. If the firm repays, it continues, its reputation is updated from \(\phi\) to \(\phi'\) according to Bayes’ rule and it obtains a continuation value \(V(\phi', \theta)\).

**Remark on the interpretation of firms as banks:** This setting applies both to financial and non-financial firms. For instance, firms can be banks with previous mortgages or loans as “ongoing projects” and new loan requests

\(^6\)For an analysis of the effects of explicit guarantees and regulatory arbitrage see Ordonez (2013b).
as “new projects.” The bank can then raise funds from depositors who can “take the bank to bankruptcy” in case of default or from outside investors by sponsoring a SPV that sells mortgages as securities. Then, the decision for banks is also whether to finance new loan requests by raising deposits (debt) or by selling securities (SPV).

In what follows, I first characterize separately the payoffs accruing from debt and from securities for a firm of a given type \(i \in \{B, G\}\) and reputation \(\phi\). Then, I characterize the optimal financing decision of firms with different types and reputations.

### 2.1. Debt

Given the assumption of costly state verification the standard debt contract is optimal in a static setting. Standard debt specifies that the firm repays a given amount \(R_D\) or defaults. In case of default lenders take the firm to bankruptcy and seize all assets paying a cost \(C\). In our setting this implies that the firm always repays when at least one of the project succeeds, keeping the difference \(y - R\) if the new project succeeds or \(z - R\) if the ongoing project succeeds, instead of nothing if defaulting.\(^7\)

Since lenders are competitive and the risk-free rate is zero, interest rates \(R_D\) equalize the expected repayment (net of expected bankruptcy costs in case of default) with the size of the individual loan, 1. Hence, interest rates \(R_D\) depend on firms’ reputation \(\phi\) and bankruptcy costs \(C\) as follows

\[
R_D(\phi) = \frac{1 + [1 - (\phi \alpha_G + (1 - \phi) \alpha_B)]C}{\phi \alpha_G + (1 - \phi) \alpha_B},
\]

where \(\alpha_G = p + p(1 - p)\) is the probability that firms of type \(G\) repay the loan (when either ongoing or new projects succeed) and \(\alpha_B = p^2 + p(1 - p) = p < \alpha_G\) is the probability that firms of type \(B\) repay the loan (only when new projects succeed). The face value of debt (in this case also the interest rate) is the loan plus the expected bankruptcy costs, effectively covered by firms, divided by the expected probability of repayment. In this case firms have the incentive to repay whenever they can, otherwise default triggers bankruptcy.

Interest rates are decreasing in \(\phi\) since the expected probability of repayment is increasing in \(\phi\) and expected bankruptcy costs are decreasing in \(\phi\). Even though interest rates depend on reputation, default decisions do not, as firms repay whenever at least one project succeeds, independent of their true type.

Repayment is an informative signal about a firm’s type, as firms of type \(G\) are more likely to repay than firms of type \(B\). Then upon repayment reputation is updated from \(\phi\) to \(\phi'\), determining the continuation value \(V(\phi'(\phi), \theta)\) of the firm. This updating follows Bayes’ rule

\[
\phi'(\phi) = \frac{\alpha_G \phi}{\alpha_G \phi + \alpha_B (1 - \phi)} > \phi.
\]

\(^7\)Naturally, this requires lenders committing to the contract and still taking the firm to bankruptcy in case of default, which only occurs in equilibrium if both assets fail.
2.2. Securitization

Securities are financial instruments that save on bankruptcy costs. When a security defaults its originator is not legally required to file for bankruptcy, being its decision whether to use or not on-balance sheet assets to repay. I argue reputation is the disciplining device that borrowers use to pay securities that are not subject to bankruptcy requirements. Hence, securitization constitutes a form of implicit collusion between lenders and borrowers to save on bankruptcy costs.

When investors buy a security, they obtain the rights of privileged information about the new projects. Then the firm necessarily has to use the proceedings from successful assets backing the security to repay. In contrast, since investors cannot observe the cash flows from successful ongoing projects, and the firm does not have a legal obligation to disclose them upon default of the security, the firm may decide strategically not to use ongoing projects to cover a failing security.

The price of a security depends on the beliefs that good firms will cover it in case of distress, that is beliefs that a firm of type $G$ is willing to use the proceedings from a successful ongoing project to cover the security when a new project fails. More formally, $\alpha_G(\hat{T}) = p + p(1-p)\hat{T}$ is the believed probability that a firm of type $G$ repays a security, where the strategy $\tau \in [0,1]$ is the probability that a firm of type $G$ uses cash flows from a successful ongoing project to repay a security in distress and $\hat{T}$ is the investor’s belief about the firm’s strategy. Hence $\hat{\alpha}_G(\hat{T} = 1) = \alpha_G > \hat{\alpha}_G(\hat{T} = 0) = \alpha_B$. Since a firm of type $B$ only repays a security if the new project succeeds, the believed probability that a firm of type $B$ repays the security is $\hat{\alpha}_B = \alpha_B = p$.

This analysis implies that the price of a security depends on the reputation of the issuer and can be expressed as an “interest rate”,

$$R_S(\phi|\hat{T}) = \frac{1}{\phi \hat{\alpha}_G(\hat{T}) + (1 - \phi)\alpha_B}. \tag{3}$$

If, for example, lenders are confident that firms of type $G$ will cover securities in distress with the proceedings of a successful ongoing project (i.e., $\hat{T} = 1$),

$$R_S(\phi|\hat{T} = 1) = R_D(\phi) - \frac{[1 - \phi \alpha_G - (1 - \phi)\alpha_B]}{\phi \alpha_G + (1 - \phi)\alpha_B}C < R_D(\phi),$$

and it is cheaper for the firm to raise funds issuing a security than issuing debt.

Reputation updating also depends on beliefs $\hat{T}$. Using Bayes’ rule,

$$\phi'(\phi|\hat{T}) = \frac{\hat{\alpha}_G(\hat{T})\phi}{\hat{\alpha}_G(\hat{T})\phi + \alpha_B(1 - \phi)}.$$

As shown in Figure 1, $\phi'(\phi|\hat{T})$ increases with $\hat{T}$ for a given $\phi$. Intuitively, if lenders believe firms of type $G$ cover securities in distress with a successful ongoing project, they expect those firms to be more likely to repay than firms of type $B$. Given these beliefs, lenders will revise reputation up when they observe
a firm repaying the security. In contrast, if lenders expect firms of type $G$ not covering securities in distress, they expect those firms are equally as likely to repay as firms of type $B$, not revising reputation when observing repayment of a security.

Figure 1: Reputation Updating

We can now express the expected profits for good firms with reputation $\phi$ when the fundamental is $\theta$ and the firm follows a strategy $\tau$, conditional on lenders believing good firms with reputation $\phi$ follow strategy $\hat{\tau}$, as

$$U^S_G(\phi, \theta, \tau | \hat{\tau}) = p(y + z) + \hat{\alpha}_G(\tau) [\beta V(\phi' | \hat{\tau}, \theta) - R_S(\phi | \hat{\tau})].$$

Good firms cover securities in distress with the proceeds from ongoing successful projects ($\tau = 1$) whenever, given beliefs $\hat{\tau}$,

$$\Delta(\phi, \theta | \hat{\tau}) = U^S_G(\phi, \theta, \tau = 1 | \hat{\tau}) - U^S_G(\phi, \theta, \tau = 0 | \hat{\tau}) > 0,$$

which can be rewritten as

$$\Delta(\phi, \theta | \hat{\tau}) = p(1 - p) [\beta V(\phi' | \hat{\tau}, \theta) - R_S(\phi | \hat{\tau})] > 0.$$

**Definition 1.** A reputation equilibrium is one in which good firms cover securities in distress with proceeds from successful ongoing projects, and beliefs are consistent, $\tau = \hat{\tau} = 1$.

The sufficient condition for a reputation equilibrium, in which $\tau = \hat{\tau} = 1$, is

$$\beta V(\phi' | \hat{\tau} = 1, \theta) \geq R_S(\phi | \hat{\tau} = 1).$$

In contrast, the condition for a non-reputation equilibrium, in which $\tau = \hat{\tau} = 0$, is

$$\beta V(\phi' | \hat{\tau} = 0, \theta) \leq R_S(\phi | \hat{\tau} = 0).$$
In what follows I describe a potential multiplicity of equilibria and refine those equilibria using global games techniques that I developed in Ordonez (2013a). Then, using such unique equilibrium, I characterize financing decisions of firms with different reputation levels as a function of expected economic conditions. Further, I discuss conditions for securitization crises that lead to sudden changes in credit markets.

2.2.1. Multiplicity with complete information

Since continuation values are monotonically increasing in posteriors $\phi'$, which are monotonically increasing in $\hat{\theta}$, then $V(\phi'|\hat{\theta} = 1, \theta) > V(\phi'|\hat{\theta} = 0, \theta)$. Also, since $\hat{\alpha}_G(\hat{\theta} = 1) > \hat{\alpha}_G(\hat{\theta} = 0)$, then $R_S(\phi|\hat{\theta} = 1) < R_S(\phi|\hat{\theta} = 0)$. Combining these inequalities with equilibrium conditions (4) and (5), there are values $\theta$ under which reputation and non-reputation equilibria coexist. Fundamentals are not only useful to characterize multiplicity in an environment with changing conditions, but are also key in selecting a unique equilibrium, using global games techniques, when agents do not observe $\theta$ perfectly, but “almost” perfectly.

Good firms cover securities in distress only when the expected gains from reputation are large enough. Since these gains increase with fundamentals $\theta$, we focus on cutoff strategies,

$$\tau(\phi, \theta) = \begin{cases} 1 & \text{if } \theta > \theta^*(\phi) \\ 0 & \text{if } \theta < \theta^*(\phi) \end{cases}$$

The previous construction was based on a belief $\hat{\theta}$ for all $\theta$. Given that these strategies follow a cutoff rule, however, we need to redefine good firms’ ex-ante (in period 1, before knowing $\theta$) repayment probabilities as $\hat{\alpha}_G(\hat{\theta}^*) = p + p(1 - p)(1 - N(\hat{\theta}^*))$, where $\hat{\theta}^*$ is the cutoff lenders believe firms will follow and $N(\hat{\theta}^*)$ is the ex-ante probability that $\theta < \hat{\theta}^*(\phi)$. Then,

$$R_S(\phi|\hat{\theta}^*) = \frac{1}{\phi\hat{\alpha}_G(\hat{\theta}^*) + (1 - \phi)\alpha_B}$$

If $\hat{\theta}^* = -\infty$, $N(\hat{\theta}^*) = 0$, $\hat{\alpha}_G(\hat{\theta}^*) = \alpha_G$ and $R_S(\phi|\hat{\theta}^* = -\infty) = \frac{1}{\phi\alpha_G + (1 - \phi)\alpha_B} < R_D(\phi)$. In words, if good firms are believed to always cover securities in distress, default probabilities are the same to those under debt financing, but without the extra cost of bankruptcy. In contrast, if $\hat{\theta}^* = \infty$, $N(\hat{\theta}^*) = 1$, $\hat{\alpha}_G(\hat{\theta}^*) = \alpha_B$, then $R_S(\phi|\hat{\theta}^* = \infty) = \frac{1}{\alpha_B}$. In words, if good firms are believed to never cover securities in distress, default probabilities are the same as those for bad firms, and then interest rates are as if firms were bad with certainty.

In this setting there are two possible sources of multiplicity. First, interest rates can possibly generate a finite number of equilibria. When rates are high, default probabilities are high rationalizing high rates and when rates are low, default probabilities are low rationalizing low rates. This is well-known and easy to refine. If there are two rates in equilibrium, for example, and investors coordinate in the high rate, there are incentives for a single lender to deviate, offering the lower rate from the other equilibrium, attracting firms and still
breaking even. This refinement, proposed by Stiglitz and Weiss (1981), exploits Bertrand competition and rationalizes as the unique equilibrium the one with the lowest rate.

The more interesting second source of multiplicity comes from reputation formation and induces a continuum of multiple equilibria. In this case the refinement from Stiglitz and Weiss (1981) only works if the lenders who update reputation beliefs are always the same as those who provide loans in the future. If this is not the case competition cannot be used to coordinate on a single equilibrium, just because current lenders cannot select the beliefs that future lenders will use to update reputation. As this is most likely to be the case in dynamic and complex financial markets, in what follows I relax the assumption of complete information about \( \theta \) and exploit global game tools developed in Ordonez (2013a) for reputation environments to select a unique equilibrium that is robust to small perturbations of information about \( \theta \).

The reader uninterested in the details of selecting a unique equilibrium using global game techniques in reputational environments can skip the next section just knowing that, when information about fundamentals is precise enough but not perfect, there is a unique threshold \( \theta^* \), which depends on expected fundamentals \( \mu \). Above the cutoff good firms cover securities in distress with the proceeding of successful ongoing projects and below they default on those securities. Furthermore \( \theta^* \) monotonically decreases with \( \mu \).\(^8\)

### 2.2.2. Uniqueness with incomplete information

In order to select a unique equilibrium we need to impose two additional assumptions. First, single crossing.

**Assumption 1. Single Crossing**

Fix a belief \( \hat{\theta} \) for all \( \theta \). There is a unique cutoff fundamental \( \theta^* \) at which firms are indifferent to covering securities in distress, such that

\[
\beta V(\phi, \theta^* | \hat{\theta}) = R_S(\phi | \theta^*).
\]

This assumption is fulfilled, for example, when the variance of fundamentals is relatively low, such that the ex-ante probability of default, \( N(\theta^*) \), and hence interest rates \( R_S \), do not change abruptly with changes of cutoffs \( \theta^* \).

Second, dominance regions. Intuitively, there is a range of fundamentals for which, regardless of other firms’ actions, a firm covers securities in distress and a range of fundamentals for which, regardless of other firms’ actions, a firm does not.

**Assumption 2. Dominance Regions**

There are fundamental levels \( \hat{\theta}(\phi) \) under which \( \beta V(\phi, \hat{\theta}|\hat{\theta} = 1) < R_S(\phi | \hat{\theta}) \) and \( \bar{\theta}(\phi) \) above which \( \beta V(\phi, \bar{\theta}|\hat{\theta} = 0) > R_S(\phi | \bar{\theta}) \).

\(^8\)The details of the proof rely on Ordonez (2013a) and are not the contribution of this paper.
For all fundamentals \( \theta < \bar{\theta} \) firms prefer not to cover securities in distress even if lenders believe \( \hat{\tau} = 1 \) and reputation suffers a lot from not doing it. Similarly, for all fundamentals \( \theta > \bar{\theta} \) firms prefer to cover securities in distress even if lenders believe \( \hat{\tau} = 0 \) and reputation does not improve from doing it. Naturally, \( \theta(\phi) < \bar{\theta}(\phi) \) because \( \beta V(\phi, \hat{\theta}^* | \hat{\tau} = 1) - R_S(\phi | \hat{\theta}^*) > \beta V(\phi, \hat{\theta}^* | \hat{\tau} = 0) - R_S(\phi | \bar{\theta}^*) \) for all \( \phi \) and all \( \hat{\theta}^* \). For all \( \theta^* \in [\theta(\phi), \bar{\theta}(\phi)] \), reputation and non-reputation equilibria coexist. Hence, a fundamental \( \theta^* \) can be defined as an equilibrium cutoff if there exists a \( \hat{\tau}(\phi, \theta^*) \in [0, 1] \) such that

\[
\beta V(\phi, \hat{\theta}^* | \hat{\tau}(\hat{\theta}^*)) = R_S(\phi | \bar{\theta}^*).
\]

Assume now each firm (now explicitly denoted by \( i \)) observes an informative signal of the fundamental, \( s_i = \theta + \epsilon_i \) where \( \epsilon_i \sim N(0, \frac{1}{\gamma_i}) \). Cutoff strategies are then based on signals,

\[
\tau(\phi, s_i) = \begin{cases} 
1 & s_i > s^*(\phi) \\
0 & s_i < s^*(\phi) 
\end{cases}
\]

The differential gains of covering securities in distress are given by taking expectations about \( \theta \), conditional on the prior \( \mu \) and the signal \( s_i \)

\[
E_{\theta | s_i} [\Delta(\phi, \theta | \hat{\tau}(s_i))] = p(1 - p) [\beta E_{\theta | s_i} [V(\phi, \theta | \hat{\tau}(s_i))] - R(\phi | \hat{s}^*)],
\]

where \( \hat{s}^* \) is the cutoff investors believe firms follow. In this situation investors compute the interest rate to charge based on an ex-ante probability that fundamentals are smaller than \( \hat{s}^* = s^* \), such that default probability is \( N(s^*) \).

I also assume each lender observe an informative signal of the fundamental, \( s_j = \theta + \epsilon_j \) where \( \epsilon_j \sim N(0, \frac{1}{\gamma_j}) \).

**Proposition 1. Unique Equilibrium.** For precise enough signals \( \gamma_s \to \infty \), there is a unique equilibrium where every good firm with a reputation \( \phi \) decides to cover securities in distress if and only if \( s_i > s^*(\phi) \), where \( s^* \) is given by the following indifference condition

\[
\beta E_{\theta | s^*} \left[ V \left( \phi, \theta | \hat{\tau}(s^*) = \frac{1}{2} \right) \right] = R(\phi | s^*).
\]

Intuitively, the only cutoff in equilibrium is the signal at which a good firm is indifferent of covering securities in distress given that it believes that 50% of lenders will believe that a good firm covers a security in distress.\(^9\) This refinement of equilibria highlights the fragility of reputation. A firm with reputation \( \phi \) would decide to cover securities in distress based on a cutoff \( s^*(\phi) \), with its default strategy changing dramatically around that cutoff.

\(^9\) Laplacian beliefs arise endogenously from the convergence to a uniform prior when \( \gamma_s \to \infty \).
Under this refinement, how does a deterioration of expected economic conditions, captured by lower $\mu$, affect the likelihood of default in the economy? I show that bad news about the future has the potential to increase current default rates of securities. There are two effects from a reduction in $\mu$. The first effect is mechanical. A lower $\mu$ reduces the ex-ante probability that firms cover securities in trouble for a given cutoff $s^*(\phi)$, reducing the price of securities. The second effect is strategic. A lower $\mu$ leads to a higher cutoff $s^*(\phi)$, making the firms less willing to cover securities at any $\theta$. Since the first effect is obvious, the proof of the next proposition focuses on the second effect.

**Proposition 2.** The cutoff $s^*(\phi)$ decreases monotonically with $\mu$.

Intuitively, a decline in $\mu$ increases $R(\phi|s^*)$ for a given $s^*$ (as it is more likely that the fundamental is below $s^*$ and there is default). This requires a larger $s^*$ to raise $E_{\theta|s^*}[V(\phi, \theta|\bar{\tau}(s^*) = \frac{1}{2})]$ and fulfill equation (7). This direct effect increases $s^*$. Furthermore, this increase in $s^*$ implies a further increase in $R(\phi|s^*)$, which reinforces the direct effect generated by lower $\mu$.

This result highlights the effect of news and rumors on securitization. It is not critical to have a real reduction in $\mu$ to induce a collapse of securitization. Just bad news about economic conditions can introduce a wave of pessimism that induces strategic default, even though nothing fundamental changes in the economy other than a more aggressive and less confident investors’ reactions.

### 2.3. Debt or Securitization? Financing Decisions

We have characterized the unique strategic default choices of firms that securitize, as a function of fundamentals $\theta$. As investors internalize these solutions when setting the price of debt and security, we can now study whether a firm prefers to issue debt or securities as a function of expected fundamentals $\mu = E(\theta)$.

I assume $\mu \in [\underline{\mu}, \overline{\mu}]$ such that, for all $\phi$, $\underline{\mu}$ is low enough and $N(s^*(\phi, \underline{\mu})) \rightarrow 1$ while $\overline{\mu}$ is high enough and $N(s^*(\phi, \overline{\mu})) \rightarrow 0$. In words, I assume that under the worst expectations of fundamentals it is almost surely that a firm with reputation $\phi$ would default strategically on its securities and similarly, that under the best expectations of fundamentals it is almost surely that a firm with reputation $\phi$ would use successful ongoing projects to cover securities in distress.

In the next proposition I show that when future economic prospects are bright and reputation incentives are strong, confidence prevails, and securitization provides a cheap financing option that is exploited by the most reputable firms. For completeness, securitization could also arise when reputation concerns are so weak that good firms prefer to sell securities at very low prices but insulating the cash flow from ongoing projects to be at stake in case a new project fails.

**Proposition 3.** Optimal Financing Decisions

When $\gamma_s \rightarrow \infty$, there is a always cutoff $\mu^*_H(\phi)$ such that firms with reputation $\phi$ issue securities for all $\mu > \mu^*_H(\phi)$. If $\underline{\mu}$ is such that $\alpha_G R_D(\phi) - 1 > \beta(\alpha_G -$
\(p)E_{\theta|\mu}V(\phi, \theta), \) then there is also a cutoff \(\mu^*_L(\phi)\) such that firms with reputation \(\phi\) issue securities for all \(\mu < \mu^*_L(\phi)\).

Figure 2 illustrates these two key thresholds, \(\mu^*_L(\phi)\) and \(\mu^*_H(\phi)\), for a given \(\phi\) which define regions for which debt or securities are preferred for the simpler case of a value function \(V(\phi, \theta)\) that is linear in \(\theta\). Intuitively, at the one extreme, when good firms are optimistic about future fundamentals (this is, \(\mu > \mu^*_H(\phi)\)), they value reputation and prefer to cover securities in distress, even if not forced by bankruptcy procedures. This reaction creates confidence of repayment and investors are willing to buy the security at a high price. This source of financing, however, has a chance of collapse in case the fundamental reveals to be worse than expected, this is in case \(\theta < s^*(\phi, \mu)\).

At the other extreme, when good firms are pessimistic about future fundamentals (this is, \(\mu < \mu^*_L(\phi)\)), they do not value reputation and do not have incentives to use their own proceedings from ongoing projects to cover securities in distress. Knowing this reaction investors are only willing to buy the security at a low price. Still, as using debt implies that good firms always repay with successful ongoing projects, there is always a gain from reputation in case of repaying debt. When reputation does not have much value this benefit of debt may be so low that firms prefer issuing securities at low prices than putting at stake cash flows from ongoing projects.

For all intermediate levels of expected fundamentals \(\mu\) (this is, \(\mu^*_L(\phi) < \mu < \mu^*_H(\phi)\)), reputation is somewhat valuable and good firms prefer to finance the new project by issuing debt. This region naturally disappears as bankruptcy costs get larger, as debt becomes relatively more expensive.

These are the decisions that good firms, with valuable ongoing projects face. However, bad firms also face the decision of financing through debt or securitization. Since this is a free choice, they always pool with good firms, otherwise reputation gets lost immediately and immediately they have to borrow facing the highest possible interest rate \(\frac{1}{a_B}\), receiving the lowest possible reputation \(\phi' = 0\) forever in the future.

Now we consider how \(\mu^*_L(\phi)\) and \(\mu^*_H(\phi)\) vary for different reputation levels \(\phi \in [0, 1]\). This comparison is important to understand how the fragility of the financial system is endogenous to the distribution of reputation levels in the economy.

**Proposition 4.** Both thresholds \(\mu^*_M(\phi)\) and \(\mu^*_L(\phi)\) decrease with reputation \(\phi\).

Combining Propositions 3 and 4, for a given \(\mu\), high reputation firms are more likely to finance issuing securities at a high price, intermediate reputation firms by issuing debt and low reputation firms issuing securities at a low price.

### 3. Securitization in Historical Context

Securitization was at the forefront of the financial architecture (in particular the so-called “shadow banking”) that collapsed at the wake of the 2007-2009 financial crisis.
financial crisis in the United States. The usual narrative about the rise of securitization, and its subsequent demise, relies on regulatory arbitrage. According to this view, securitization was used to avoid regulation constraints initially imposed to give financial institutions stability, and then its avoidance was responsible of putting the system in a fragile position. Based on this narrative, the Dodd-Frank reform passed in 2010 reacted to securitization imposing rules that require issuers to retain part (no less than a 5%) of the credit risk of assets sold as securities. In addition to the risk-retention requirement, Dodd-Frank also imposes more transparency about the securitization process and disclosure of asset level data.

Even though regulatory arbitrage was an important element for the recent rise of securitization and the subsequent crisis, as highlighted by Acharya and Richardson (2009), Acharya et al. (2013) and Ordonez (2013b) among others, securitization is hardly a new phenomena. The issuance of securities to raise funds can be tracked to periods in history when financial markets operated without regulatory constraints. Acknowledging the historical evolution of securitization is crucial and justifies this paper. Any proposed securitization reform with the goal of improving its functioning needs to understand first how security markets are formed, how they operate and why they fail.

Even though any economic environment with high expectations about fut-
ture economic opportunities is a fertile ground for the expansion of finance, it is particularly fecund for the raise of securitization. As I argued in this paper, securitization relies more heavily on the market discipline provided by reputation concerns, which is fueled by future expected profits, than other alternatives that rely more heavily on contractual provisions. For the same reason, securitization is more prone to collapses when optimism about future economic activity declines. This is a first implication of our setting: securitization is more volatile than debt (Propositions 1 and 2). The second implication of our setting is that firms that first self-select into issuing securities and lead securitization processes are the ones with relatively high reputation (Propositions 3 and 4). Notice that these implications would arise in case of regulatory arbitrage as securitization would be a sign of weakness of the bank, not strength.

In what follows I discuss that these implications are consistent with historical waves of securitization in the world, regardless of prevailing regulatory environments. Securitization explosions have been marked by periods of fast economic growth and new investment opportunities, and their demise by recessions and poor economic performance after which securitization virtually disappeared for long periods. Another common feature of these episodes as a precondition for security issuance was the well-recognized reputation of the institutions initially involved.

Buchanan (2014), based on Rouwenhorst (2005) and Riley (1980), identified plantation negotiates in the 1700s as perhaps the earliest examples of mortgage-backed securities. Proceeds from bonds issued in the Dutch market were used to finance mortgages to plantation owners abroad, particularly in the West Indies. This process grew exponentially from 1753 to 1776, fueled by the large increase experienced by the West Indian trade and the ensuing investment opportunities, and came to a halt late 1790s, after large declines in stock and commodity prices. This process was mostly performed by two well-known investment houses, Deutz and Co. and Dutch Hope Company. As these securities involved foreign loans and were backed by plantation properties whose quality was hard to evaluate, particularly considering they included slaves and equipment, the reputation of the firms issuing the security was critical for facilitating this type of finance.12

Snowden (1995) describes exhaustively the development of private mortgage securitization in the United States during the 1800s. As in Europe, securitization in the United States was largely motivated to facilitate interregional transfers of funds across heterogeneous and distant investment opportunities, mostly with flows from the northeast towards the western and southern regions. This early financial system developed during a period of scarce regulation, spurred with news of large and profitable investment opportunities in the West and came to an end in 1874, when the United States experienced a large recession. Brewer (1976) discusses the governance structure of two early entrants to this market and prominent issuers of securities, the Mercantile Trust Company and

12 Another early example corresponds to the Danish mortgage and covered bond market that became mainstream in the European market during the 1800s.
the USA Mortgage Company. Buchanan (2014) argued that the existence and functioning of these companies was highly possible “due to the reputation of the(ir) American board and familiarity with the securities process (from the previous experiences in Europe)”.

In 1880 there was a second wave of securitization in the United States, which was boosted by a land boom and came to a halt by the mid-1880s, right after signals of an agricultural depression that led to a bust in land prices in 1893. This experience was also led by highly reputable companies at the time. In 1881 the Iowa Loan and Trust Company became the first one to issue debenture bonds secured by mortgages. Lombard Investment Company of Kansas also made loans and financed ventures in 18 states, selling the mortgage-backed products both in the USA and Europe. In a more systematic analysis, Snowden (2010) uses a sample of ninety-nine of the largest western mortgage companies that had established debenture programs by 1890 and issued securities most intensively and find that the costs of funding loans with debentures fell with the size, financial strength and reputation of the mortgage company.

The first wave of American securitization in the twentieth century rose in the 1920s, led by the real estate optimism that ended a decade later during the Great Depression. A new form of security was developed at the time, known as the “Straus bond”. These securities were characterized by a senior claim on a building that was sold to the public in small denominations. These single property bonds were used to finance the real estate development of large urban centers, such as New York and Chicago. According to Buchanan (2014), while by 1925 the real estate bond issuance accounted for 23% of all corporate debt issuance in the United States, by 1934 this figure collapsed to 0.1%.

Reputation was also critical for this development. As explained by White (2009), “to protect the buyers, companies were required by law (New York regulators) to maintain a reserve fund, expressed as a percentage of their capital..... They were thus constrained more by their reputation than regulation to set aside sufficient reserves.....According to Snowden (1995), New York regulators were overwhelmed and did not examine whether the loan to value ratio was the legal 50 percent; they simply accepted the claimed value. Yet, investors purchased these bonds reassured by their reputation, insurance, approval of the regulators, and favorable assessments by the rating agencies.” Buchanan (2014) also discussed how the success of these securities relied heavily on the reputation of Simon Straus. A famous 1912 advertisement claimed that his business ran “thirty-five years without loss to any investor”.

The most recent wave of securitization in the United States, however, is the one capturing the most attention and receiving the most careful analysis. Securitization grew disproportionately during a period in which banks faced both regulation and problems to finance the growing demand for housing. First dominated by government sponsored institutions, such as a Fannie Mae and Freddie Mac, non-agency securities private issuance increased in relevance after 2003.
(when these institutions were forced to scale down by regulators and there was a house price boom) and collapsed in 2008, together with the reduction in house prices and the Great Recession.

During this most recent wave of securitization, reputation was a critical determinant of who issued securities. Gorton and Souleles (2006) use credit card asset back securities (ABS) during the sample period 1991-2000 to show that low rating sponsors and high rating sponsors securitize more than sponsors with intermediate ratings (consistent with our Proposition 3). Gorton and Souleles (2006) also show that, controlling for the quality of securities, the cost of financing monotonically decreases with the reputation (or credit rating) of the sponsor (consistent with our Proposition 4).

Cetorelli and Peristiani (2012) also study the characteristics of issuers in the recent securitization wave and show that issuance was performed mostly by a few large companies. In particular “MBS issuances are moderately concentrated, with a 38.4 percent HHI (Herfindahl-Hirschman Index), dominated by a small group of financial institutions led by Countrywide, Lehman Brothers, and Morgan Stanley, which collectively accounted for 25 percent of the overall volume.”

In this paper I argue that securitization is based on confidence provided by reputation concerns, but as such it is more volatile than other forms of finance, such as debt, which relies on contractual specifications. This explanation seems consistent with historical waves of securitization that arise regardless of the existence of regulatory constraints, that required optimism in economic conditions to grow disproportionately vis-a-vis other forms of financing, that were led by highly reputable firms and that ended precipitously once bad news about the economy arises.

4. Regulation that Enhances Reputation Concerns

If confidence is the main rationale for securitization, a natural question is: Can policy exploit confidence to maintain the benefits of securitization and at the same time reduce its fragility? I propose a novel regulation that could be used to stabilize the functioning of securitization by exploiting its roots: reputation concerns. I argue that a budget balanced scheme of taxes and subsidies that cross-subsidizes firms with different reputation levels can enhance the disciplining effects of reputation concerns among those that self-select into confidence banking. In doing so, this regulation increases expected production, and at the same time, makes securitization less sensitive to news about future economic conditions.

Assume for the moment that the economy does not have aggregate shocks (there is a unique possible $\mu$). Assume also that the government can impose taxes and subsidies conditional on $\theta$ for each $\phi$, $T(\phi|\theta)$, such that $\tilde{V}(\phi) = V(\phi, \theta)T(\phi|\theta)$ is constant for all $\theta$. In this case, the results of the paper can be recomputed considering $\tilde{V}(\phi)$, now independent of $\theta$. This potential taxation is compelling (and trivial) to eliminate volatility but difficult to sustain.
Financial decisions and crises are intimately related to news about expected economic conditions, so it is usually not plausible to eliminate financial cycles by eliminating economic cycles and news about the future directly. This raises a more challenging question: Is it possible to reduce fragility if it is not possible to attack the source of fragility directly?

Another, ideal but infeasible, solution is to just give a high constant subsidy $T > 1$ for all firms with reputation $\phi$ and all fundamentals $\theta$, conditional on repayment of the loans, such that $\tilde{V}(\phi) = V(\phi, \theta)T$. This subsidy trivially increases the cost of default in terms of forfeiting future profits for all firms, then allowing for more self-regulation. This solution has the same effects as an exogenous increase of $\mu$, but how does one finance these widely available subsidies?

Subsidization, however, can be self-financed by exploiting the heterogeneity of reputation concerns in the economy. The government can transfer resources from firms with poor reputation to firms with high reputation to balance the budget. I propose a subsidy scheme, independent on $\theta$ and monotonically increasing in reputation, such that there is a level of reputation $\tilde{\phi}$ for which $T(\tilde{\phi}) = 1$, $T(\phi) > 1$ for $\phi > \tilde{\phi}$ and $T(\phi) < 1$ for $\phi < \tilde{\phi}$.

This novel regulation increases the incentives for firms with low reputation to issue debt (and then rely on contracts) and increases the incentives for firms with high reputation to use securitization (and then rely on confidence). The subsidy increases the incentives for firms that securitize to repay their loans, making them less sensitive to news about future economic prospects, while the taxes do not change the incentives of firms that rely on debt to repay their loans. This cross subsidization then induces more stable securitization and lower overall production waste of monitoring resources and bankruptcy costs.

The next proposition, proved in the Appendix, formalizes this result.

**Proposition 5.** Assume $\mu$ is such that $\alpha_G R_D(0) < \beta(\alpha_G - p)\mu E_{\theta | \mu} V(0, \theta)$, then, from Proposition 3 there is a unique reputation level $\phi^*(\mu)$ that makes good firms indifferent between debt and securities in the absence of cross subsidization. It exists a subsidy scheme increasing in reputation, $\frac{\partial T(\phi)}{\partial \phi} > 0$ such that $T(\phi) = 1$, where $\phi > \phi^*(\mu)$ and $\phi^*(\mu)$ is also the reputation level that make good firms indifferent in the presence of cross subsidization. The expected profits of firms with reputation $\phi < \phi^*(\mu)$ remain unchanged and of firms with reputation $\phi > \phi^*(\mu)$ increase, as their ex-ante probability of strategic default $\langle N(\theta^*(\phi, \mu)) \rangle$ decline.

Intuitively, a cross-subsidization scheme just affects the behavior of firms that securitize in equilibrium (those with relatively high reputation), and not firms that use debt, and are then subject to bankruptcy procedures. Hence, this novel intervention hinges on subsidizing securitization and making it sustainable using funds from firms that already use debt, which is a stable contract. In a sense, good firms cannot effectively enjoy their capacity to self-regulate because lenders confuse them with bad firms. Since bad firms on average have lower reputation levels than good firms, taxing low reputation is a way for bad firms to
compensate the externality they impose on good firms. This result is consistent with Atkeson et al. (2015). While in their case cross-subsidization works through affecting entry in an industry, in mine it works through affecting the endogenous selection of financing.

Whether cross-subsidization can be self-financed or not depends on the distribution of reputation across firms and on the value functions for different reputation levels. In particular, cross-subsidization is self financed at each expected future condition $\theta$ if transfers depend on both $\phi$ and $\theta$ such that

$$\int_0^1 T(\phi, \theta)V(\phi, \theta)d\phi = \int_0^1 V(\phi, \theta)d\phi.$$ 

where $d\phi$ is the distribution of reputation, conditional on a realized fundamental $\theta$.

**Caveats:** This proposed novel regulation is just intended to highlight important forces that go towards making securitization more stable. It is clear, however, that it presents serious challenges in terms of implementation and political feasibility. Usually reputation is strongly correlated with firm size (as more reputable firms can attract a larger clientele) and firm profits (as more reputable firms can charge a larger premium for their services, which are perceived of higher quality). Then, subsidizing large and profitable firms by taxing small and unprofitable firms may be in direct conflict with other concerns, such as avoiding market power and concentration in the industry.

Given these caveats, it is interesting to note that bailouts may be a hidden type of cross-insurance that indeed stabilizes the banking system. Most literature claims that bailouts buffer the losses of “too big to fail” banks, thereby inducing them to take excessive risks. This literature, however, takes the size of banks as exogenous. If becoming a big bank requires building and maintaining good reputations, bailouts may have the opposite effect, to reduce the incentives for excessive risk-taking in order to become a “too big to fail” bank.

Finally, even though this alternative novel regulation improves welfare, there may exist other more complicated regulatory requirements that constitute better policies. Regardless of its practicality and optimality, the novel regulation proposed here uncovers potential benefits of cross-subsidization in an industry, which compensates other considerations raised in the literature. I leave for future research the practical complications of implementing a cross-subsidization policy and the design of an optimal mechanism that maximizes welfare by acknowledging the microfoundations and rationale of securitization.

5. Conclusions

This paper argues that the rise, growth, and collapse of securitization is consistent with the dynamics of confidence in financial markets sustained by financial institutions that are concerned about reputation. If good times are expected, gains from having a good reputation are large, introducing incentives for good behavior (such as coverage of securities in trouble). These incentives create
a cheap, but fragile, methods of finance based on implicit promises. When bad news about future prospects arises, reputation gains become weaker and may fail to provide incentives for good behavior. Incentives can collapse suddenly, leading to a fast destruction of confidence banking. In contrast, more traditional financing methods are more stable, but also more costly as they rely on costly contractual provisions (such as monitoring and bankruptcy procedures). The goal of this paper is to highlight this trade-off between two financing alternatives, and to argue that optimal intervention does not imply avoiding one of the alternatives, but rather supporting it.

The paper can be extended in several directions. First, reputation gains can be determined endogenously, as in Ordonez (2013a). Second, the forces in this paper can be accommodated to study other financial institutions and instruments, such as repo, money markets, investment banks, etc. Third, the model can be used to study confidence relations when transactions include collateral of unknown quality, in which prices also depend on aggregate economic conditions. Finally, reputation concerns likely play also an important role in sustaining securitization that tries to avoid costly regulations, such as capital requirements, as in Ordonez (2013b).

All these extensions would make the model richer and more realistic, but would not change this main insight: That reputation concerns induce confidence and create a rich environment an alternative method of finance based on implicit promises. Even though this alternative based on confidence is cheaper and more efficient it is also fragile and prone to collapses. Whether it is desirable to have a system based on confidence depends on the trade-off between these benefits and costs. Hence, the challenge for regulation is not eliminating confidence, but making it more robust.

References


Appendix A. Proofs

Proof of Proposition 1
Since $s^*(\phi)$ is the signal that makes a good firm with a given reputation $\phi$ indifferent between covering a security in trouble or not, the condition at $s^*(\phi)$ is clearly

$$\beta E_{[s^*]} [V(\phi, \theta|\tilde{s}(s^*))] = R(\phi|s^*),$$

where $\tilde{s}(s_i) = 1 - Pr(E_j(\theta) < E_i(\theta)|s_i)$, which is the probability that investors expect a fundamental $\theta$ under the one the firm expects conditional on the signal $s_i$ that the firm observes. Since at the cutoff $s^*$ firms are indifferent between covering securities in trouble or not, $\tilde{s}(s^*)$ is the probability firms assign to investors believing $\theta$ is such that the firm covers securities in trouble, and hence the belief investors use to update reputation at the cutoff $s^*$.

The updated belief of the firm about the fundamental, after observing a signal $s_i$ is

$$E_i(\theta|s_i) = \frac{\gamma\theta \mu + \gamma s s_i}{\gamma \theta + \gamma s}.$$  

The updated distribution of the fundamental after the firm observes the signal $s_i$ is

$$\theta|s_i \sim \mathcal{N}(E_i(\theta|s_i), \frac{1}{\gamma \theta + \gamma s}),$$

and the distribution of investors’ signals $s_j$, conditional on the firm’s signal $s_i$ is

$$s_j|s_i \sim \mathcal{N}(E_i(\theta|s_i), \frac{1}{\gamma \theta + \gamma s} + \frac{1}{\gamma s}).$$  

(A.1)

Hence,

$$Pr (E_j(\theta) < E_i(\theta)|s_i) = Pr \left( s_j < E_i(\theta) + \frac{\gamma \theta}{\gamma s} (E_i(\theta) - \mu)|s_i \right)$$

$$= \Phi \left( \sqrt{s}(s_i - \mu) \right),$$

where $\gamma = \frac{\gamma_s \rho^2}{(\gamma \theta + \gamma s)(\gamma \theta + 2 \gamma s)}$.

As $\gamma_s \to \infty$, $\gamma \to 0$, then $\tilde{s}(s_i) = \frac{1}{2}$ for all $s_i$. Hence, in the limit the unique cutoff $s^*$ is uniquely determined by $\beta E_{[s^*]} [V(\phi, \theta|\tilde{s}(s^*)) = \frac{1}{2}] = R(\phi|s^*)$.

Investors update reputation based on their beliefs, which depend on their signals. When investors observe a signal $s_j$, they infer that the probability the firm observes a signal $s_i$ below the cutoff $s^*(\phi)$, and decides not to cover securities in trouble, is

$$\tilde{s}(s_j) = 1 - Pr(s_i < s^*|s_j) = 1 - \Phi \left[ \sqrt{\frac{\gamma s (\gamma \theta + \gamma s)}{\gamma \theta + 2 \gamma s}} (s^* - \frac{\gamma \theta \mu + \gamma s s_j}{\gamma \theta + \gamma s}) \right].$$

where $\Phi$ is just the standard normal distribution from equation (A.1). As $\gamma_s \to \infty$, $\tilde{s}(s_j) \to 0$ if $s_j < s^*(\phi)$ and $\tilde{s}(s_j) \to 1$ if $s_j > s^*(\phi)$. This implies that in
the limit, whenever investors observe a signal above \(s^*(\phi)\), they believe firms cover securities in trouble and update reputation. Similarly, whenever investors observe a signal below \(s^*\), they believe firms do not cover securities in trouble and do not update reputation. Q.E.D.

**Proof of Proposition 2**

The proof applies for a given \(\phi\), hence for simplicity I denote \(s^*(\phi)\) just as \(s^*\). Differentiating the condition (7) that pins down \(s^*\) with respect to \(\mu\),

\[
\frac{\partial \beta}{\partial \mu} E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))] + \frac{\partial \beta}{\partial s^*} E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))] ds^* \frac{d\mu}{\partial s^*} + \frac{\partial R(\phi|s^*)}{\partial \mu} \frac{d\mu}{\partial s^*} = \frac{\partial R(\phi|s^*)}{\partial \mu} + \frac{\partial R(\phi|s^*)}{\partial \mu},
\]

\[
\left(\frac{\partial \beta}{\partial \mu} E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))] \right) + \frac{\partial R(\phi|s^*)}{\partial \mu} ds^* \frac{d\mu}{\partial s^*} = \frac{\partial \beta}{\partial \mu} E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))].
\]

Recall that, since, \(\frac{\partial N_*(s^*)}{\partial \mu} < 0\), then \(\frac{\partial R(\phi|s^*)}{\partial \mu} < 0\). Also \(\frac{\partial \beta}{\partial \mu} E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))] > 0\). From assumptions 1 and 2 the term in parenthesis is positive. Combining these results using the envelope condition shows that \(\frac{ds^*}{d\mu} < 0\).

Intuitively, a decline in \(\mu\) increases \(R(\phi|s^*)\) for a given \(s^*\) (by an increase in the cumulative distribution up to \(s^*\)). This requires a larger \(s^*\) to raise \(E_{\theta|s^*} [V(\phi, \theta|\hat{\tau}(s^*))]\) and fulfill equation (7). This direct effect increases \(s^*\). Furthermore, this increase in \(s^*\) implies a further increase in \(R(\phi|s^*)\), which reinforces the direct effect generated by a lower \(\mu\). There is also a second effect that comes from reducing beliefs \(\hat{\tau}(s_i)\) and reputation updating at each \(s_i\), (since \(\hat{\tau}(s_i) = 1 - \Phi(\sqrt{\hat{\tau}(s_i) - \mu})\), weakly reducing \(E_{\theta|s_i} [V(\phi, \theta|\hat{\tau}(s_i))]\), for every signal \(s_i\). Hence, a further increase in \(s^*\) is necessary to compensate for this reduction and still fulfill equation (7). Q.E.D.

**Proof of Proposition 3**

Value functions from issuing debt and securities, as \(\gamma_s \to \infty\) (almost perfect information), are

\[
U^D_G(\phi, \mu) = p(y + z) + \alpha_G \left[ \beta E_{\theta|\mu} V(\phi', \theta) - R_D(\phi) \right]
\]

and

\[
U^S_G(\phi, \mu) = p(y + z) + N(s^*(\phi, \mu)) \left[ \beta E_{\theta|\mu, \theta < s^*} V(\phi, \theta) - R_S(\phi|s^*(\phi, \mu)) \right] + (1 - N(s^*(\phi, \mu))) \alpha_G \left[ \beta E_{\theta|\mu, \theta > s^*} V(\phi', \theta) - R_S(\phi|s^*(\phi, \mu)) \right]
\]

respectively.

Since \(\hat{\alpha}_G = N(s^*(\phi, \mu)) p + (1 - N(s^*(\phi, \mu))) \alpha_G\) and \(N(s^*(\phi, \mu)) = E_{\theta|\mu, \theta < s^*} V(\phi', \theta) + (1 - N(s^*(\phi, \mu))) E_{\theta|\mu, \theta > s^*} V(\phi', \theta)\) we can rewrite the difference between these two values as

\[
U^S_G(\phi, \mu) - U^D_G(\phi, \mu) = \left[ \alpha_G R_D(\phi) - \hat{\alpha}_G R_S(\phi|s^*(\phi, \mu)) \right] - \beta N(s^*(\phi, \mu)) \Delta V(\phi, \mu|s^*(\phi, \mu))
\]

(A.4)
where
\[
\alpha_G R_D(\phi) = \alpha_G \frac{1 + [1 - (\phi \alpha_G + (1 - \phi) \alpha_B)] C}{\phi \alpha_G + (1 - \phi) \alpha_B},
\]
\[
\tilde{\alpha}_G R_S(\phi | s^*(\phi, \mu)) = \frac{\tilde{\alpha}_G}{\phi \alpha_G + (1 - \phi) \alpha_B},
\]
and
\[
\Delta EV(\phi, \mu | s^*(\phi, \mu)) \equiv \left[ \alpha_G E_{\theta | \mu, \theta > s^*} V(\phi', \theta) - p E_{\theta | \mu, \theta > s^*} V(\phi, \theta) \right] > 0.
\]
The net benefits of securitization, \(B(\phi, \mu)\), come from firms paying lower rates for funds. The net cost of securitization, \(C(\phi, \mu)\), come from defaulting more frequently and from losing the reputation update in those cases.

First, I evaluate the function \((U_G^S - U_G^D)\) in the extremes, for very large and very small \(\mu\). When \(\mu\) is high enough such that \(N(s^*) \rightarrow 0\), then i) \(C(\phi, \mu) \rightarrow 0\) and ii) as \(\tilde{\alpha}_G \rightarrow \alpha_G\), \(B(\phi, \mu) \rightarrow \alpha_G \frac{(1-\phi \alpha_G - (1-\phi) \alpha_B) C}{\phi \alpha_G + (1-\phi) \alpha_B} > 0\). This implies that there is always a \(\mu(\phi)\) large enough such that a firm with reputation \(\phi\) prefers to issue securities, not debt.

At the other extreme, when \(\mu\) is low enough such that \(N(s^*) \rightarrow 1\), then i) as \(\tilde{\alpha}_G \rightarrow p\), \(\phi' \rightarrow \phi\) and \(C(\phi, \mu) \rightarrow \beta(\alpha_G - p) E_{\theta | \mu} V(\phi, \theta) > 0\) and ii) as \(\tilde{\alpha}_G R_S(\phi | s^*(\phi, \mu)) \rightarrow 1\), then \(B(\phi, \mu) \rightarrow \alpha_G R_D(\phi) - 1 > 0\). This implies that there may be a \(\mu^*_L(\phi)\) low enough such that a firm with reputation \(\phi\) prefers to issue securities, not debt, for all \(\mu < \mu^*_L(\phi)\) if and only if \(\alpha_G R_D(\phi) - 1 > \beta(\alpha_G - p) E_{\theta | \mu} V(\phi, \theta)\). This is naturally the case when \(\mu\) is so low that \(E_{\theta | \mu} V(\phi, \theta) = 0\), as this is isomorphic to a static situation in which the future does not matter. In such case securities are preferred because the firm pays $1 in expectation for the loan of $1, but involves a lower probability of firm continuation.

Second, to assess what happens for intermediate levels of \(\mu\), we evaluate the change of the expression \((U_G^S - U_G^D)\) as a function of \(\mu\), this is \(\frac{\partial(U_G^S - U_G^D)}{\partial \mu}\). Taking derivatives of each component.

\[
\frac{\partial B(\phi, \mu)}{\partial \mu} = -\left[ \frac{\partial \tilde{\alpha}_G R_S(\phi | s^*)}{\partial \phi} \cdot \frac{\partial \tilde{\alpha}_G}{\partial N(s^*)} \right] \left[ \frac{\partial N(s^*)}{\partial \mu} + \frac{\partial N(s^*)}{\partial s^*} \cdot \frac{\partial s^*}{\partial \mu} \right] < 0 \tag{A.5}
\]
\[
\frac{\partial C(\phi, \mu)}{\partial \mu} = \beta \left[ \frac{\partial N(s^*)}{\partial \mu} + \frac{\partial N(s^*)}{\partial s^*} \cdot \frac{\partial s^*}{\partial \mu} \right] \Delta EV + \beta N(s^*) \left[ \frac{\partial \Delta EV}{\partial \mu} + \frac{\partial \Delta EV}{\partial s^*} \cdot \frac{\partial s^*}{\partial \mu} \right] < 0 \tag{A.6}
\]
We can always characterize these derivatives for relatively high and small values of \(\mu\). When \(\mu\) is high enough such that \(N(s^*) \rightarrow 0\), then \(\frac{\partial N(s^*)}{\partial \mu} \rightarrow 0\) and \(\frac{\partial s^*}{\partial \mu} \rightarrow 0\). This implies that i) \(C(\phi, \mu) \rightarrow 0\) and ii) \(B(\phi, \mu) \rightarrow 0\) and the net
positive incentives to issue securities over debt do not change when $\mu$ is high enough. Intuitively, the expected fundamentals are so good that the assessed probability of strategic default is so low that the probability of continuation, and hence the update of reputation, is high. At the other extreme, when $\mu$ is low enough such that $\mathcal{N}(s^*) \to 1$, still it is the case that $\frac{\partial \mathcal{N}(s^*)}{\partial \mu} \to 0$ and $\frac{\partial s^*}{\partial \mu} \to 0$. This implies that i) $\mathcal{C}(\phi, \mu) \to \beta \frac{\partial \mathcal{E}_s \mathcal{V}}{\partial \mu} = \beta (\alpha_G - p) \frac{\partial \mathcal{E}_s \mathcal{V}(\phi, \theta)}{\partial \mu} > 0$ and ii) $\mathcal{B}(\phi, \mu) \to 0$, then the potential net positive incentives to issue securities over debt when $\mu$ is low decreases as we increase $\mu$. Intuitively, the higher probability of default from securities becomes more costly in terms of continuation as fundamentals improve in expectation.

For intermediate levels of $\mu$, the characterization of these derivatives depend on the shape of the value function with respect to $\theta$. In principle there may be many thresholds for which $\mathcal{U}_G^s - \mathcal{U}_G^D = 0$ and then many regions of $\mu < \mu_H^*(\phi)$ for which firms issue securities. As long as the value $\mathcal{V}(\phi, \theta)$ is smooth enough in $\theta$, however, at most two thresholds exist and then firms of reputation $\phi$ issue debt for $\mu_H^*(\phi) < \mu < \mu_H^*(\phi)$. The condition depends on value function not displaying jumps or large changes as function of $\mu$. Q.E.D.

**Proof of Proposition 4**

As discussed, $\mu_H^*(\phi)$ is determined by equation (A.4) equal to zero, when $\mathcal{N}(s^*) < 1$. Also, if $\mu_H^*(\phi)$ exists, it is for $\mathcal{N}(s^*) \to 0$. I will analyze each of these thresholds as function of reputation $\phi$ in steps.

**Step 1:** Taking derivatives of firms’ expected profits with respect to $\phi$,

$$
\frac{\partial \mathcal{U}_G^s(\phi, \mu)}{\partial \phi} = \alpha_G \left[ \frac{\partial \mathcal{E}_s V(\phi', \theta)}{\partial \phi'} - \frac{\partial \mathcal{R}_D(\phi)}{\partial \phi} \right],
$$

(A.7)

which is positive by construction of value functions increasing with $\phi$ and because

$$
\frac{\partial \mathcal{R}_D(\phi)}{\partial \phi} = - \frac{(1 + C)(\alpha_G - \alpha_B)}{(\phi \alpha_G + (1 - \phi) \alpha_B)^2} < 0.
$$

$$
\frac{\partial \mathcal{U}_G^s(\phi, \mu)}{\partial \phi} = \mathcal{N}(s^*(\phi, \mu)) \beta p \frac{\partial \mathcal{E}_s V(\phi, \theta)}{\partial \phi} + (1 - \mathcal{N}(s^*(\phi, \mu))) \beta \alpha_G \frac{\partial \mathcal{E}_s V(\phi, \theta)}{\partial \phi} + (1 - \mathcal{N}(s^*(\phi, \mu))) \beta \frac{\partial \mathcal{E}_s V(\phi, \theta)}{\partial \phi} - \mathcal{R}_S(\phi|s^*(\phi, \mu)) - \mathcal{N}(s^*(\phi, \mu)) \beta \frac{\partial \mathcal{R}_S(\phi|s^*(\phi, \mu))}{\partial \phi} - \mathcal{N}(s^*(\phi, \mu)) \beta \frac{\partial \mathcal{R}_S(\phi|s^*(\phi, \mu))}{\partial \phi}
$$

(A.8)
Differentiating the condition that pins down \( s^* \) with respect to \( \phi \),

\[
\frac{dE_{\theta|s^*}[V(\phi, \theta|\tilde{\tau}(s^*))]}{d\phi} = \frac{dR_S(\phi|s^*)}{d\phi}.
\]

Since

\[
dR_S \frac{dR_S}{d\phi} = \frac{\partial R(\phi|s^*)}{\partial \phi} + \frac{\partial R(\phi|s^*)ds^*}{\partial \phi} = \frac{(\tilde{\alpha}_G(s^*) - \alpha_B)}{(\phi\tilde{\alpha}_G(s^*) + (1 - \phi)\alpha_B)^2} + \frac{\phi(1 - p)\partial N(s^*)}{d\phi} \frac{ds^*}{d\phi},
\]

\[
\left[ \frac{\partial E_{\theta|s^*}[V(\phi, \theta|\tilde{\tau}(s^*))]}{\partial s^*} - \frac{\partial R(\phi|s^*)}{\partial s^*} \right] \frac{ds^*}{d\phi} = \frac{\partial R_S(\phi|s^*)}{\partial \phi} - \frac{\partial \beta E_{\theta|s^*}[V(\phi, \theta|\tilde{\tau}(s^*))]}{\partial \phi}.
\]

The term in brackets on the left is positive (by assumptions 1 and 2) and the term on the right is negative. By the envelope condition, \( \frac{ds^*}{d\phi} < 0 \) and \( \frac{dR_S}{d\phi} < 0 \).

This implies the steep part of the value function \( U^S_D(\phi, \mu) \) moves to the left when \( \phi \) grows.

Since both \( U^S_D(\phi, \mu) \) and \( U^D_D(\phi, \mu) \) increase with \( \phi \) for each \( \mu \), the threshold \( \mu^*_H(\phi) \) declines with \( \phi \) if \( \frac{dU^S_D(\phi, \mu^*_H(\phi))}{d\phi} > \frac{dU^D_D(\phi, \mu^*_H(\phi))}{d\phi} \). Since the threshold \( \mu^*_H(\phi) \) is given by the value \( \mu \) at which equation (A.4) is equal to zero, by evaluating equations (A.7) and (A.8) at \( \mu^*_H \) it is clear that this condition is fulfilled.

\[
\frac{d\mu^*_H}{d\phi} < 0.
\]

Step 2: \( \mu^*_L(\phi) \) is determined by equation

\[
\alpha_G R_D(\phi) - 1 \approx \beta(\alpha_G - p)E_{\theta|\mu^*_L(\phi)}V(\phi, \theta)
\]

Taking the derivative with respect to \( \phi \),

\[
\alpha_G\frac{\partial R_D(\phi)}{\partial \phi} \approx \beta(\alpha_G - p) \left[ \frac{\partial E_{\theta|\mu^*_L(\phi)}V(\phi, \theta)}{\partial \phi} + \frac{\partial E_{\theta|\mu^*_L(\phi)}V(\phi, \theta)}{\partial \phi} \frac{\partial \mu^*_L}{\partial \phi} \right]
\]

Since we have shown \( \frac{\partial R_D(\phi)}{\partial \phi} < 0 \) and by assumption of value functions \( \frac{\partial E_{\theta|\mu^*_L(\phi)}V(\phi, \theta)}{\partial \phi} > 0 \) and \( \frac{\partial E_{\theta|\mu^*_L(\phi)}V(\phi, \theta)}{\partial \phi} > 0 \). Then \( \frac{\partial \mu^*_L}{d\phi} < 0 \). Q.E.D.

Proof of Proposition 5

First I prove the impact of subsidies on the incentives to cover securities in distress, summarized by \( \theta^* \).

Imposing \( V(\phi', \theta|\tilde{\tau}(\theta^*))T(\phi') \) in the condition that pins down \( \theta^* \), and differentiating with respect to \( T(\phi') \),

\[
\left( \frac{\partial \beta V(\phi', \theta|\tilde{\tau}(\theta^*))T(\phi')}{\partial \theta^*} - \frac{\partial R(\phi|\theta^*)}{\partial \theta^*} \right) \frac{d\theta^*}{dT(\phi')} = -\beta V(\phi', \theta|\tilde{\tau}(\theta^*)).
\]

The right hand side is negative and the term in brackets is positive, which implies that \( \frac{d\theta^*}{dT(\phi')} < 0 \). In words, the ex-ante probability of strategic default
for all reputations $\phi$ for which the update $\phi'$ is subsidized with $T(\phi') > 1$. In contrast, the ex-ante probability of strategic default increases for all reputations $\phi$ for which the update $\phi'$ is taxed with $T(\phi') < 1$.

This result is important to prove the first part of the proposition. Assume $T(\phi^*) = 1$ such that $T(\phi^{**}) > 1$. This implies that, in the presence of cross-subsidization, good firms with reputation $\phi^*$ strictly prefer to issue securities. This is clear from comparing equations (A.2) and (A.3). Equation (A.2) remains constant while equation (A.3) increases for two reasons. First, fixing $\theta^*$, the value of reputation updating is larger because $E_{\theta|\mu, \theta > \theta^*} V(\phi^*, \theta) T(\phi^*) > E_{\theta|\mu, \theta > \theta^*} V(\phi^{**}, \theta)$. Second, as shown above, $\theta^*$ declines, which reduces $R_S$ and further increases the gains from securitization in equation (A.3).

Combining this result with proposition 4, when $T(\phi^*) = 1$, then $\phi^* > \phi^{**}$, where $\phi^{**}$ is the reputation level that makes good firms indifferent between using debt or securitization in the presence of cross subsidization. By imposing $T(\phi) < 1$, equation (A.2) declines while equation (A.3) does not increase so much as in the previous case. This implies there is always a $\phi^*(\mu) < \phi^* < \phi^{**}(\mu)$ such that $T(\phi) = 1$ and $\phi^*(\mu) = \phi^{**}(\mu)$. If the government imposes such a scheme, the firms that issue debt and securities do not change. The firms with reputation $\phi < \phi^*$ issue debt and since they are subject to contractual provisions, they keep paying loans with successful ongoing projects. In contrast, the good banks with reputation $\phi > \phi^*$ issue securities, but because subsidies decrease $\theta^*(\phi)$, they use successful ongoing projects to cover securities in distress and securitization is less fragile.

### Appendix B. Institutional Details of Special Purpose Vehicles (SPV)

Securitization involves the following steps: (i) a sponsor or originator of receivables sets up a remote “special purpose vehicle” (SPV), pools the receivables, and transfers them to the SPV as a true sale; (ii) the cash flows are tranched into asset-backed securities, the most senior of which are rated and issued in the market; the proceeds are used to purchase the receivables from the sponsor; (iii) the pool revolves in that over a period of time the principal received on the underlying receivables is used to purchase new receivables; (iv) there is a final amortization period, during which all payments received from the receivables are used to pay down the tranche principal amounts.

A critical step in securitization then involves sponsoring SPVs. By financing the firm using off-balance sheet instruments, the issuer maintains control over the business decisions while the financing is done in the SPVs. The two key characteristics of SPVs are the following: **Bankruptcy remoteness and privileged information.** First, SPVs are not subject to bankruptcy costs because, as a matter of design, they cannot in practice go bankrupt. Second, investors holding SPVs have privileged access to information about the proceedings of the assets composing the SPVs.

First, with respect to bankruptcy remoteness, in the U.S. it is not possible to waive the right to use a bankruptcy procedure, but it is possible to structure
an SPV so that there cannot be an event of default that would throw the SPV into bankruptcy. How? According to Klee and Butler (2002) and Gorton and Souleles (2006), an SPV is a legal entity which has been set up for a specific, limited purpose by another entity (the sponsoring firm), and can take the form of a corporation, trust, partnership, or a limited liability company. The SPV may be a subsidiary of the sponsoring firm, or it may be an orphan SPV, one that is not consolidated with the sponsoring firm for tax, accounting, or legal purposes (or may be consolidated for some purposes but not others). An SPV is off-balance sheet of the sponsor firm if meeting the requirements set forth in Financial Accounting Standard 140. To fulfill these requirements the SPV must be a separate and distinct legal entity from the sponsor (the sponsor does not consolidate the SPV for accounting reasons). It must be an automaton in the sense that there are no substantive decisions for it to ever make, just simply rules that must be followed. SPVs are essentially robot firms that have no employees, make no substantive economic decisions, have no physical location, and cannot go bankrupt.

That the SPV itself must (as a practical matter) never be able to become bankrupt is its most essential feature. As it is legally unenforceable for a firm to waive its right to file a voluntary bankruptcy petition, it can completely eliminate the risk of either voluntary or involuntary bankruptcy by creating the SPV in a legal form that is ineligible to be a debtor under the U.S. Bankruptcy Code. The SPV can be structured to achieve this result. As Klee and Butler (2002) highlight, "the use of SPVs is simply a disguised form of bankruptcy waiver".

Even though under accounting and regulatory rules sponsors are not supposed to provide support, still this support is recognized by U.S. bank regulators who usually refer to it as "implicit recourse" or "moral recourse:" the provision of credit support, beyond contractual obligations. Gorton and Pennacchi (1995)) discussed the issue of implicit recourse in financial markets in the context of the bank loan sales market and provide empirical evidence for its existence.

Second, investors have access to proprietary information about the proceedings of the pool. As described by Plantin (2009), "a number of securities, such as securitized pools of loans, are not traded publicly but are sold to institutional investors who, from then on, receive from the issuer information that is not publicly available. Thus, investors in such privately placed securities buy a bundle comprised of not only a claim to future cash flows but also a flow of future privileged information about these cash flows".