FROM LOW-QUALITY ACCOUNTING TO FINANCIAL CRISES: POLITICS OF DISCLOSURE REGULATION ALONG THE ECONOMIC CYCLE

JEREMY BERTOMEU ROBERT P. MAGEE*

Abstract

This paper models interactions between disclosure regulation and the economic cycle, within a positive framework in which politically-sensitive regulators respond to the demands of firms (borrowers) and banks (lenders). We show that accounting quality is lowest prior to a recession, as the increase in the stock of non-performing projects shifts political power toward those favoring less financial transparency. In turn, bad debt accumulates in banks, as lending activity, cost of debt and aggregate uncertainty all increase; as a result of lower financial transparency, the deterioration in project quality is not immediately reflected in market prices. When recessionary times become known, borrowers raise accounting quality to offset the deadweight cost of bad investments, leading to credit market contraction.

Keywords: Business Cycle; Regulation; Positive Economics, Political; Crisis; Credit Market; Accounting Standards; Lobbying.

*Department of Accounting Information and Management, Kellogg School of Business, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208-2001. Current version: August 30^{th} 2010. We thank Tim Baldenius, Anne Beyer, Craig Chapman, Carlos Corona, Edwige Cheynel, Ron Dye, Pierre Liang, Tom Lys, Ivan Marinovic, Georg Schneider, Anup Srivastava, Jerold Zimmerman as well as Liang Tan for his excellent research assistance. All remaining errors are our own.

Times of economic hardship are important moments for accounting regulation. Looking through the recent history of security markets regulations, major pieces of legislation were passed during recessions. To cite only a few examples, the SEC Act was passed in 1934, the ARB 43 codification in 1953, the revision to Regulation S-X in 1976 and the FAS 141/142 methods for business combinations in 2001, the Sarbanes-Oxley Act of 2002, all during or shortly after years of recession. By contrast, casual evidence suggests that resistance to new regulation has been more intense before the outbreak of a recession; these periods have featured some of the most prominent debates on new accounting proposals, as for example for the oil and gas extractive industries (1979/1980), initial stock option expensing (over the 1990s) and the pooling-of-interest method (2000/2001).

The most recent recession started in December 2007 and, so far, has not been an exception to this rule. The recession poses several questions as to how and why accounting regulation accompanies economic cycles, and whether there are cyclical patterns in financial transparency. Yet, despite a wide interest about these questions, we have no theory that explains how accounting regulation is related to the cycle and, as such, how it contributes to the cyclical variations in macroeconomic activity.[1]

There are certainly conflicting views about the causes of a recession, and in particular as they relate to accounting standards. In his keynote address to the 2009 general meeting of the American Accounting Association, Sir David Tweedie, chairman of the International Accounting Standard Board, spoke in the following terms:

"Let's look at the crisis, what's caused it? It was not accounting. It was caused by bankers making ridiculous loans to people who had no income, no jobs, no assets (...), fraud, bad compensation practices, poor risk management practices, the originate-to-distribute model leading to levels of complexity that few understood, rating agencies grossly underestimating the loss potential and due diligence wasn't done by investors."

His views as a standard-setter may be contrasted to that of other (more critical) observers, which is most apparent from one of the follow-up questions from the audience, *"Practically every bank has*

[1]That standard-setters are responsive to situations of financial crisis is not controversial. As an example, the FASB met with the IASB in London between January 20 and January 22 (see IASB Update - January 2010). The minutes mention the following areas as part of the Financial crisis topic: Consolidation, Fair value measurement, Financial instruments: classication and measurement, Financial instruments: hedge accounting, Financial instruments with characteristics of equity, Derecognition.

published opaque sets of accounts and they all complied with International Accounting Standards. (...) How can you say that IFRS had nothing to do with the current crisis?". Financial instruments are contractual objects whose very existence is affected by accounting information; in particular, a complete argument about which loans were issued, or the price at which they traded, cannot reasonably be separated from the quality of the accounting information. Vice-versa, it is equally unsatisfactory to view "bad" accounting as a primitive without asking why it may have become less effective during the period prior to the crisis.

That financial reporting may be related to the cycle raises a number of important and subtle issues, many of which go far beyond the ambition of a single study. We elaborate here on one particular facet of these debates, examining the possible effects of political pressures on accounting regulation. We examine how the demand for accounting quality varies as a function of the cycle, leading to cyclical implemented regulations. Our objective is to explain how regulations may have interacted with macroeconomic fluctuations and to what extent (low-quality) politically-sensitive regulation could be a catalyst of recessions.

We present next a brief overview of our basic argument and state our main conceptual findings. We describe an economy that is regulated by a politically-sensitive regulator who implements a regulation that is preferred by a large enough fraction of its constituents. We adopt this assumption not because it is always descriptive of current regulatory bodies, but because it provides a way to highlight the effect of political pressures on those bodies. In our theoretical model, "the regulation" represents the set of all mandatory disclosure rules that help detect (and stop) non-performing investments. This of course includes accounting standards themselves but also, and at least equally as important, the enforcement of these standards, auditing standards and guidances, or banks' oversight.

The political demands for disclosure are a function of the aggregate stock of good projects (whose owners demand more informative disclosures), relative to the aggregate stock of bad projects. Prior to the outbreak of a recession, the number of good projects falls. Their influence on regulatory choice decreases, and political power shifts towards interest groups with unprofitable projects who benefit from lower-quality disclosure requirements. This leads the regulator to adopt lax mandatory disclosure rules, in turn implying less information in the credit market and more projects being financed (a

credit market boom).[2] Because the adverse selection is priced in the loan market, interest rates increase in anticipation of a rise in default rates. In the periods that follow, if these first stages turn into a full-fledged recession, the social costs of non-performing loans may become so high that even firms with bad projects may (partially) raise disclosure quality, which leads to a partial or complete credit market collapse. When compared to the credit market boom that precedes, the economy exhibits a sharp contraction in activity levels that closely resembles a credit crunch.

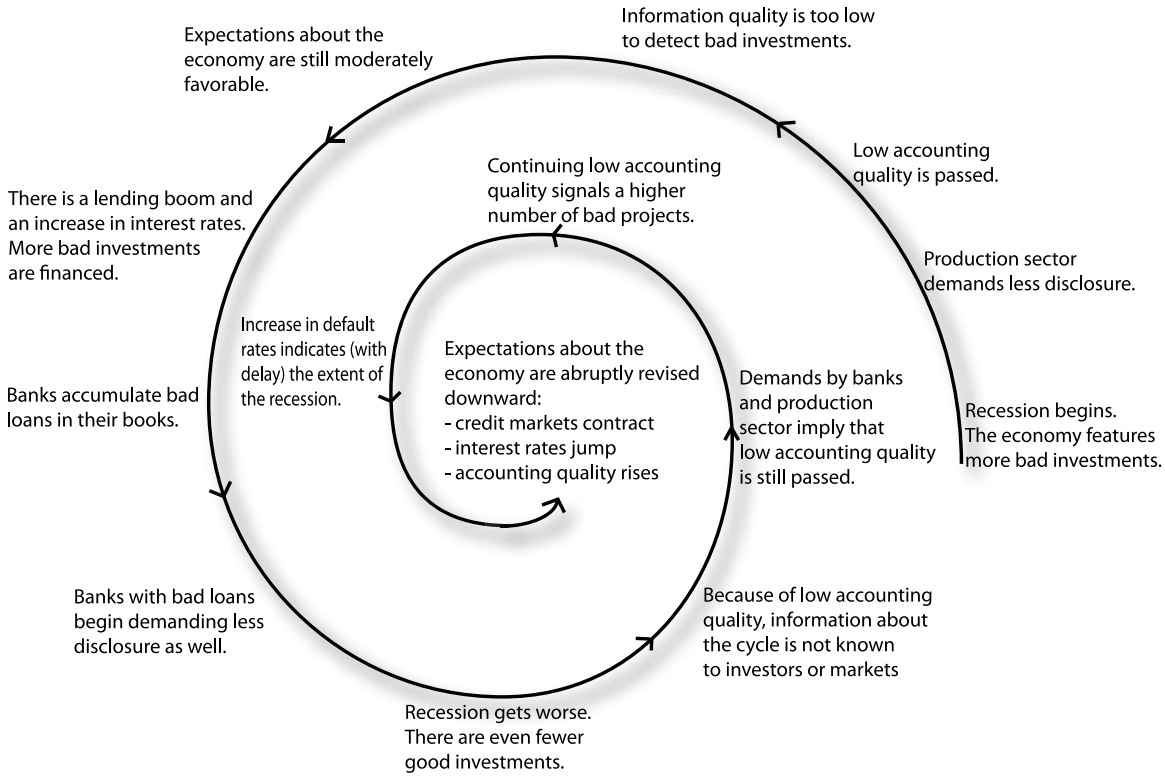

Figure 1: Spiral to a Crisis: An Illustration of the Results

This basic argument develops how accounting responds to economic fluctuations, but other important considerations emerge by considering how accounting may provide information about macroeconomic fluctuations. If investors are imperfectly informed about the state of the economy, accounting reports serve a role as an information channel about the cycle. We formally establish that political forces may create a "crisis spiral" as illustrated in Figure 1. During the first-stage of an economic

[2]We recognize that accounting regulations are seldom seen to be relaxed. This assumption is meant to be a reduced form of a setting in which the ability of current standards to differentiate good and bad projects deteriorates over time (perhaps due to innovations in transactions or business practices). As a result, periodic adjustments/improvements are required to maintain the informational quality of the standards.

downturn, the majority of firms demand lower-quality disclosures. In turn, this creates (a) a greater quantity of bad loans in the books of banks, so that banks begin (also) to demand less disclosure, and (b) a loss of information about current changes in the cycle. If the downturn worsens, the low-quality accounting system fails to convey that a severe recession is occurring and, thus, market participants fail to respond by tightening credit or increasing disclosure quality. Because disclosure helps filter out bad projects, banks accumulate increasing levels of bad debt and and create an increased push for even less disclosure. The declining accounting quality slightly precedes the outbreak of a financial crisis. Finally, the increase in default rates of previously-financed projects reveals (with delay) the severity of the recession. The private sector responds to this information by repricing all assets financed in previous periods, tightening current interest rates and increasing the overall level of disclosure. The increase in accounting quality is coincidental with the realization of the financial crisis and the burst of the credit boom.

Figure 2 provides some further motivational facts that seem broadly consistent with these observations. The production of accounting standards, as captured by pronouncements, pages and word count, is the lowest prior to a NBER recession and greatest during a NBER recession; after the recession ends, the output tends to return to its average levels. We are not aware of any comprehensive study of these ideas, but we hope that our study will help formulate a number of predictions that can be empirically tested.

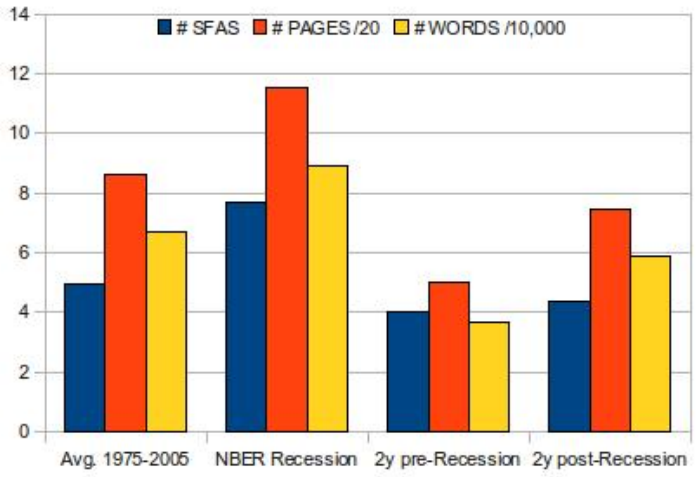

Figure 2: Standard-Setting by FASB - per year 1975-2005

It is noteworthy that, given the extensive prior research on business cycles and financial crises,

few studies have looked specifically at its relationship with accounting regulation. No less surprising is that accounting numbers are the primary source of information used for valuation and national growth accounting, and may be closely linked to aggregate fluctuations (Ball, Sadka, and Sadka (2009), Balakrishnan (2009), Crawley (2009), Li, Jorgensen, and Sadka (2009)). In this area, several classic papers have looked at the informational determinants of business cycles and credit market crises (e.g., Bernanke (1983), Bernanke and Gertler (1988), Kiyotaki and Moore (1997)); however, the quality of the information available in the marketplace is usually taken as being exogenously given. More recently, several authors discuss how an unregulated banking industry may make choices that lead to greater levels of systematic risk (Allen and Carletti (2008), Plantin, Sapra, and Shin (2008), Brunnermeier et Al. (2009), Acharya (2009)). Laux and Leuz (2010) examine more specifically the role of mark-to-market accounting and find no direct evidence that this aspect of accounting may have contributed to the crisis. Glode, Green, and Lowery (2009) show that financial intermediaries optimally respond to increases in asset volatility by acquiring more information, possibly leading to a market breakdown. This study further contributes to the existing body of literature by showing how endogenous accounting regulations may also increase aggregate uncertainty and affect how the real economy responds to fluctuations.

Given that we model the political demand for regulation as a determinant of accounting choice, our study is also related to an existing literature documenting how political processes may influence mandatory accounting rules. Starting with Watts and Zimmerman (1978, 1979), several studies have described the influence of political pressures on the formation of accounting regulation (e.g., Sunder (1988), Zeff (2002, 2005)). Lo (2003), Ramanna (2008) and Hochberg, Sapienza, and Vissing-Jorgensen (2009) provide empirical evidence of the consequences of public lobbying by firms affected by accounting changes, which appears in line with several comments from standard-setting board members (Beresford (2001), Tweedie (2009)). This literature provides many illustrations that political aspects - however one may feel about them - are in actual practice a central institutional feature of disclosure regulation.

There are few papers that model regulatory choices as the outcome of a positive process. In an early paper, Boot and Thakor (1993) show that banks prefer a level of regulatory oversight that is less than the social optimum. More recently, Dye and Sridhar (2008) develop an argument as to why

some firms demand flexible standards, if existing standards may not represent all economic events. Although their approach and results are very different from our paper, their idea - which we share here - is to model accounting regulation as it may provide information on a common component of cash flows. Bertomeu and Magee (2009) show that endogenous regulatory cycles may occur even absent macroeconomic shocks, if there is a continuum of firm types competing to set the agenda. Finally, Huddart, Hughes, and Brunnermeier (1999) examine the choice of disclosure quality by two competing exchanges. They show that competition leads to a race-to-the-top with high disclosure. Their setting focuses on profit-seeking institutions and competition, while our main focus is on a self-regulated institution.

1. The Model

We present a simplified model of an economy subject to time-varying real business cycle shocks. The economy operates over an infinite horizon, indexed by $t = 0, \ldots, +\infty$. Each period t is decomposed into several event-stages which occur over the following timeline: at $t.1$, a state of the world is realized; at $t.2$, political pressures are exerted and determine the current disclosure regulation; at $t.3$, entrepreneurs request and may obtain capital from banks; at $t.4$, some projects may be stopped based on a public report; at $t.5$, investments are completed and entrepreneurs sell their residual stake on a competitive equity market; finally, at $t.6$, firms financed in the previous period realize their cash flows. This sequence of events is described in greater detail in Figure 3 and in the paragraphs that follow.

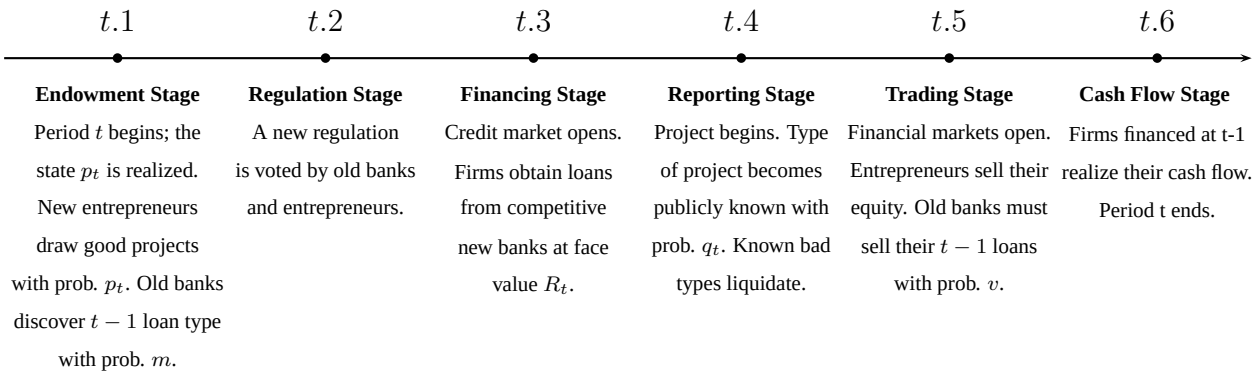

Figure 3: Model Time Line

Endowment Stage. At event-stage $t.1$, there is a continuum of new entrepreneurs with mass normalized to one. Each entrepreneur draws a new project which can be a good project with probability $p_t \in (0,1)$ or a bad project with probability $1-p_t$; the type of a firm or project is known only to the entrepreneur. Similar to the Kydland and Prescott (1982) model of time-to-build (and to convey the idea that there is some lag between cash flow information and accounting numbers), we hypothesize that a project requires some time before it produces its cash flows. For simplicity, assume that projects take one full period to complete and pay off their final cash flow by the cash flow stage of the following period $t+1$; good projects pay out a certain high cash flow $H > 1$ while bad projects fail and pay out a cash flow $L = 0$.[3]

A state of the world p_t captures how business cycle shocks may alter the set of profitable investment opportunities such as, among other examples, innovations, productivity or shocks to demand (Cooley and Prescott (1995)). Suppose that $\{p_t\}$ follows a geometric Markov process, namely, $p_{t+1} = \min(1, p_t u)$ with probability $1/(1+u)$ and $p_{t+1} = p_t/u$ with probability $u/(1+u)$. In this specification, the parameter $u \in (1,2)$ captures the volatility of shocks to the economy and the current state is an unbiased predictor of the next state $\mathbb{E}(p_{t+1}|p_t) = p_t$, except possibly for states very close to one.[4] For expositional purposes, we set the first state $p_0 = .5$ and, since our primary focus is on moderate or recessionary times, we develop the analysis for states $p_t \leq 1/u^2$ that are not extremely close to all projects being good.[5]

In addition to the entrepreneurial sector, there is an existing set of old projects financed at $t-1$ and which have not yet completed. There is a banking sector that originated these loans at $t-1$ and, for simplicity, we assume that each bank owns one loan and exists for the duration of that loan.[6] Each loan contractually requires the firm to repay the face value R_{t-1} at the end of the current period (at

[3]Equivalently, one may assume that the bad project pays out some cash flow L less than one; in that case, the model variables should be relabeled so that we speak only of the portion of the cash flow above L that is risky.

[4]This is a bounded version of the binomial geometric process used, for example, in Cox, Ross, and Rubinstein (1979) to model asset prices. The process converges to a geometric Brownian motion as periods become small. This process is useful to the extent that it allows for a convenient parametrization of aggregate uncertainty and provides a simple explicit solution for investors' inferences; however, the main conceptual findings are robust to other assumptions about the process.

[5]The analysis applies unchanged to states with $p_t > 1/u^2$ when p_t is observable at t.1 (as in Section 2). In section 3, these states are not particularly interesting from the perspective of regulatory choices: since these states correspond to an overwhelming majority of good projects, the high-quality regulation $q_t = 1$ will tend to always pass.

[6]The conceptual argument carries over to N loans but the algebra becomes more cumbersome with no additional economic intuition. If there were also some well-diversified banks, these institutions would be indifferent to new accounting regulations and would not affect the predictions.

$t.6$) provided the firm generates the high cash flow. Banks may receive private information about the type of the old project (for example, in the process of interacting with the firm); in formal terms, at time $t.1$ the bank learns the type of the firm with probability $m \in (0,1)$ where m is a measure of banks' private information. The residual equity portion of the $t-1$ firms is held by well-diversified or long-term equity investors.

Regulation Stage. By the beginning of event-stage t.2, the economy is composed of several parties: (a) new entrepreneurs with good projects, (b) new entrepreneurs with bad projects, (c) informed banks with good old loans, (d) informed banks with bad old loans, (e) uninformed banks.[7] Banks offering new loans are competitive and price-protect against lower accounting quality (breaking even on average), so that they are indifferent to current accounting regulations. These groups collectively pass a mandatory disclosure regulation which we denote $q_t \in [0,1]$ where q_t refers to the probability that the type of the project (either new or old) is publicly disclosed at the reporting event-stage $t.4$. Given that q_t captures how much information is disclosed by firms, we will refer to it as "accounting quality." In terms of basic interpretation, the variable q_t is a theoretical proxy for any form of public regulation that increases the information available to financial markets about recent projects; for example, as new technologies and inventions occur, new business transactions result, and these new transactions require new accounting treatments.[8] In addition to written rules, disclosure quality also represents aspects that relate to the enforcement of accounting standards, such as SEC guidance, SEC actions or audit standards and regulatory oversight, which are aspects that may vary considerably across time.

We incorporate the idea of political motives by assuming that the regulator makes a choice over q_t that aggregates the demands from the above-mentioned parties. To avoid having to specify details

[7]For expositional convenience, we have left out other interest groups whose preferences are perfectly aligned with one of the five groups and does not present any conceptual difficulty (beyond reinterpretations of the parameters). In particular, undiversified equity investors owning old projects would have the same preferences in our model as banks; one may interpret the banking sector as a proxy for the investor community at large. In addition, if some entrepreneurs are either diversified or uninformed, then they will always support the maximal regulation quality, which also maximizes ex-ante social surplus.

[8]Leasing became a prominent business transaction in the 1960s which required firms to "invent" new or modify old accounting treatments (capital vs. operating lease treatment). In the 1950s/1960s, full cost vs. successful efforts accounting was invented for oil and gas exploration. The same story can be told for computer software (revenue recognition), derivatives, ecommerce, etc. We thank the editor for these suggestions. The existing literature finds little evidence that the information contained in accounting numbers changed over the twentieth century, despite the growth in the written volume of accounting standards. Brown, Lo, and Lys (1999) find no evidence that the explanatory power of accounting variables on prices changed. Li, Jorgensen, and Sadka (2009) do not find evidence of fundamental changes in the relationship between accounting and macroeconomic numbers.

about an electoral process, we adopt the widely-used Condorcet criterion (e.g., Black (1948), Black and Newing (1998)). Namely, a Condorcet winner is a regulation $q_t \in [0,1]$ that receives more that 50% of all votes in a runoff choice against any other alternative $q' \in [0,1]$.[9] One possible - although not exclusive - implementation of the Condorcet winner in our framework is this: participants send their preferred regulation to the regulator, who then takes a sequence of runoff consultations (i.e., circulating discussion papers, exposure drafts, Congressional bills, etc.) and retains the regulation that survives.[10] For knife-edge cases with multiple winners, we assume that the highest q_t is passed.

In our model, the surplus of each interest group is single-peaked in the current regulation q_t. Therefore, the Condorcet winner reduces to the regulation preferred by the median voter (Black (1948)). In formal terms, the chosen regulation satisfies that: (a) less than half of all participants prefer a regulation that is set strictly lower, and (b) less than half of all participants prefer a regulation that is set strictly higher. Intuitively, increasing the regulation q from 0 to 1, one will reach a point at which the political pressure to increase disclosure will exactly match the political pressure to decrease disclosure. This median voter property has also been commonly used in the macroeconomic literature (Meltzer and Richard (1981), Alesina and Rodrik (1994)).[11] More broadly, the approach to regulatory choice follows the positive paradigm in regulatory economics which takes a preexisting institution as a given (Friedman (1953), Stigler (1964, 1971)) and examines its consequences on social outcomes. Kothari, Ramanna, and Skinner (2009) recently provide an overview of the basic theory of regulatory capture and its limitations.[12]

The regulatory choice has two consequences on the capital market, as described in more detail in the next two stages $t.3$ and $t.4$. First, new loans disclose with probability q_t, which may allow the bank to terminate the new project prior to completion and recover the investment before it fails (see

[9] An actual vote should, of course, not be taken literally (in the same sense that constituencies do not separately vote on all public issues) but as a manner to conceptually capture the various manners through which demands affect social choices. As this seems the most reasonable, our implicit assumption is that the banking sector does not have more political influence that the entire productive sector.

[10] Although this may involve potentially infinitely-many such votes, there are never more than two regulations that may be candidate Condorcet winners so that an actual process could take the form of a single runoff vote. Indeed, in many cases, this implementation would take the form of one new regulation being proposed against the status-quo regulation implemented in the prior period.

[11] One important difference between our paper and this literature is that the political cycles literature tends to focus on welfare programs, while we focus on the redistributive consequences of disclosure in the productive sector.

[12] To stay true to the basic working premise, we do not entertain normative questions that relate to the design of efficient institutions if they do not seem descriptive of those we observe, such as a benevolent dictator committing to perfect accounting quality or making direct wealth transfers between entrepreneurs.

Reporting stage). Second, old loans also disclose with probability q_t which may provide additional information on those loans that did not disclose in the past and thereby reduce the adverse selection on the secondary loan market (see Trading stage).[13]

Financing Stage. At event-stage t.3, the accounting quality q_t for the current period has been chosen and is observable to market participants.[14] New entrepreneurs do not have, on their own, capital to start the firm and must borrow $\$1$ from a competitive banking sector. Importantly, for tractability, we develop the main intuition with short-lived projects that feature a single investment date and which may be monitored (and possibly terminated) in the current period only prior to the investment being completed.[15] The terms of the loan specify the face value of the debt R_t, repayable when the project completes at $t + 1.6$ and if the final cash flow is H. Because accounting quality q_t determines, at date $t.4$, whether the project will be terminated early by the bank, it affects the face value that banks are willing to offer (see Section 4 for further discussion). We use here standard debt as a means to finance project, given its important role in project financing and because of the many institutional reasons that make standardized debt instruments attractive to banks (taxes, debt markets or capital ratios); nevertheless, it is worth noting that, in our setting, equity financing would not perform strictly better than debt. Further, to maintain coherence with the assumption of a single loan per bank, we assume that new loans are given by a new set of banks and their available capital does not depend on previous cash flows.[16]

Reporting Stage. After the initial capital has been received, the firm begins implementing the project and produces an advance accounting report at event-stage $t.4$. New and old projects, with probability q_t, publicly disclose the type of the project and, otherwise, provide no further informa-

[13]The analysis is unchanged if old loans disclose with a probability that is strictly increasing in q_t (but not necessarily equal q_t). This assumption seems plausible: it seems unlikely that standard-setters could or would implement a regulation that increases disclosure for one type of loans and decreases disclosure for another type of loans. If we assumed, alternatively, that the disclosure level were separately chosen for old and bad loans, then, the existing stock of old bad loans would only affect the current disclosure level for old loans, but not the disclosure level for new loans (and vice-versa).

[14]Mainly for reasons expositional simplicity, we rule out other forms of voluntary disclosure or analyst following (Arya and Mittendorf (2005), Beyer (2008)) and assume that the quality of the information reported is fully captured by the regulation q_t.

[15]The model is not meant to describe the complex optimal financing issues that pertain to relationship banking, i.e. when the same bank is financing a project over time or may have additional information prior to financing a new loan. These questions are discussed for example in Plantin and Parlour (2008).

[16]If available bank capital were also a function of prior cash flows, an economic crisis would also contaminate the supply of bank capital, causing further decreases in lending activity.

tion (no-disclosure).[17] As in the incomplete-contract literature (Hart and Moore (1988), Magee and Sridhar (1996)), we assume that the early-stage public report on new projects is publicly observable to outside investors but is not directly contractible or enforceable in a court of law. If a project is revealed to be bad, it is liquidated; then, the loan capital is returned to the bank. Therefore, the bank uses the public report to monitor the loan and possibly shut down the project. We do not specifically examine post-investment shutdowns in this model. Since an extension to renegotiated loans does not present any difficulty except for one extra consideration (which is developed formally in Section 4), we develop the basic argument in a streamlined environment where the project is always continued unless it is bad.

Trading Stage. At event-stage $t.5$, entrepreneurs have liquidity motives and must resell their residual equity claim in a competitive equity market. Investors in the market know the information disclosed during the reporting stage and price a good reporting firm at $H - R_t$ and a non-reporting firm at its expected future cash flow. A secondary debt market also opens for loans made in period $t-1$. With probability $v \in (0,1)$, a bank bears a liquidity shock and must resell its $t-1$ loan in a competitive financial market.[18][19] In addition, banks that do not bear the liquidity shock opportunistically sell their bad loans. The loan from the good reporting projects are always sold at their fair price R_t. The loans from non-reporting firms are sold at the expected cash flow conditional on the loan being sold. Any bad reporting equity or loan cannot be sold or, equivalently, is sold for its fair price of zero. Note that banks with new date-t loans may or may not resell their loan but, given that banks do not have private information yet, the trading value of new loans is equal to its unconditional value. In Section 4, we examine a variation on the model in which a market for new loans exists and some banks may receive information prior to the end of the period.

[17] It is possible, with no change to the results, that the probability that an old non-disclosing projects reports at $t-1$ is $g(q_t)$ strictly increasing in q_t. What is important is that there should be some information about old projects and that this information should be at least partially associated to the current regulation (i.e., the regulator cannot write entirely different accounting rules for old and new projects).

[18] As in Bertomeu, Beyer, and Dye (2010), the liquidity shock may represent several examples in which the bank experiences an unexpected need for cash. For example, depositers may withdraw from an account at the bank, or the owner of a privately-traded bank may need some funds for personal use. Alternatively, the bank may have other activities that may require cash, such as a new lending or investment opportunity, loss on a trading account or a margin call.

[19] Since our focus is on real business cycles (i.e., cycles due to changes in the quality of projects), we assume that the liquidity shock is firm-specific and not based on market-wide events. However, the results are unchanged if v is time-varying.

Cash Flow Stage. Finally, event-stage t.6 is a netting-out period in which no actual decisions are made, and old investments made in $t-1$ pay out their final cash flow. Given that the entrepreneur had a short horizon and exited by $t-1.5$, no further cash flow may be earned by the entrepreneurs at this point. Equity investors with a good project receive the residual payment $H - R_{t-1}$ and debt holders with a good project receive the debt repayment R_{t-1}. A bad project pays no cash flow to its equity and debt holders.

2. Informed Economy: Perfect Aggregate Information

As an important baseline for the analysis, we develop the main argument in an economy where the current state p_t is publicly observable. Among other possibilities, some information may be conveyed by early economic indicators such as a confidence index or forecasts made by macroeconomists. At a conceptual level, the baseline captures how the economic cycle affects regulatory choice without (yet) considering the feedback channels through which accounting choice provides information about the cycle.

The model is solved period by period, by backward induction. By the start of period t, the history $h_t = (q_{t-1}, p_{t-1}, p_t)$ contains three variables which summarize all the information relevant at this point in time. Conditional on h_t, the economy features a current stock of $1 - q_{t-1}$ non-reporting old loans in the assets of banks, of which a fraction p_{t-1} are good loans and $1 - p_{t-1}$ are bad loans. We develop next the analysis from the prices offered in the debt and equity markets at $t.5$, to the face value quoted on debt issues at $t.3$, and finally to the regulation q_t chosen at $t.2$.

2.1. Capital Markets

Consider the trading stage $t.5$ during which financial assets are sold by banks and entrepreneurs. At this stage, the current regulation and the face value on new and old loans has been agreed-upon. What remains to be done is to derive the price of the equity and debt sold in the market. Since the securities written on previously-reported good projects are sold at their fair price, we focus here on the non-reporting projects for which market prices are not immediate.

In the equity market, projects financed in the current period are put sold by entrepreneurs. The

value of the residual equity V_t^e (for a non-reporting firm) is equal to the expected cash flow from the residual claim.

$$V_t^e = p_t(H - R_t) \tag{2.1}$$

In the debt market, projects financed in period $t-1$ are sold by banks with a liquidity shock and, for the remaining loans privately known to be bad, by informed banks that do not bear the liquidity shock. Therefore, the probability that a non-reporting loan is sold is $v+(1-v)(1-p_{t-1})m$; of which v is the fraction of loans sold for liquidity reasons with expected value $p_{t-1}R_{t-1}$, and $(1-v)(1-p_{t-1})m$ is the fraction of bad loans sold strategically.

$$V_t^d = \frac{v}{v + (1-v)m(1-p_{t-1})} p_{t-1}R_{t-1} \tag{2.2}$$

Loans in the debt market are sold at a discount relative to non-reporting loans that are retained and which have value $p_{t-1}R_{t-1}$ (uninformed banks) or R_{t-1} (informed banks with good loans). The new buyers are price protected the adverse selection created by informed banks with bad loans selling for strategic reasons; as a result, the market price understates the expected value of loans that are retained by banks. Due to the discount, marking to market non-traded loans would always cause retained non-reporting loans to be valued below their fundamental value.[20] As expected, the discount is greater when the adverse selection in the loan market is higher, i.e. when banks are less likely to bear a liquidity shock, more likely to receive private information and when the previous period's state of the world is more unfavorable.

2.2. Debt Face Value

At date $t.3$, the competitive banking sector quotes a face value R_t for new loans. The face value is set such that the banks break even on average, conditional on its expected future cash flow from the loan.

There are three possible outcomes for the loan: (a) the project is publicly revealed to be good with probability $q_t p_t$ and the loan pays out R_t at $t+1$; (b) the project is publicly revealed to be bad

[20] See also Plantin, Sapra, and Shin (2008) and Bleck and Gao (2010) for other discussions of the adverse selection problem and, in particular, why market values may differ from the actual value of loans kept in the books.

with probability $q_t(1-p_t)$ and the project is terminated with the initial funding returned to the bank, (c) the project does not report with probability $1-q_t$, and the bank can ex-ante expect a cash flow (from holding or selling the loan at $t+1$) equal to the expected cash flow from the loan $p_t R_t$.[21] The bank's competitive pricing condition equates the amount of financing to the expected cash flow from the loan.

$$1 = q_t p_t R_t + q_t(1-p_t) + (1-q_t)p_t R_t \tag{2.3}$$

Solving for the face value quoted by the bank,

$$R_t - 1 = \frac{1-p_t}{p_t}(1-q_t) \tag{2.4}$$

In Equation (2.4), the right-hand side represents the premium or cost of debt charged by banks in order to finance the project. This premium is positive because banks anticipate some bad projects to be financed, reincorporating these expected costs into the interest rate charged on their loans. It also increases with lower states of the world and a lower quality regulation. Substituting the face value quoted by banks in the debt and equity values,

$$V_t^e = p_t(H-1) - (1-p_t)(1-q_t) \tag{2.5}$$

$$V_t^d = \frac{v}{v+(1-v)m(1-p_{t-1})}(p_{t-1} + (1-p_{t-1})(1-q_{t-1})) \tag{2.6}$$

As is intuitive, the value of (non-reporting) traded debt and equity is greater in the presence of more accounting quality or during more favorable states of the world.

2.3. Regulatory Choice

At date $t.2$, a new regulation is passed and agents in the economy take into account both their private information and the consequences of that regulation on asset prices. To examine the political choice over regulations, we describe the preferences of each interest group.

Preferences of the Banking Sector

[21] Note that the $t+1$ debt market is competitive, therefore - at $t.3$ prior to learning the type of the project or whether there is a liquidity shock - one may apply the law of iterated expectations to verify that the bank values a loan at its expected final cash flow.

Excluding banks that hold reporting loans and have no preferences for current regulations, the total size of the banking sector with non-reporting loans is equal to $1 - q_{t-1}$.

Uninformed banks value their loan at date $t.2$ at the expected cash flow; this expected cash flow is $p_{t-1}R_{t-1}$ if they retain the loan or if the loan discloses, but $V_t^d < p_{t-1}R_{t-1}$ if they must resell a non-reporting loan for liquidity reasons. Therefore, the uninformed banks are better-off with an additional report in period t because a more transparent information environment will reduce the probability of an uninformed sale. Similarly, informed banks with good loans resell their loan for less than the fair price R_{t-1} if they bear the liquidity shock and their loan does not report; they are also better-off with a greater quality regulation. By contrast, informed banks with bad loans are better-off when the quality of their loan is not publicly known; they always resell their loan and obtain an expected surplus $(1 - q_t)V_t^d$ that is decreasing in q_t.

For further reference, note that a total of $1 - q_{t-1}$ banks are involved in the regulatory choice, of which a fraction $(1 - p_{t-1})m$ of informed banks with bad loans demands $q_t = 0$ and the remaining banks demand $q_t = 1$.

Preferences of the Entrepreneurial Sector

Good-project entrepreneurs expect a surplus from reselling the project equal to $H - R_t$ if the project reports or V_t^e if the project does not report; their surplus is clearly increasing in accounting quality.

Things are slightly different for bad-project entrepreneurs, who face an economic trade-off between decreasing cost of debt (similar to the good-project entrepreneurs) and reducing the chances that their own project is detected and publicly disclosed to be bad. After substituting V_t^e from Equation (2.5), the surplus of bad-project entrepreneurs is given as follows.

$$U_b^t = (1 - q_t)(p_t(H - 1) - (1 - p_t)(1 - q_t)) \tag{2.7}$$

Proposition 2.1 *The surplus of the bad-project is single-peaked with a unique maximum $q_t^b \in [0, 1)$ given by (a) $q_t^b = 0$ if $p_t \geq 2/(H + 1)$, and, otherwise (b) $q_t^b > 0$ with:*

$$q_t^b = \frac{1 - .5p_t(H + 1)}{1 - p_t} \tag{2.8}$$

There are two intuitive comparative statics that emerge. When there are more good projects or these good projects pay higher cash flows, there is a large option value for bad entrepreneurs in not being detected. Perhaps slightly less intuitive, bad-project entrepreneurs may push for some accounting regulation $q_t^b > 0$ even though these regulations are meant to detect them (and contrary to, say, the preference of bad-loan banks). Precisely because bad-project entrepreneurs mimic the good-project entrepreneurs, they internalize some of the deadweight social costs of bad projects and may prefer more informative regulations. If the state of the world deteriorates, the potential deadweight cost of financing bad projects increases, and the bad-project entrepreneurs tend to favor more regulation.

For further reference, a total of p_t good-project entrepreneurs support full disclosure, while a total of $1 - p_t$ bad-project entrepreneurs support the regulation $q_t^b \in [0, 1)$ given by Equation (2.8).

Collective Preferences over Regulations

Having considered the preferences of banks and entrepreneurs over regulations, we solve for the regulation preferred by the median interest group. This involves, as a preliminary step, ranking all groups from the group preferring the lowest-quality regulation to the group preferring the highest-quality regulation, namely (1) the bad-loan informed banks prefer the lowest-quality accounting system $q_t = 0$, followed by (2) bad-project entrepreneurs prefer $q_t^b \in [0, 1)$, and, finally, (3) good-project entrepreneurs and the remaining non-reporting banks prefer $q_t = 1$. We examine - as a function of market conditions - which of these groups forms the median voter.

Consider the bad-loan banks, which lie at one extreme of the spectrum and always demand minimal disclosure. The informed banking sector represents a smaller group that the uninformed banking sector and the entrepreneurial sector; then, the bad-loan banks never form the median group.

At the other extreme, the good-project entrepreneurs and other banks with non-reporting loans prefer $q_t = 1$. In terms of the notations of the model, this group represents a size $p_t + (1 - q_{t-1})(mp_{t-1} + 1 - m)$ against a size $1 - p_t + (1 - q_{t-1})(1 - p_{t-1})m$ of bad-loan banks and bad-project entrepreneurs who demand less regulation: although bad-loan banks do not form the median group, they indirectly exert political influence to oppose the full-disclosure regulation. Comparing both terms, good-project entrepreneurs and other non-reporting banks have more political power than the groups demanding

less disclosure when:

$$p_t + (1 - q_{t-1})(mp_{t-1} + 1 - m) \geq 1 - p_t + (1 - q_{t-1})(1 - p_{t-1})m \tag{2.9}$$

When this inequality is not satisfied, a syndicate of bad-loan banks and bad-project entrepreneurs will defeat the full-disclosure regulation. Then, the median group is composed of the bad-project entrepreneurs who set $q_t^b < 1$. We formally state the outcome of the regulatory process in Proposition 2.2, where condition (2.9) has been rewritten in terms of a bound on p_t.[22]

Proposition 2.2 *Let $\overline{p}_t$ be defined as:*

$$\overline{p}_t = .5q_{t-1} + m(1 - p_{t-1})(1 - q_{t-1}) \tag{2.10}$$

If $p_t \geq \overline{p}_t$, $q_t = 1$; otherwise, $q_t = \max(0, \frac{1-.5p_t(H+1)}{1-p_t})$.

What we have established is this. The greater the residual of undisclosed bad projects in the economy, the greater the demand for low-quality accounting regulation. This demand originates from two main sources: the bad-loan banks and the bad-project entrepreneurs. Further, although bad-loan banks do not have on their own the political power to implement their preferred regulation, they push together with bad-project entrepreneurs toward lower-quality regulations. Importantly, the banking sector creates an intertemporal channel through which the past state of the world, through its effect on the surviving stock of non-reported bad debt, contaminates accounting choice in the current period. As part of this channel, a lower accounting quality in the previous period increases the fraction of non-reporting banks which in turn reinforces the political weight of the banking sector.

[22] An alternative assumptions which we consider here, is that banks with (good) reporting loans in the previous period may still participate to the voting process, for example if they could acquire some of the social surplus in the current period or if investors may fail to consider the $t-1$ report with some non-zero probability. In this case, Equation (2.9) should be changed to:

$$p_t + (1 - q_{t-1})(mp_{t-1} + 1 - m) + q_{t-1}p_{t-1} \geq 1 - p_t + (1 - q_{t-1})(1 - p_{t-1})m$$

This will imply the following characterization of $\overline{p}_t$.

$$\overline{p}_t = (1 - p_{t-1})(.5q_{t-1} + m(1 - q_{t-1}))$$

Under this alternative assumption, the stock of old good projects increases more the current demand for accounting quality. We thank the reviewer for this suggestion.

When the high-quality $q_{t-1} = 1$ is implemented, there are no remaining non-reporting loans: the entrepreneurial sector decides on its own about accounting choice. This is a simple, yet important, property of the model: times when banks become involved in accounting matters are preceded by periods of low accounting quality chosen by entrepreneurs. Indeed, banks do not cause the original decrease in accounting quality (bad entrepreneurs do), but this prior decrease may cause a future involvement by banks. The banking sector collectively supports more disclosure if $p_{t-1} > 1 - .5/m$, i.e. when the existing stock of good old loans is high. Importantly, the adverse selection in the loan market is closely linked to the preferences of banks: because all uninformed banks lose from the adverse selection on the loan market and support more disclosure, more private information increases the demand for lower quality accounting information.

2.4. Effects of Regulatory Choice on Economic Activity

We substitute next the implemented q_t in the face value of debt instruments, and recover how that regulation affects economic activity. If $p_t \geq \overline{p}_t$, the implemented regulation filters out all bad projects and the prevailing face value is one. Reporting good projects are traded at $H - 1$ and there remain no projects that do not report. Old good loans are traded at their correct value R_{t-1}. In this situation, financial markets trade at the fair price and include only good projects. If $p_t < \overline{p}_t$, the prevailing face value is greater than one and some non-reporting equity and loans may be traded.

Definition 2.1 *Let the lending activity L_t be defined as the total size of current projects financed and continued, i.e. $L_t = p_t + (1 - p_t)(1 - q_t)$. Let the economic efficiency or date $t + 1$ bankruptcy, be defined as the size of bad projects financed and continued, i.e. $\Delta_t = (1 - p_t)(1 - q_t)$.*

Proposition 2.3 *Let $h_t = (q_{t-1}, p_{t-1}, p_t)$ be the information available at date t.*

(i) If $p_t \geq \overline{p}_t$ (i.e., expansionary times), a high-quality accounting system $q_t = 1$ is implemented, then: (a) $R_t = 1$; (b) $L_t = p_t$; (c) $\Delta_t = 0$; (d) all projects report. In the period that follows, $\overline{p}_{t+1} = .5$

(ii) If $p_t \in [2/(H + 1), \overline{p}_t)$ (i.e., moderate times), a low-quality accounting system $q_t = 0$ is implemented, then (a) $R_t = 1 + (1 - p_t)/p_t$; (b) $L_t = 1$; (c) $\Delta_t = 1 - p_t$; (d) $V_t^e = p_t(H - R_t)$. In the period that follows, $\overline{p}_{t+1} = m(1 - p_t)$.

(iii) If $p_t < 2/(H+1)$ *(i.e., recessionary times), a moderate-quality accounting system* $q_t = (1 - .5p_t(H+1))/(1-p_t)$ *is implemented, then: (a)* $R_t = .5(H+1)$*; (b)* $L_t = .5p_t(H+1)$*, (c)* $\Delta_t = .5p_t(H-1)$ *and (d)* $V_t^e = .5p_t(H-1)$*. In the period that follows,* $\overline{p}_{t+1} = .5(1 - .5p_t(H+1))/(1-p_t) + .5(H-1)mp_t$.

Proposition 2.3 describes how the quality of the implemented disclosure regulation is a function of the economic cycle. The choice of the regulation and some of its effects on the real economy are illustrated in Figure 4. With a slight abuse of terminology, we refer to these regions in a relative sense, labeling region (i) as expansions, region (ii) as moderate times and region (iii) as recessions.

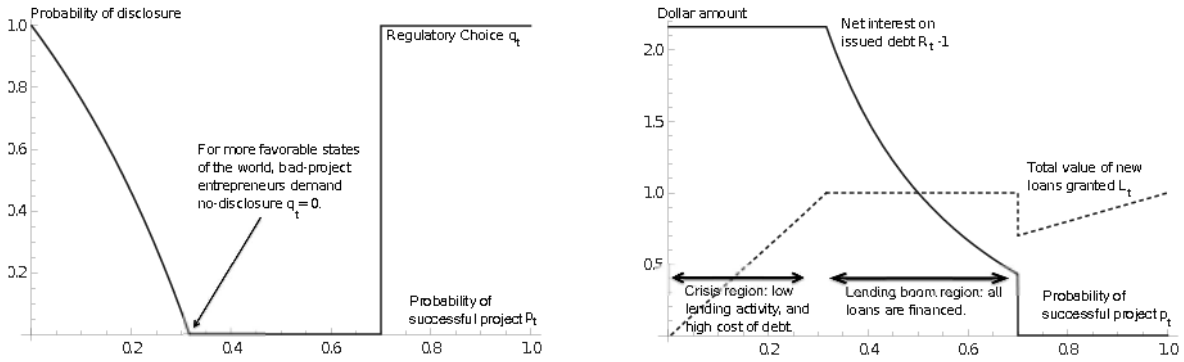

Figure 4: Regulation, Lending and Cost of Debt as a Function of Probability of a Successful Project, p_t (with $H = 10$, $\overline{p}_t = .7$)

During expansionary times (part (i)), good-project entrepreneurs and good-loan or uninformed banks have more political power and implement the high accounting quality. Cost of debt is low and lending activity is moderate as only good projects are continued. A greater expansion (higher p_t) leads to more lending and more projects being financed. Further, the stock of bad loans given in the previous period (if any) is fully disclosed in the current period, so that only good old loans trade. Banks with bad old loans would prefer lower accounting quality but do not have enough power to implement it.

Following a moderate slowdown in the economy (from part (i) to part (ii)), there is a point at which the bad-project entrepreneurs form a sufficiently large fraction of all projects to take control of the regulatory choice. What results is a deterioration in accounting quality. The economy features a boom in the demand for loans - in fact greater than the demand during an economic expansion - accompanied by a decrease in the quality of financed projects and a moderate cost of debt. Yet,

despite the boom in lending, economic conditions are less favorable than in part (i): the total value of equity and debt issued is lower due to the increase in financing inefficiencies. Indeed, the lending boom is indicative of the low lending standards implied by the low disclosure environment and the widespread financing of bad projects.

In the period that follows, the low accounting quality leads to an accumulation of a large stock of bad loans in the assets of banks. This accumulation of bad loans, through its effect on $\overline{p}_{t+1}$, can increase or reduce the demand for regulation in period $t+1$. In environments where banks are unlikely to receive private information or the previous state is sufficiently favorable, banks who know they have bad loans represent a minority of all loans. A low-quality accounting system in the prior period increases the fraction of banks that have non-reporting loans and thus increases the demand for more reporting quality. Specifically, during a moderate slowdown (p_t below but close to $\overline{p}_t$), the pressure from banks may actually reverse deteriorations in the accounting standard and push the regulation back to high-quality disclosure.

In environments where banks are likely to receive information and the past state is unfavorable, the banking sector will become dominated by bad-loan banks. In particular, this situation will tend to occur as the economy further deteriorates (p_t decreases) so that an increasingly large fraction of banks is informed with bad loans. Then, the passing of a low regulation generates a positive feedback effect: one low accounting regulation in the current period, increases the number of non-reporting bad loans, thus increases the political power of the bad-loan banks, leading to more low-quality regulations in the future. In summary, the bank sector exhibits some resistance to the *first* low accounting regulations but, once as the slowdown continues and deepens, may turn around entirely and begin supporting low-quality accounting.

If the economy falls into recessionary times (from part (ii) to part (iii)), the fraction of bad projects may become so large that the social burden of financing all bad projects would shut down credit markets. Then, even though bad-project entrepreneurs control the regulation, they strategically implement a high or moderate quality regulation that keeps cost of debt at a constant (but high) level. The most visible effect of this regulation is to sharply contract the credit market, which is characteristic of a credit crunch, particularly when compared to the credit boom of moderate times. Looking more closely, the economy maintains a constant ratio of bad to good projects $\Delta_t/p_t = .5(H-1)$ as if each

bad-project entrepreneur were using $.5(H-1)$ good projects as collateral to sustain lower cost of debt. In this respect, regulatory capture allows the bad-project entrepreneurs to pledge as collateral good projects on which they do not have legal ownership. Unlike in parts (i) and (ii), an increase in the number of good projects leads to a proportionate increase in bad projects financed; therefore, an improvement in economic conditions also increases the total financing inefficiency.

In the banking sector, the current state of the world affects the total stock of bad loans held by banks, via its effect on the current state and the regulation implemented in response to that state. To see what determines the demands of banks in the next period, we examine how $\overline{p}_{t+1}$ depends on characteristics of the current environment. First, this term is increasing in m; intuitively, more bad-loan informed banks push for less regulation when there is more private information. Second, a more favorable current state may or may not increase $\overline{p}_{t+1}$. To see this, consider differentiating $\overline{p}_{t+1}$ in p_t,

$$\frac{\partial \overline{p}_{t+1}}{\partial p_t} = .5(H-1)(m - \frac{.5}{(1-p_t)^2}) \tag{2.11}$$

The effect of the prior state on current accounting regulation deserves some additional comments. An increase in p_t reduces the number of continuing bad loans that remain in the books of banks; this first selection effect implies that fewer banks support less accounting quality. However, the selection effect ignores the impact of the state of the world on the date t accounting quality q_t. As noted earlier, lower-quality regulations may be passed when the state is more favorable so that more bad project are continued; this second regulatory effect implies that more banks support less accounting quality. Somewhat counter-intuitively, an expansion in the influence of the bad-loan banks may then create demand for less disclosure, solidifying the grip of the the bad-project entrepreneurs over regulatory choices.

3. Uninformed Economy: Stale Aggregate Information

3.1. Information Flows

In terms of understanding the development of an economic crisis, an important aspect of the base-line model is that accounting rules play a relatively secondary role in driving the crisis. A low-quality

accounting standard, during a moderate recession, acts as a catalyst that aggravates and may prolong an ongoing crisis but it does not originate or trigger the crisis. In order to capture a more primitive role of accounting measurement - which seems more in line with casual observations and public statements - we relax the assumption that the state of the world is fully known and build from this assumption some intuitions as to how accounting measurement affects the cycle *as perceived* by agents in the economy.

Formally, we assume that the state of the world p_t, although realized at $t.1$, may only be learnt through information channels that are endogenous to the disclosure, financing and production technologies. We make several stylized assumptions with respect to the information channels that help investors infer the state of the world; these assumptions are described in more detail next.

If p_t cannot be observed directly, entrepreneurs' decisions can only be predicated on the observation of the quality of their own project. The chosen standard cannot depend on p_t (as in part (iii) of Proposition 2.3) because the entrepreneurs with bad quality projects do not know how many other entrepreneurs have bad quality projects. Therefore, all entrepreneurs with good quality projects will support one accounting quality standard (q_t=1), and all those with bad quality projects will support another standard (q_t^b) that results from an equilibrium process described below.

At date $t.3$, the implemented regulation $q_t \in \{q_t^b, 1\}$ becomes known to market participants. In cases in which the choice of q_t is correlated to p_t, banks may revise their beliefs in order to price new loans. At this point, markets may update their belief based on the observation of a regulatory choice; specifically, let $\hat{p}_t(x) = \mathbb{E}_t(p_t|q_t = x)$ denote the market belief conditional on a particular regulation.

At dates $t.4$ and $t.5$, markets observe the reports made by new entrepreneurs or, equivalently, the size of the new equity issue $p_t + (1 - p_t)(1 - q_t)$. This can be inverted to recover p_t if and only if $q_t \neq 0$, i.e. some information is given by accounting numbers. In the debt markets, the probability that an existing non-reporting loan is traded is $v + (1 - v)(1 - p_{t-1})$ which can be inverted to recover p_{t-1}. We use these properties to operationalize in a tractable manner how accounting and markets may provide information about the cycle, by assuming that p_{t-1} is observable as well as p_t when $q_t > 0$.[23]

[23]For greater transparency, we implicitly assume in this formulation that information about the current state is either perfectly known or unknown, as a deterministic function of q_t. However, the main results would carry over with minor adjustments if the probability that markets learn the current state is an increasing function of q_t.

As in the informed economy, we only need a limited set of variables to summarize the relevant historical information useable by agents at $t.1$. Specifically, we denote $h_t = (q_{t-1}, p_{t-2}, \theta_t)$, where q_{t-1} is the last regulation choice and p_{t-2} is the state of the economy two periods prior. Both of these items represent historical information that is always known by $t.1$. The variable $\theta_t \in \{p_{t-1}, \text{“}NI\text{”}\}$ represents whether the market knows p_{t-1} or “NI” when the market does not know p_{t-1}.

To describe the belief $\hat{p}_t(q)$, we make an important preliminary remark. A regulatory choice of $q_t = 1$ provides zero surplus to both bad-project entrepreneurs and bad-loan banks. It is thus natural for markets to anticipate that the high-quality regulation is passed by good-project entrepreneurs and update to $\hat{p}_t(1) = \mathbb{E}_t(p_t | p_t \geq \overline{p}_t)$, where the subscript t on $\hat{p}_t(.)$ and the expectation operator implies that the expectation is conditional on the history h_t. Conversely, we set $\hat{p}_t(x) = \mathbb{E}_t(p_t | p_t < \overline{p}_t)$ for $x < 1$.[24] This is an intuitive aspect to underline: the regulatory choice is a social aggregation process that conveys, on its own, information about economic conditions; in particular, markets should respond favorably to the adoption of higher accounting quality.[25]

3.2. Debt Financing Stage

For a given vector of historical information h^t, banks offer terms on the loan such that the zero-profit condition is satisfied.

$$1 = q_t \hat{p}_t(q_t) R_t + q_t(1 - \hat{p}_t(q_t)) + (1 - q_t)\hat{p}_t(q_t) R_t \tag{3.1}$$

And, solving for the net interest rate,

$$R_t - 1 = \frac{1 - \hat{p}_t(q_t)}{\hat{p}_t(q_t)}(1 - q_t) \tag{3.2}$$

This interest rate is similar to the interest rate in the informed economy, but for the fact that the information available to banks is a function of the information conveyed in prior periods and in

[24] Specifically, the system of beliefs assigns probability zero to the bad-project entrepreneur playing the (weakly-dominated) strategy $q_t = 1$; it can be justified on the grounds of common equilibrium refinements such as strategic stability or Bank and Sobel’s D1 criterion.

[25] We set $\hat{p}_t(.)$ as is the most convenient after realizations (q_t, p_{t-1}) that occur with probability zero and thus play no role. Technically, in such cases, the conditional expectation defined by $\hat{p}_t(x)$ is unrestricted in a Bayesian Nash equilibrium and could potentially be chosen to be any number in $[0, 1]$ that does not induce a deviation.

the current regulatory choice. As before, an increase in the regulation increases the detection and early termination of bad projects before the investment is irreversible. In addition, unlike in the informed economy, the regulation is potentially informative on the state of the world, i.e. investors may anticipate a greater number of good projects if they observe certain regulations.

3.3. Post-Regulation Market Beliefs

We solve next more explicitly for the post-regulation market beliefs implied by the model. We consider two distinct cases: when aggregate information is timely, i.e. $\theta_t = p_{t-1}$ is known at $t.1$, or when aggregate information is unknown at $t.1$, i.e. $\theta_t = \text{“}NI\text{”}$.

Timely Aggregate Information

Suppose that $\theta_t = p_{t-1}$ is known from the last period and consider the market belief $\hat{p}_t(1)$ after an observation of the high-accounting quality in period t. As noted earlier, the information contained in q_t depends on the association between q_t and the underlying true state p_t.

One possibility is that the regulation $q_t = 1$ is already expected by date $t.1$. This occurs when, even after a downturn $p_t < p_{t-1}$, the majority of good-project entrepreneurs is large enough to pass the high accounting quality, i.e. $p_{t-1}/u \geq \overline{p}_t$. In this situation, the regulation q_t does not provide any extra information on the state, beyond what is known of $t.1$; then, $\hat{p}_t(1) = \mathbb{E}_{t.1}(p_t|p_{t-1}) = p_{t-1}$.

Conversely, if $p_{t-1}/u < \overline{p}_t$ and $q_t = 1$ may potentially pass, markets know that any downturn would have caused the low-quality regulation to pass. The regulatory choice must be informative on the actual realization of the state of the world $p_t = p_{t-1}u = \hat{p}_t(1)$ and greater accounting quality conveys an improvement in economic conditions. By convention, we set $\hat{p}_t(1) = p_{t-1}u$ if the high-quality regulation never passes.

Consider next market beliefs $\hat{p}_t(x)$ for $x < 1$, after the low accounting quality is passed. Following the same logic, if $\overline{p}_t > p_{t-1}u$, the low accounting quality is expected after any favorable or unfavorable change in economic conditions and conveys no information. Otherwise, the passing of the low-quality regulation indicates an economic downturn relative to the previous state.

Substituting $\overline{p}_t$ from Equation (2.10) and rewriting the above conditions in terms of p_{t-1} yields the following Proposition.

Proposition 3.1 *Suppose that aggregate information is timely, i.e.* $\theta_t = p_{t-1}$. *Then:*

(i) If $p_{t-1} \geq \frac{.5q_{t-1}+m(1-q_{t-1})}{1/u+m(1-q_{t-1})}$ *or* $p_{t-1} < \frac{.5q_{t-1}+m(1-q_{t-1})}{u+m(1-q_{t-1})}$, *the quality of regulation does not convey information on the current state, i.e.* $\hat{p}_t(q_t) = p_{t-1}$.

(ii) Otherwise, the accounting choice conveys information on the current state, i.e. $\hat{p}_t(1) = p_{t-1}u$ *and* $\hat{p}_t(q_t) = p_{t-1}/u$ *for* $q_t < 1$.

Proposition 3.1 establishes that markets' response to regulations depends on whether the regulation is expected to pass, which in turn depends on current macroeconomic conditions. When economic conditions are sufficiently unfavorable (or when the banking sector is expected to resist more informative regulations) a new high-quality regulation is indicative of an economic upturn $p_t > p_{t-1}$; markets respond favorably, revising upward their beliefs about the state of the world. Otherwise, the high quality regulation is perfectly anticipated and does not convey more information about the cycle; simply put, markets respond favorably to a move to high accounting quality in bad times and when disagreement over the standard is high (implying that either standard might pass).

A similar intuition is apparent after a low-quality regulation is passed (or not changed). If economic conditions are so unfavorable that the low-quality regulation is always expected, then the regulation becomes uninformative on the true state. By contrast, markets learn from the regulatory choice when the high-quality regulation could have passed: then, markets respond unfavorably to low accounting quality in good times and when disagreement over the standard is high.

These observations have an important empirical implication in terms of the predicted association between capital market prices and a new disclosure regulations. While it is common to examine new regulations as exogenous, they are better captured as endogenous responses in a given economic environment. As a result, it is important to distinguish the real effects of the regulation from what this regulation reveals on current macroeconomic conditions. In particular, at least part of the response of capital markets to the regulation is due to learning about macroeconomic conditions and not just how this new regulation helps select better new projects.

Stale Aggregate Information

Consider next the economy at a point in time where $\theta_t = \text{“}NI\text{”}$ so that the market knows p_{t-2} but does not know whether the past state at $t-1$ was favorable or unfavorable, and $p_t \in \{p_{t-2}/u^2, p_{t-2}, p_{t-2}u^2\}$ may feature a downturn, no change or an upturn. As compared to timely aggregate information, stale information has two main consequences. First, there is more uncertainty about p_t and thus markets may potentially respond more to regulatory choice. Second, stale information occurs after $q_{t-1} = 0$, so that it corresponds to periods in which the banking sector is the most active in the regulatory process. The next Proposition adapts Proposition 3.1 to the environment with stale information.

Proposition 3.2 *Suppose that aggregate information is stale, i.e. $\theta_t = \text{“}NI\text{”}$. Then:*

(i) If $p_{t-2} \geq mu/(m + 1/u)$ or $p_{t-2} < m/(mu + u^2)$, the regulation does not convey information on the current state, i.e. $\hat{p}_t(q_t) = p_{t-2}$.

(ii) If $p_{t-2} \in [mu/(m + u), mu/(m + 1/u))$, the high quality regulation conveys some favorable information while the low quality regulation conveys very unfavorable information, i.e. $\hat{p}_t(1) = p_{t-2}\frac{2u+u^2}{2u+1}$ and $\hat{p}_t(q_t) = p_{t-2}/u^2$ for $q_t < 1$.

(iii) If $p_{t-2} \in [m/(1 + mu), mu/(m + u))$, the regulation conveys information about the date $t - 1$ state, i.e. $\hat{p}_t(1) = p_{t-2}u$ and $\hat{p}_t(q_t) = p_{t-2}/u$ for $q_t < 1$.

(iv) If $p_{t-2} \in [m/(mu + u^2), m/(1 + mu))$, the high quality regulation conveys very favorable information while the low quality regulation conveys some unfavorable information, i.e. $\hat{p}_t(1) = p_{t-2}u^2$ and $\hat{p}_t(q_t) = p_{t-2}\frac{2u+1}{2u+u^2}$ for $q_t < 1$.

Proposition 3.2 illustrates how these two extra forces affect the learning process. When the environment is more uncertain, the market may learn more from the regulatory choice. This is because a regulatory choice is indicative of the state of the world in both the current and the past period. Banks' pressures play a key role in this learning process. When m is small, so that banks tend to support more disclosure, the high-quality regulation will pass nearly always, and thus there will be little to learn from the new high-quality regulations. Conversely, when more banks receive private information, the region of states with some amount of learning increases. For intuitive reasons as well, environments with more volatility (higher values of u) tend to lead to more variability in potential regulations, and thus they also lead to more learning from regulatory choices.

3.4. Regulatory Choice: Timely Aggregate Information

Moving to period $t.2$, consider the regulatory choice preferred by good or bad project entrepreneurs when aggregate information is timely. The bad-project entrepreneurs maximize an objective function equal to the expected surplus conditional on their regulation being passed.

$$U_b^t = (1-q_t)(\hat{p}_t(q_t)(H-1) - (1-\hat{p}_t(q_t))(1-q_t)) \tag{3.3}$$

This expression is very similar to the analysis with complete information about the state, except that p_t is replaced by the current belief $\hat{p}_t(q_t)$. Substituting $\hat{p}_t(q_t)$ from Proposition 3.1, we obtain the following Proposition.

Proposition 3.3 *Suppose aggregate information is timely, i.e.* $\theta_t = p_{t-1}$. *Then:*

(i) If $p_{t-1} \geq \frac{.5q_{t-1}+m(1-q_{t-1})}{1/u+m(1-q_{t-1})}$, *the regulation* $q_t = 1$ *is always passed. In the period that follows,* $\theta_{t+1} = p_t$.

(ii) If $p_{t-1} < \frac{.5q_{t-1}+m(1-q_{t-1})}{u+m(1-q_{t-1})}$, *the regulation* $q_t^b = \max(0, \frac{1-.5(p_{t-1}/u)(H+1)}{1-(p_{t-1}/u)})$ *is passed. In the period that follows,* $\theta_{t+1} =$ "NI" *if* $p_{t-1} \geq 2u/(H+1)$ *and* $\theta_{t+1} = p_t$ *if* $p_{t-1} < 2u/(H+1)$.

(iii) Otherwise, the regulation $q_t = 1$ *passes if* $p_t > p_{t-1}$ *and* $q_t = \max(0, \frac{1-.5p_{t-1}(H+1)}{1-(p_{t-1}/u)})$ *passes if* $p_t < p_{t-1}$. *In the period that follows,* $\theta_{t+1} = p_t$.

When the state of the economy has been favorable, the low-quality regulation passes only after a downturn. Therefore, although p_t is initially unknown by $t.1$, it is deterministic conditional on the low-quality regulation being passed. In other words, the regulatory choice is a social aggregation process that, after it becomes observable, indicates the true state of the world. The bad-project entrepreneurs anticipate the post-regulation belief and pick their preferred regulation conditional on $p_t = p_{t-1}/u$, as if the state of the world were originally known. After the regulatory choice, markets can infer the downturn, and there is no aggregate uncertainty created even if $q_t = 0$ is implemented.

If the state of the economy is unfavorable, the regulation is no longer indicative of the current state of the world and, therefore, the bad-project entrepreneurs pass a regulation that is adapted to the average state of the world $\hat{p}_t(q_t) = p_{t-1}$. As compared to the economy with perfect aggregate

information, this extra uncertainty causes more bad projects to be financed during a downturn. This situation is also the starting point that may cause information to become stale. Specifically, stale information requires the conjunction of two events: one, the state of the world must be sufficiently unfavorable that a low-quality regulation is expected; two, the state of the world must be sufficiently favorable that the bad-project entrepreneurs pass $q_t = 0$. One important implication is that stale information is indicative of moderate slowdowns, in times where the political power has shifted into the hands of groups demanding less disclosure.

3.5. Regulatory Choice: Stale Aggregate Information

Consider next the economy with stale information, so that investors know only p_{t-2}. Under stale information, there is greater possible variability in the market expectations, which leads to the following characterization of regulatory choices.

Proposition 3.4 *Suppose that aggregate information is stale, i.e.* $\theta_t = \text{“}NI\text{”}$. *Then:*

(i) If $p_{t-2} \geq mu/(m + 1/u)$, *the regulation* $q_t = 1$ *is always passed. In the period that follows,* $\theta_{t+1} = p_t$.

(ii) If $p_{t-2} \in [mu/(m + u), mu/(m + 1/u))$, *the high-quality regulation passes when* $p_t \geq p_{t-2}$; *and the low-quality regulation* $q_t = \max(0, \frac{1-.5p_{t-2}/u^2(H+1)}{1-p_{t-2}/u^2})$ *passes if* $p_t < p_{t-2}$. *In the period that follows,* $\theta_{t+1} = p_t$.

(iii) If $p_{t-2} \in [m/(1 + mu), mu/(m + u))$, *the high-quality regulation* $q_t = 1$ *passes when* $p_{t-1} > p_{t-2}$ *and the low-quality regulation* $q_t = \max(0, \frac{1-.5p_{t-2}/u(H+1)}{1-p_{t-2}/u})$ *when* $p_{t-1} < p_{t-2}$. *In the period that follows,* $\theta_{t+1} = \text{“}NI\text{”}$ *if* $p_{t-1} < p_{t-2}$ *and* $p_{t-2} \geq 2u/(H + 1)$ *and otherwise* $\theta_{t+1} = p_t$.

(iv) If $p_{t-2} \in [m/(mu + u^2), m/(1 + mu))$, *the regulation* $q_t = 1$ *is passed when* $p_t = p_{t-2}u^2$; *and the low-quality regulation* $q_t = \max(0, \frac{2u+u^2-.5p_{t-2}(2u+1)(H+1)}{2u+u^2-p_{t-2}(2u+1)})$ *passes if* $p_t < p_{t-2}$. *In the period that follows,* $\theta_{t+1} = \text{“}NI\text{”}$ *if* $p_{t-1} < p_{t-2}$ *and* $p_{t-2} \geq 2/(H + 1)\frac{2u+u^2}{2u+1}$ *and otherwise* $\theta_{t+1} = p_t$.

(v) If $p_{t-2} < m/(mu+u^2)$, the low-quality regulation $q_t = \max(0, \frac{1-.5p_{t-2}(H+1)}{1-p_{t-2}})$ is always passed. In the period that follows, $\theta_{t+1} =$ "NI" if $p_{t-2} \geq 2/(H+1)$ and otherwise $\theta_{t+1} = p_t$.

The proposition expands Proposition 3.3 to capture the effects of stale information on regulatory choices. To develop these effects more intuitively, we place the focus on the collective preferences of the banking sector.

When m is low, so that the banking sector tends to support more regulation, periods of stale information feature more influence by the banking sector, and thus more demand for more information. As a result, the high-quality regulation $q_t = 1$ tends to be passed more often. In addition, because the low-quality regulation is indicative of worse states, the bad-project entrepreneurs also tend to pass higher-quality regulations that anticipate such states. In other words, when the banking sector demands more disclosure, the regulatory outcomes during periods of stale information tend to be more favorable. This negative feedback effect of a period $q_{t-1} = 0$ on the regulatory choice in the next period has two consequences. The first consequence is to lead to higher regulatory choice in the next period and lower financing inefficiencies. The second consequence is to make it more likely that information will not be stale in the next period.

By contrast, if m is high, the banking sector tends to demand less disclosure. In such cases, periods of stale information tend to lead to more frequent low-quality regulations and, as a result, also less learning from regulatory choices. As a result, this creates a positive feedback effect of stale information on future periods, where one period of stale information tends to generate more staleness in the future.

The collective preference of banks is a function of the current state of the world. Namely, when the state becomes increasingly unfavorable, banks tend to demand less regulation. Thus, long-lived stale information is specific to moderately unfavorable states such that banks demand less information. Then, although banks originally tend to cause short-term staleness after the first signs of a recession, they cause more persistent staleness if the economy further declines and, in such cases, staleness may only end as a result of a regulation passed by the bad-project entrepreneurs.

3.6. Revisiting Accounting and the Cycle: A Path to a Crisis

In this Section, we illustrate the analysis by considering the evolution of a model economy at a set of periods that are distinctive to the extent that they constitute the turning point at which the political power shifts to the bad-project entrepreneurs. Several examples are given below (in each of these case, period t refers to the *current* period).

- High expansion, i.e. $p_t \geq .5u$, it is common-knowledge that the current state is expansionary.
- Post-expansionary downturn, i.e. $p_{t-2} = .5u$, $p_{t-1} = .5$ and $p_t = .5/u$, i.e. the economy falls into recession.
- Short-term recovery, i.e. $p_{t-2} = .5$, $p_{t-1} = .5/u$ and $p_t = .5$; the economy moves back into expansion after a short-lived recession.
- Long-term decline, i.e. $p_{t-2} = .5$, $p_{t-1} = .5/u$ and $p_t = .5/u^2$; the economy moves toward a steep recession.

As casual illustrative examples, we may think about high expansions as periods of the cycle that feature multiple sequential years of higher growth, such as for example, the two most recent NBER expansions from 1992 to 2000 and from 2002 to (December) 2007. A post-expansionary downturn can describe the year 2001 and the year 2008 during which the economy moved to a recession. The recession that occurred in 2001 was mostly a short-term one (9 months) while the recession that began in December 2007 has been more persistent. We are now equipped to describe regulatory choice and its consequences during and after high expansions. To present the analysis in an intuitive manner, we consider an economy that begins in a high expansion; then, we examine regulatory choices and lending markets as the economy moves to less favorable states.

Corollary 3.1 *During a high expansion (i.e., $p_t \geq .5u$), the high-quality regulation $q_t = 1$ is implemented.*

During periods of high expansions, the high-quality accounting regulation is passed and implies a moderate to high lending activity and no financing inefficiencies. As is intuitive, the amount of lending activity is positively associated to the state of the world. Banks may possibly intervene in the

regulatory process if the previous period was $p_t = .5$ (which may imply $q_t < 1$) but even in this case, non-reporting loans of the previous period tend to be good, and thus banks collectively support more disclosure. In the debt markets, only reporting loans are traded and thus there is no discount on loans traded.

Corollary 3.2 *In a post-expansionary downturn (i.e., $p_{t-2} = .5u$, $p_{t-1} = .5$ and $p_t = .5/u$), the low-quality accounting $q_t < 1$ is always implemented. By period $t.3$, investors perfectly infer that $p_t = .5/u$. The interest rate increases, as do financing inefficiencies. In addition, lending activity increases if and only if $H \geq 2u - 1$.*

In the periods that follow high-quality accounting regulations, the demand for disclosure is entirely driven by the productive sector. As a result, the low-quality accounting regulation will pass when the economy exhibits a downturn. In fact, this is the period in the cycle in which market expectations about the cycle are the least unfavorable (conditional on a low-quality regulation being passed) and thus the disclosure level chosen by the bad-project entrepreneurs is the least informative.

The regulation is observed by market participants who, since they know that the high-quality regulation would have passed conditional on an expansion, infer that the post-expansionary downturn is taking place. The low-quality regulation causes a negative revision in market beliefs from $.5$ to $p_t = .5/u$. As a result of the observed deterioration in the economy and the low-accounting quality, the net interest rate offered by banks increases.

The amount of lending depends on the magnitude of the downturn and the potential value of good projects. When the post-recessionary downturn is not (yet) too severe, the less informative regulation implies that more bad projects are being financed. Total lending activity increases "abnormally," more than what it should have been under high-quality information. In particular, excessive lending activity jointly with high interest rates and lax disclosure is indicative of environments in which bad projects are being financed.

Continuing the path one period further, suppose that the recession is short-lived and the economy returns to an expansionary state.

Corollary 3.3 *During a short-term recovery (i.e., $p_{t-2} = .5$, $p_{t-1} = .5/u$ and $p_t = .5$),*

(i) If $m \leq u/(2u - 1)$, $q_t = 1$ is implemented. In the period that follows, $\theta_{t+1} = .5$.

(ii) Otherwise, $q_t = q_{t-1}$ is implemented. In the period that follows, $\theta_{t+1} =$ "NI" if $H \geq 4u - 1$ and $\theta_{t+1} = .5$ if $H < 4u - 1$.

During a short-term recovery, bad-project and good-project entrepreneurs have similar amounts of political influence. In addition, the period of low regulation that precedes implies that banks have many non-reporting loans and thus are directly interested in the accounting choice. As a result, the accounting choice is entirely driven by the collective preferences of the banking sector. Then, the accounting choice depends on what the banking sector collectively views as a desirable reporting regime.

When most banks are uninformed and favor more disclosure, the entrepreneurial and banking sector will tend to demand more disclosure as the economy moves back into an expansion. As a result, the recovery is revealed by the accounting information at $t.4$ and becomes publicly known in a timely manner. The recovery is immediately conveyed into prices, and the interest rate on loans falls. If the short-term recession was not too severe, the recovery will feature a contraction in the credit market as only the good projects are financed. That is, during periods of reversals in the cycle, total lending activity is counter-cyclical, and a moderate contraction in credit markets may be indicative of improvements in economic conditions.

On the other hand, if banks are informed or the recession has been more severe, there are more bad loans in the books of banks. This causes the low-accounting regulation to pass, as a result of the banks' pressures to hide these bad loans. In addition, there are some important implications in terms of whether or not markets immediately learn (as in the previous case) whether the recovery is taking place. Specifically, when observing $q_t = q_{t-1}$ at $t.3$, investors cannot extract any new information about the current state. Further, if expectations are sufficiently favorable, or $q_t = 0$, the financial market does not convey information about the state p_t. Then, by the end of the period, information has become stale and, while a recovery is indeed taking place, investors do not know this fact yet and anticipate that $p_t \in \{.5/u^2, .5\}$. Thus, the market does not learn about the recovery as fast as it learnt about the post-recessionary downturn.

Alternatively, in lieu of recovery, the economy may evolve from the post-expansionary downturn to a long-term decline $p_t = .5/u^2$.

Corollary 3.4 *Let* $Q \equiv \max(0, \frac{1-(.25/u)(H+1)}{1-.5/u})$. *During a long-term decline (i.e.,* $p_{t-2} = .5$, $p_{t-1} = .5/u$ *and* $p_t = .5/u^2$*),*

(i) If $m \leq \frac{1-Qu^2}{u(1-Q)(2u-1)}$, $q_t = 1$ *is implemented. In the period that follows* $\theta_{t+1} = .5/u^2$.

(ii) If $m > u/(2u-1)$, $q_t = q_{t-1}$ *is implemented. In the period that follows,* $\theta_{t+1} =$ "NI" *if* $H \geq 4u-1$ *and* $\theta_{t+1} = .5/u^2$ *if* $H < 4u-1$.

(iii) Otherwise, $q_t = \max(0, \frac{1-(.25/u^2)(H+1)}{1-.5/u^2}) \geq q_{t-1}$ *is implemented.*

The influence of banks over the course of a long-term recession is again made apparent. When most banks are uninformed, the growth in non-reporting loans increases the demand for more accounting regulation. Thus, the long-term decline exhibits the negative feedback effect on accounting regulation, which springs back the regulation to high quality after the first period of recession. In turn, the high-quality disclosure in a worse state of the world causes a sharp contraction in credit markets. Note however that this contraction is a socially efficient outcome (all bad projects are eliminated) and features, on the upside, a decrease in cost of debt. In summary, environments with uninformed banks lead to a sharp contracting in credit markets during a long-term decline, in particular as compared to the initial downturn, but also a reduction in cost of capital for those projects that are financed.

If banks are moderately informed, the low-quality regulation is passed and is indicative of the long-term decline (the high-quality regulation would have passed during a recovery). As a result, the long-term decline features a negative revision in market expectations, as investors learn that it is taking place. Bad-project entrepreneurs adapt their choice of regulation to this more unfavorable environment, choosing to increase the regulation. Only at this point, the economy features the two common symptoms of a crisis: the credit market shrinks (more disclosure and more bad projects) and interest rate on existing loans increases.

If banks are well-informed, the low-quality regulation is passed during both long-term declines and recoveries. Because market expectations do not reflect the decline, cost of debt may be lower and the chosen regulation is one of lower quality than in the previous case. Thus, the aggregate uncertainty leads to an accumulation of a large number of bad projects. If $q_t > 0$, the market learns with delay, at the trading stage $t.4$ that the long-term decline is taking place, leading to a greater adjustment in market expectations. If $q_t = 0$, information remains stale and, at the beginning of the next period,

market participants remain unsure as to whether the recession turned into a long-term decline. In the period that follows, these excessively favorable beliefs imply that the accounting regulation remains low if the economy moves to deeper recessionary states.

4. Extensions and Discussions

In this Section, we incorporate into the model several other aspects of the environment, and discuss their effect on regulatory choice, lending activity and financing inefficiencies. In these extensions, we define in short-hand $\hat{p}_t$ as the expected belief conditional on any low-quality regulation being passed.

4.1. Renegotiated Loans

The baseline model develops the analysis in the context of a simple loan. We extend next the main argument under the reasonable assumption that banks may also be able renegotiate a loan by a non-reporting firm. Further, some differences made apparent under renegotiation make it worth revisiting the regulatory choice when the relationship between the firm and the bank is close enough to facilitate a renegotiation.

We extend the model by assuming that at date $t.4$, banks and entrepreneurs may choose to renegotiate the loan and that the bank has all the bargaining power in this renegotiation. A bilateral renegotiation is desirable if the value of termination is greater than the expected value of the bank and the entrepreneur, i.e. after there is no report and if $1 > \hat{p}_t(H - R_t) + \hat{p}_t R_t = \hat{p}_t H$. In particular, the assumption of renegotiation is equivalent to that of a Chapter 11 bankruptcy in which a court evaluates the economic value of continuing the firm.

Rewriting this condition, the renegotiation is valuable for states of the world $\hat{p}_t < 1/H$. Then, the bank purchases the project back from the entrepreneur (e.g., making a take-it or leave-it offer) for the equity value $\hat{p}_t(H - R_t)$. Adapting the bank's zero profit condition to this setting,

$$1 = \hat{p}_t q_t R_t + (1 - \hat{p}_t) q_t 1 + (1 - q_t)(1 - \hat{p}_t(H - R_t)) \tag{4.1}$$

This yields a face-value R_t that given by:

$$R_t = H(1 - q_t) + q_t \tag{4.2}$$

As before, we substitute this face value in the surplus of bad-project entrepreneurs to derive their preferred regulatory choice.

$$\begin{aligned} V_t^b &= (1 - q_t)\hat{p}_t(H - R_t) \\ &= \hat{p}_t q_t (H - 1)(1 - q_t) \end{aligned}$$

This objective function has a unique optimum located at $q_t = .5$. This level is always less than the regulation q_t^b chosen in the baseline with no renegotiation (since $\hat{p}_t < 1/H$). Renegotiation increases the ex-post efficiency of the financing arrangement, by transferring some potential surplus to the bank. Then, the competitive banking sector reallocates this efficiency gain to entrepreneurs via lower interest rates. In turn, this increases the continuation surplus of bad entrepreneurs and increases incentives to pass lower-quality disclosure.

The renegotiation has then two effects on the economy. First, it eliminates the cost of financing bad projects entirely, by stopping all projects that do not report. Second, it implies a decrease in the accounting quality, which in turn increases the number of good projects that do not report and are terminated.

Proposition 4.1 *In the economy with renegotiation, the total surplus of entrepreneurs is the same as in the economy without renegotiation, regulation quality is lower and the good-project (bad-project) entrepreneurs achieve lower (higher) surplus.*

From an ex-post perspective, renegotiation increases the efficiency of the financing arrangement and, for a given regulation, it is desirable to both the good-project and bad-project entrepreneurs. Ex-ante, however, the bad-project entrepreneurs can adapt their preferred regulation to sustain a greater number of financed bad projects. The renegotiation is entirely redistributive and, after considering the new regulation, tends to shift surplus from the good-project entrepreneurs to the bad-project entrepreneurs. Further, given that this effect occurs via the effect of the collective regulatory choices,

the good-project entrepreneurs will typically have no desire not to renegotiate and, at an individual level, renegotiation will always occur if it is feasible.

4.2. Complete Contracts

We consider next a version of the model under the stronger assumption that the public report is contractible. Formally, we assume that entrepreneurs can, subject to the banks breaking even, propose a complete contract which takes the form of two face values, one face value R_t^+ if the firm does not report and a (possibly lower) face value R_t^- if the firm discloses the good outcome.[26] Implicit to the setting, after accepting the financing arrangement proposed by the entrepreneur, the bank is bound to this face value by the contract and cannot renege on R_t^- after the good report. One interpretation of this financing scheme is as a performance pricing loan where the interest rate depends on accounting reports.

Since the choice of the contract may convey information on the type of a project, we use a simple equilibrium refinement that follows immediately from the intuitive criterion. Namely, we assume that if markets observe a contract that would yield zero surplus for the bad-project entrepreneurs, they infer that this contract must have been offered by the good-project entrepreneurs. If such a contract exists and yields a surplus $H - 1$ to the good-project entrepreneurs, we assume that it is chosen.

We claim that such a financing contract always exists if $q_t > 0$ and yields the first-best surplus to the good-project entrepreneurs. To see this, consider the following contract:

$$R_t^+ = H \tag{4.3}$$

$$R_t^- = H - \frac{H-1}{q_t} \tag{4.4}$$

Under this contract, the bank charges an interest rate that brings the equity value of a non-reporting firm to zero; in particular the bad-project firms achieve zero surplus.[27] Expecting that only the good-project entrepreneur participates, the bank expects a surplus: $q_t R_t^- + (1 - q_t) R_t^+ = 1$ which ensures participation by banks. Finally, the good-project entrepreneurs achieve a surplus $q_t(H - R_t^-) + (1 -$

[26] As in the baseline, the project is shut down and the loan returned to the bank if the project is detected to be bad.

[27] It is noteworthy that this contract may feature $R_t^- < 0$, i.e. with the bank making a transfer to the firm. This is not restrictive because the bank can easily bypass any negativity constraint on ex-post cash flows by financing the firm more than \$1.

$q_t)(H - R_t^+) = H - 1$.

This means that the contract (R_t^+, R_t^-) can be used to perfectly tease out the bad-project entrepreneurs, leaving them with a residual surplus equal to zero. For most accounting regulations $q_t > 0$, then, only good projects are financed and economic inefficiencies are resolved. Namely, the effect of complete contracting is to provide a mechanism that requires very little disclosure regulation.

Unfortunately, the promise of efficiency under complete contracts is also the main reason for its demise. By taking all of the economic surplus away from the bad-project entrepreneurs, complete contracts shift the preferences of bad-project entrepreneurs toward regulations that do not provide any information useable for contracting purposes, i.e. $q_t = 0$. In turn, complete contracts are self-defeating and lead to lower-quality regulation as long as the uninformative regulation can be used to finance projects.

Proposition 4.2 *If $\hat{p}_t(0) > 1/H$, the bad-project entrepreneurs always demand $q_t = 0$. If the regulation passes, it reduces the surplus of both good and bad entrepreneurs and increases the financing inefficiencies. If $\hat{p}_t(0) \leq 1/H$, the model with complete contracting features a regulatory choice $q_t = 1$.*

As a social choice problem, the undesirable interaction between contracting and regulatory choices may be one reason why many countries are unwilling to enforce certain contracts; in fact, (and unlike renegotiation) all entrepreneurs would be willing to pass a regulation that prevents complete contracting when $\hat{p}_t > 1/H$. Complete contracting is desirable to good entrepreneurs only in cases of very unfavorable states of the world, in which passing no information would cause a complete market breakdown.

4.3. Liquidity Shock Timing

The model above assumes that banks must express their preferences for accounting quality before knowing whether they will experience a liquidity shock. As a result, high accounting quality is favored by uninformed banks and by informed banks with good loans. Informed banks with bad loans favor poor accounting quality.

However, if banks know whether they will experience a liquidity shock prior to the accounting quality choice, the demand for good accounting quality will vary with the number of banks needing

to sell their loans. Good-loan banks and uninformed banks who do not experience a liquidity shock will be indifferent to the accounting quality standard and will express no preference. Informed banks with bad loans favor poor accounting whether they experience a liquidity shock or not.

As a result, the demand for high quality accounting regulation will depend on the proportion of banks experiencing a liquidity shock. If more banks must sell their loans on the market, then there will be more support for high accounting quality.

One implication of this connection is that efforts to ease banks' liquidity shocks will affect the banking sector push for accounting quality. If many uninformed banks (or informed banks with good loans) must sell their loans in the market, they will be in favor of better accounting quality. On the other hand, if a third party (e.g., a governmental entity) provided other means for most banks to meet their liquidity needs, the banking sector support for high quality accounting would diminish. For instance, if the Federal Reserve provided ready liquidity for most banks, there is less urgency for these banks to push for better accounting on loan values.

4.4. Monitoring by Banks

We briefly consider a simplified, single period version of the model in which some sophisticated banks can use their own information to monitor new loans. In comparison, in the baseline model, banks receive information only after the investment has been made and, therefore, use their information for strategic trading purposes only.

A static version of the model is considered in which we can better investigate the role of private information by banks and its interaction with regulatory choice. The timeline of the model remains as in the baseline, except for the following modifications to the timing and information environment. We state the modified timeline below and, since we focus on a single period, drop the indexation on t for all variables. Importantly, we do not solve the formal model entirely but, to save space, focus on the new aspects directly involving bank private monitoring.

At stage 1, when the state of the world $p \in (0, 1)$ becomes known, there is a mass $m \in (0, 1)$ of "sophisticated" banks and a large number of "unsophisticated" banks. A sophisticated bank may be a large investment bank with highly-trained employees, or it may be a local branch that typically lends to a group of firms about which it will receive high-quality information. Unsophisticated banks may

represent the capital available in the economy, as for example provided by fund managers, non-local banks or regulated lending institutions. A sophisticated bank receives information, *at stage 4*, about the quality of the loan. A bank knows privately at stage 1 whether it is sophisticated or not. Stages 2 and 3 are similar to the baseline model: a new regulation q is voted and a competitive price R forms for the cost of debt. At stage 4, the quality of the loan is revealed with probability q; in addition, sophisticated banks learn the quality of the loan and may shut down the project when the loan is bad. At stage 5, banks and entrepreneurs sell their equity or loan in a competitive market.

We first derive the market clearing cost of debt R. This cost of debt must be set such that the supply of capital is equal to one (the mass of all entrepreneurs demanding capital). Since sophisticated banks do not have sufficient capital to meet all the demand, the equilibrium cost of debt must be set such both sophisticated and some unsophisticated banks supply capital. In turn, this requires the cost of debt to be such that unsophisticated banks break even. Denoting V^d the market value of a loan,

$$1 = q(pR + 1 - p) + (1 - q)V^d \tag{4.5}$$

Equation (4.5) further implies that $V^d < 1$ so that sophisticated banks efficiently use their information and shut down all bad projects. Solving for the cost of debt,

$$R = \frac{1 - V^d - q(1 - p - V^d)}{pq} \tag{4.6}$$

The market value V^d is determined as the expected value of all non-disclosing loans.

$$V^d = \frac{p}{p + (1 - p)(1 - m)}R \tag{4.7}$$

Solving Equations (4.6) and (4.7) for R and V^d yields the following:

$$V^d = \frac{1 - q(1 - p)}{1 - mq(1 - p)} \tag{4.8}$$

This characterization is intuitive and captures the direct effect of bank monitoring. For a given accounting quality, more monitoring increases the number of bad loans that are detected, leading to greater productive efficiency and higher market value of debt. Similarly, it is immediate to show that

cost of debt R is decreasing in m.

Finally, consider how the preferences from the banking sector affect the demand for accounting quality. As in the baseline, unsophisticated banks break even so that they are indifferent to any choice of q. However, because they are in limited numbers, sophisticated banks achieve a positive surplus V^s which can be written as follows.

$$V^s = q(pR + 1 - p) + (1 - q)(pV^d + 1 - p) \tag{4.9}$$

After substituting R and q, this objective function is single-peaked with a unique optimum q^s.

$$q^s = \frac{1 - \sqrt{1 - m(1-p)}}{m(1-p)} \in (0, 1) \tag{4.10}$$

Sophisticated banks favor an interior level of accounting quality and their preference is not well-aligned with those of good entrepreneurs. This observation is intuitive: the competitive surplus of sophisticated banks is a function of their competitive advantage over unsophisticated banks. At one extreme, if accounting quality is perfect $q = 1$, sophisticated banks would have no competitive advantage and make zero profit. At the other extreme, if accounting quality is low $q = 0$, the deadweight cost of bad projects destroys most of the social surplus, and in particular the share of the surplus that is received by the sophisticated banks. The choice of q^s has two other comparative statics. First, tt is decreasing in p, since less accounting quality is necessary when more good projects are available. Second, it is increasing in m; this is because their competitive advantage over unsophisticated banks is greater and they are willing to tolerate more public disclosure.

In summary, we find two effects of private monitoring by banks. The "direct" effect of bank monitoring is to increase the amount of monitoring over bad privately-detected loans, leading to a decrease in cost of debt. This effect is broadly consistent with the idea developed earlier by Sir David Tweedie that insufficient bank monitoring may have contributed to the increase in bad debt. We also point out an "indirect" effect of bank monitoring on accounting quality. Sophisticated banks have strategic motives to reduce accounting quality and an increase in the number of monitoring banks may increase their political power. However, we show that there is a balancing effect that may soften this indirect effect; when m is larger, the sophisticated banks as a constituency are less sensitive to

the competitive effects of accounting quality and demand greater quality.

5. Concluding Remarks

In this paper, we examine the interactions between politically-based information regulations and the economic cycle. The quality of entrepreneurs projects changes over time and, with it, the entrepreneurs preferences for the quality of information produced by an accounting system. As the economy moves downward from good times, the political weight moves from entrepreneurs with good quality projects to those with bad quality projects, with the result that information quality declines and there are increases in both lending activity and interest rates. The initial impetus for these changes is the decline in the economy, but the resulting pressure for a shift in accounting quality can increase bad loans and interest rates.

In any period, one part of the banking sector makes loans to new entrepreneurs, with interest rates that provide price protection based on the quality of information. Another part of the banking sector holds loans from the previous periods financing of entrepreneurs and, therefore, has preferences over this periods accounting system quality. When banks are likely to have private information about the quality of their existing loans, those with bad loans will exert pressure to decrease accounting quality so they may hide their transactions among those occurring for liquidity reasons. Those banks who have good loans, or who remain uninformed about their loan quality, will press for high accounting quality to limit the discounts that occur with liquidity shocks. In particular, the path that politically-sensitive accounting quality will take depends on the likelihood that banks have become informed about the quality of their own loans. The higher that likelihood, the less likely a return to high accounting quality.

We have illustrated a few of these complex issues with a simple stylized model. It is central to the analysis to understand how the demands for standards and the underlying economic conditions map to the actual standards implemented. We recognize that the current study is exploratory in nature, and maps only to a small subset of the issues that relate to accounting standards and macroeconomic cycles. As a natural limitation of our study, we have assumed that new banks have access to capital, even if past projects do not perform well and, in particular, we do not cover here issues that relate to

regulatory capital (e.g., Boot and Thakor (1993)). However, as Watts and Zimmerman (1978, 1979) pointed out thirty years ago, it is useful to think about accounting regulation as an endogenous process, bringing in the tensions and constraints that can pull it away from efficient or socially desirable outcomes.

Appendix

Proof of Proposition 2.1: The surplus of the bad entrepreneur is a single-peaked quadratic function. Differentiating it in q_t,

$$\begin{aligned}\frac{\partial U_b^t}{\partial q_t} &= -p_t(H-1)+(1-p_t)(1-q_t)+(1-q_t)(1-p_t)\\ &= 2(1-p_t)(1-q_t)-p_t(H-1)\end{aligned}$$

This above Equation is zero at $q_t = \frac{1-.5p_t(H+1)}{1-p_t}$. Since $H > 1$, this number is strictly less than one. Subject to the condition that $q_t \geq 0$, the optimum is given by $q_t^b = \max(0, \frac{1-.5p(H+1)}{1-p})$ where $q_t^b = 0$ if and only if $1-.5p_t(H+1) \geq 0$, i.e. $p_t \geq 2/(H+1)$.□

Proof of Proposition 2.3: (i) and (ii) are immediate. (iii) implies that $q_t = (1-.5p_t(H+1))/(1-p_t)$ by Proposition 2.2.

$$\begin{aligned}R_t &= 1+\frac{(1-p_t)(1-\frac{1-.5p_t(H+1)}{1-p_t})}{p_t} = 1+\frac{1-p_t-1+.5p_t(H+1)}{p_t} = .5(H+1)\\ \Delta_t &= (1-\frac{1-.5p_t(H+1)}{1-p_t})(1-p_t) = 1-p_t-1+.5p_t(H+1) = .5p_t(H-1)\\ L_t &= p_t+\Delta_t = .5p_t(H+1)\\ V_t^e &= p_t(H-1)-\Delta_t = .5p_t(H-1)\\ \overline{p}_{t+1} &= .5\frac{1-.5p_t(H+1)}{1-p_t}+m\Delta_t = .5\frac{1-.5p_t(H+1)}{1-p_t}+.5p_t(H-1)m\end{aligned}$$

This concludes the proof.□

Proof of Proposition 3.1: Case 1. Suppose that $p_{t-1}/u \geq \overline{p}_t$. Substituting $\overline{p}_t$ from Equation (2.10), this Equation can be rewritten as follows.

$$\begin{aligned}\frac{p_{t-1}}{u} &\geq .5q_{t-1}+m(1-p_{t-1})(1-q_{t-1})\\ p_{t-1}(\frac{1}{u}+m(1-q_{t-1})) &\geq .5q_{t-1}+m(1-q_{t-1})\\ p_{t-1} &\geq \frac{.5q_{t-1}+m(1-q_{t-1})}{\frac{1}{u}+m(1-q_{t-1})}\end{aligned}$$

Then, the regulation $q_t = 1$ will pass for any realization of p_t. Therefore, the belief structure $\hat{p}_t(q_t) = p_{t-1}$ for any q_t is consistent with equilibrium.

Case 2. Suppose that $p_{t-1}u < \overline{p}_t$. This inequality is symmetric to that obtained in Case 1 and can be rewritten as:

$$p_{t-1} < \frac{.5q_{t-1}+m(1-q_{t-1})}{u+m(1-q_{t-1})}$$

Then, a regulation $q_t < 1$ will pass for any realization of p_t. Therefore, the belief structure $\hat{p}_t(q_t) = p_{t-1}$ for any q_t is consistent with equilibrium.

Case 3. Finally, suppose that $\overline{p}_t \in [p_{t-1}/u, p_{t-1}u)$. Then, $q_t = 1$ passes if and only $p_t = p_{t-1}u$, therefore $\hat{p}_t(1) = p_{t-1}u$. For $q_t < 1$, the belief structure $\hat{p}_t(q_t) = p_{t-1}/u$ is consistent with equilibrium.□

Proof of Proposition 3.2: The fact that $q_{t-1} = 0$ implies that $\overline{p}_t = m(1 - p_{t-1})$; thus the high quality regulation is passed if and only if $p_t \geq m(1 - p_{t-1})$. The reader should note that in the following proof, Cases 1.i and 2.i correspond to part (i) of the proposition, Cases 1.ii and 2.iv correspond to part (ii) of the proposition, Cases 1.iii and 2.iii correspond to part (iii) of the proposition, and Cases 1.iv and 2.ii correspond to part (iv) of the proposition.

Case 1. Suppose $q_t = 1$. There are four cases to consider. Case 1.i. the regulation $q_t = 1$ always passes, i.e. $p_{t-2}/u^2 \geq m(1 - p_{t-2}/u)$ or $p_{t-2} \geq mu/(m + 1/u)$. Then, $\hat{p}_t(1) = p_{t-2}$. Case 1.ii. the regulation $q_t = 1$ passes as long as $p_t \geq p_{t-2}$, i.e. $p_{t-2} \geq m(1 - p_{t-2}/u)$; that is $p_{t-2} \in [mu/(m + u), mu/(m + 1/u))$. Then:

$$\begin{aligned} \hat{p}_t(1) &= \frac{\frac{1}{(1+u)^2} p_{t-2} u^2 + \frac{2u}{(1+u)^2} p_{t-2}}{\frac{1}{(1+u)^2} + \frac{2u}{(1+u)^2}} \\ &= p_{t-2} \frac{2u + u^2}{2u + 1} \end{aligned}$$

Case 1.iii. the regulation $q_t = 1$ passes as long as $p_{t-1} > p_{t-2}$, i.e. $p_{t-2} \geq m(1 - p_{t-2}u)$; that is: $p_{t-2} \in [m/(1 + mu), mu/(m + u))$. Then, $\hat{p}_t(1) = \mathbb{E}(p_{t-1}|q_t = 1) = p_{t-2}u$. Case 1.iv. If $p_{t-2} < m/(1 + mu)$, the high-quality regulation may only pass if $\hat{p}_t(1) = p_t = u^2 p_{t-2}$.

Case 2. Suppose $q_t < 1$. There are four cases to consider. Case 2.i. the regulation $q_t < 1$ always passes, i.e. $p_{t-2}u^2 < m(1 - p_{t-2}u)$ or $p_{t-2} < m/(mu + u^2)$. Then, $\hat{p}_t(q_t) = p_{t-2}$. Case 2.ii. the regulation $q_t < 1$ passes as long as $p_t < p_{t-2}$, i.e. $p_{t-2} < m/(1 + mu); that is p_{t-2} \in [m/(mu + u^2), m/(1 + mu))$. Then:

$$\begin{aligned} \hat{p}_t(q_t) &= \frac{\frac{u^2}{(1+u)^2} p_{t-2}/u^2 + \frac{2u}{(1+u)^2} p_{t-2}}{\frac{u^2}{(1+u)^2} + \frac{2u}{(1+u)^2}} \\ &= p_{t-2} \frac{2u + 1}{2u + u^2} \end{aligned}$$

Case 2.iii. the regulation $q_t < 1$ passes as long as $p_{t-1} < p_{t-2}$, i.e. $p_{t-2} \geq m(1 - p_{t-2}/u)$; that is: $p_{t-2} \in [m/(1 + mu), mu/(m + u))$. Then, $\hat{p}_t(q_t) = \mathbb{E}(p_{t-1}|q_t < 1) = p_{t-2}/u$. Case 2.iv. If $p_{t-2} \geq mu/(m + u)$, the high-quality regulation may only pass if $\hat{p}_t(q_t) = p_t = p_{t-2}/u^2$.□

Proof of Corollary 3.1: If $p_t \geq .5u$, then $p_{t-1} \geq .5$, implying that $\overline{p}_t \leq .5$. It follows that $p_t \geq \overline{p}_t$ and therefore $q_t = 1$ will pass.□

Proof of Corollary 3.2: During a post-expansionary downturn, $\overline{p}_t = .5$ (no bank has non-reporting loans). The regulation preferred by the bad entrepreneurs passes. Finally, since the high-quality regulation would have passed if $p_t = .5u$, markets infer perfectly the state conditional on observing q_t. Finally, lending activity is given by $L_t = \min(1, .5p_t(H+1))$, which is greater than .5 if $H \geq 2u - 1$.□

Proof of Corollary 3.3: The entrepreneurial sector is indifferent to more or less regulation and, therefore, the high-quality regulation passes if and only if the banking sector supports it, i.e. $1-m+m.5/u > m(1-.5/u)$, i.e. $m \leq u/(2u-1)$. If the high-quality regulation does not pass, the low-quality regulation passes, and the bad-project entrepreneurs must anticipate that the low-quality regulation will always pass, i.e. $\hat{p}_t = .5/u$.. This implies an optimal choice identical to period $t-1$, i.e. $q_t = q_{t-1}$. Information becomes stale if and only if $q_t = 0$, i.e. $.5/u \geq 2/(H+1)$.□

Proof of Corollary 3.4: By Proposition 2.1 and Corollary 3.2,

$$q_{t-1} = \max(0, \frac{1-(.25/u)(H+1)}{1-.5/u}) \equiv Q \tag{5.1}$$

(i) Suppose that $.5/u^2 \geq \overline{p}_t$. This inequality can be rewritten as follows.

$$\begin{aligned} \frac{.5}{u^2} &\geq .5Q + m(1-.5/u)(1-Q) \\ m &\leq \frac{\frac{.5}{u^2} - .5Q}{(1-.5/u)(1-Q)} \\ &\leq \frac{1-u^2Q}{(1-Q)u(2u-1)} \end{aligned}$$

In this case, $q_t = 1$ will pass.

(ii) Suppose that $.5 < \overline{p}_t$. Note that this implies that $q_t < 1$ would have passed even if p_t were equal to .5, and thus investors do not learn p_t from q_t, i.e. $\hat{p}_t(q_t) = p_{t-1} = .5/u$. This prior is identical to the prior in $t-1$, and thus implies a choice of $q_t = q_{t-1}$. Note that $q_t = q_{t-1} = 0$ if $H \geq 4u - 1$ (by Corollary 3.3) and then $\theta_{t+1} =$ "NI". Otherwise, $q_t = q_{t-1} > 0$ and the cycle is revealed by the end of the period, i.e. $\theta_{t+1} = .5/u^2$.

(iii) Suppose that $\overline{p}_t \in (.5/u^2, .5]$, then, $q_t < 1$ passes but, because it would only pass at $p_t = .5/u^2$, it also implies that $\hat{p}_t(q_t) = .5/u^2$ for $q_t < 1$. This implies $q_t = \max(0, \frac{1-.25/u^2(H+1)}{1-.5/u^2}) \geq q_{t-1}$.□

Proof of Proposition 4.1: The case with $q_t = 1$ being trivial, we focus here on $q_t < 1$ (i.e., bad project entrepreneurs control the regulatory process).

First, consider the economy with renegotiation. All bad projects are either detected or renegotiated and terminated, therefore there is no deadweight cost of inefficient continuation. However, $\hat{p}_t(1-q_t)$ good projects do not disclose and are terminated. Therefore, in this economy, the total deadweight cost is equal to $DC = \hat{p}_t(1-q_t)(H-1)$, where

$H-1$ is the deadweight cost of incorrectly terminating a good projet. Recall that, in this economy, $q_t = .5$. Therefore, $DC = .5\hat{p}_t(H-1)$.

Second, consider the economy without renegotiation (the baseline model). All good projects are continued, therefore the deadweight cost is entirely represented by inefficient continuation of $(1-\hat{p}_t)(1-q_t^b)$ bad projects where $\hat{p}_t < 1/H$ implies that $q_t^b > 0$. Substituting q_t^b, the deadweight cost of continuing bad projects is exactly equal to $.5\hat{p}_t(H-1)$, and thus the inefficiency is the same with or without renegotiation. It follows that the sum of the surplus of the good and bad project entrepreneurs must be the same.

To see how these gains from renegotiation are shared between these two groups, substitute $q_t = .5$ in the surplus of bad-project entrepreneurs, which yields a surplus $V_t^b = .25\hat{p}_t(H-1)$. Compare this to the surplus of the bad-project entrepreneur in the baseline model. By Proposition 2.3, it is given by: $\frac{(.5\hat{p}_t(H-1))^2}{1-\hat{p}_t}$. This last term is always strictly less than $.25\hat{p}_t(H-1)$. Therefore, the bad-project entrepreneur is better-off in the economy with renegotiation. Vice-versa, the surplus of the good-entrepreneur is given by $.5(H+1)$ in the baseline model but only $.5\hat{p}_t(H-1)$ with renegotiation.□

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