

Governments as shadow banks: The looming threat to financial stability¹

Viral V. Acharya

NYU-Stern, CEPR, and NBER

Governments often have short-term horizons and are focused excessively on the level of current economic activity, ignoring whether it will lead to stable long-term growth. This objective can be well-served through policies governing competition and risk-taking in the financial sector. By allowing excessive competition, providing downside guarantees and encouraging risky lending for populist schemes, governments can create periods of intense economic activity fueled by credit booms. This way, governments effectively operate as “shadow banks” in the financial sector. Such government role appears to have been at the center of recent boom and bust cycles and continues to present a threat to financial stability.

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I. Introduction

Most discussion of macro-prudential regulation of the financial sector focuses on banks and intermediaries in the private sector. However, governments are themselves heavily involved in intermediation, either explicitly in the form of government-sponsored enterprises (GSEs), or implicitly in the form of government guarantees to the private sector intermediaries. The government involvement also extends to determining the nature of regulation in the financial sector, in the form of policies governing competition among financial firms, rules for prudential risk controls, and leverage limits or equivalently capital requirements. Thus, governments exercise a significant control over the extent and quality of intermediation activity in the economy and the attendant risks.

Governments, however, typically have a short-term horizon and adopt policies that often create excessive current intermediation – a “large financial center” – at the expense of future costs of financial instability. For example, in pursuit of short-run popularity, governments can encourage competition in the financial sector, provide downside guarantees, weaken risk controls, subsidize leverage through tax deductions, and direct lending to specific sectors for populist goals. This way, governments can effectively operate as “shadow banks”, exploiting intermediation activity for private objectives, the end result of which is often the fueling of credit booms and periods of intense economic activity but with a looming threat to financial stability.

There are several reasons why governments are short-term in their horizons. First and foremost, they are primarily focused on getting re-elected. Hence, they may cater to their specific constituencies or preferences of the current generation even if that risks financial hazards for other constituencies or future generations. Second, government

balance-sheets are hard to comprehend since they inherently involve some smoothing of expenditures and taxation over time. Given such difficulty of comprehension, recent growth and economic activity numbers often drive evaluation of government's success by the population. In turn, even long-term governments and politicians can find themselves caught up in the game of meeting short-term expectations.² Alternately, opportunistic governments can exploit the moral hazard opportunity given the opaqueness of their activities and balance-sheets, and signal-jam into current spending and activity by relegating to future governments the tail risks undertaken by such spending. Prime examples of such risks include the long-run risk of housing subsidies, funding risks from excessive health-care and labor protection for current generation of voters, the risk of sovereign default when fiscal deficits grow large and unsustainable, among others, many of which have realized or come to surface following the housing, financial and sovereign crises in Western economies since 2007.

For the purposes of this paper, I take such distortion in government objective as given and assume that the government chooses financial sector policies to maximize the *level of current* economic activity, disregarding the likelihood whether such activity will lead to stable growth and ignoring the future costs of encouraging intermediation through its policies. In contrast, prudential regulation of the financial sector – a normative benchmark for the analysis – maximizes the expected output from intermediation net of the costs of financial failures. I examine policies under the two objectives in a setting where financial firms have incentives to take on excessive risks after borrowing funds, but the strength of these incentives depend upon the “franchise values” they give up from

² This point is akin to the modeling of corporate myopia, see for example, Stein (1988), and government myopia, see for example, Acharya and Rajan (2011).

risk-taking, which in turn, depend upon the nature of competition in the financial sector and the extent of risk and leverage controls imposed on the financial sector.³

While prudential regulation adopts limited competition policy to preserve franchise values in the financial sector, limited downside guarantees (if any) to limit taxpayer costs from failures, and adequate risk and leverage controls, governments in the model do exactly the reverse: they deregulate the financial sector fully, encouraging a competitive “race to the bottom” among financial firms; offer blanket downside guarantees to boost franchise values so that full deregulation implies greater entry and competition; and weaken risk controls and capital requirements. Government policies for the financial sector thus emerge as bigger risk to financial stability than the risk-taking incentives of the private financial sector.

I then present a leading example for this thesis. Based on Acharya et al. (2011), I argue that the housing boom and bust in the United States that caused the financial crisis of 2007-09 was deeply rooted in government interventions and policies in housing finance. I focus on the role played by two GSEs, Fannie Mae and Freddie Mac. Born of a well-intentioned and economically efficient goal of creating liquidity in the secondary mortgage market, these institutions morphed into profit-taking firms that had the majority of their risks being backstopped by the government. As of 1970, when Fannie Mae had been recently privatized and Freddie Mac was newly created, they represented only 4.4% of the mortgage market; by 1991, they captured 28.4%; by the time of the financial crisis, 41.3% with a combined \$1.43 trillion mortgage portfolio and \$3.50 trillion in mortgage-

³ “Franchise values” for banks generally refer to continuation values for bank owners in case the bank survives another period. The model in this paper is one-period only, but its assumptions on the probability structure of bank’s outcomes at end of the period facilitate interpreting bank owners’ payoff when the bank survives as “franchise value”.

backed security (MBS) guarantees; and, as of August 2010, they had left the US taxpayers with a dent of close to \$150 billion.⁴ I document the series of government initiatives that led to the extraordinary growth of these institutions and their eventual debacle.

In a nutshell, the privatization of Fannie Mae in 1968 even as their debt was implicitly guaranteed, followed by the creation of Freddie Mac to further support housing markets, the deregulation of MBS markets to allow private market securitization starting 80s, and the relaxation of GSE capital requirements and expansion of their business to riskier mortgages in 90s, all lead to conclusion that these were part of initiatives to boost lending against housing as a government-favored asset class, disregarding the substantial downside risks to taxpayers. Importantly, I also make the case that the deregulation of housing finance in the United States in the 80s and the “push” to extend GSE activity to high-risk mortgages in 90s created a fierce competition in risk-taking and market-share grabbing between the GSEs and the financial sector. Data presented are highly suggestive of distorted government objective function behind these outcomes, an objective focused on short-run populist schemes for housing, provided through its own imprint in the financial sector in the form of GSEs as well as through policies affecting quality of lending against houses by the private sector. While this threat from government policies was raised by some prior to the crisis, it went largely unnoticed, but it did materialize and continues to loom.

⁴ Some projections anticipate that this figure will more than double in years to come, with substantial downside risk.

The rest of the paper proceeds as follows. Section II presents the model of government's role in the financial sector as shadow banks. Section III describes in detail the case of GSEs in the United States as a quintessential example of government operating as shadow bank in the financial sector. Section IV provides some other examples besides the GSEs of governments operating as shadow banks, and concludes with implications for financial stability and prudential regulation of the financial sector.

II. The model of governments as shadow banks

1. Benchmark model

Consider a representative financial firm (bank, shadow bank, government-sponsored enterprise, etc.) operating in a one-period economy. The financial firm borrows deposits from investors who can otherwise earn a reservation rate of r (by investing in government bonds, e.g.). For simplicity, deposits are normalized to one unit. The financial firm can invest the funding raised into projects in the economy (loans and loan guarantees to households and corporations, e.g.). The firm can choose the “scale” of its portfolio of investments, denoted as y . Specifically, portfolio y has likelihood of “success” of $p(y)$ in which case it yields a return of y at end of the period; otherwise, it “fails” producing no return. This can be thought of as return on an aggregate portfolio of the economy with the states corresponding to an economic (or financial) boom and bust, respectively. The economy's capacity to produce high level of output has limits, which are captured by assuming that $p'(y) < 0$, and to ensure bounded outcomes in the model, it is also assumed that $p''(y) < 0$. That is, as the financial firm grows its portfolio size, it

must do so on the margin by making poorer quality loans and the overall likelihood of success of the portfolio falls.⁵

The first-best portfolio size (or equivalently the level of risk) y^{FB} maximizes the expected output of the economy, which is $p(y).y$, so that the first-order condition and second-order conditions for the optimal investment size are given respectively by

$$p(y) + yp'(y) = 0, \quad (1)$$

$$2p'(y) + yp''(y) < 0. \quad (2)$$

In contrast, the financial firm's choice of portfolio size, denoted as y^* , maximizes firm's expected equity value, which is $p(y). (y - r_D)$, where r_D is the equilibrium (gross) cost of borrowing of the firm. Assume that the financial firm chooses its portfolio size *after* it has borrowed at the rate of interest r_D . Then, the first-order and second-order conditions are given respectively by

$$p(y) + (y - r_D)p'(y) = 0, \quad (3)$$

$$2p'(y) + (y - r_D)p''(y) < 0. \quad (4)$$

Comparing conditions (1) and (3) it follows that for any rate of borrowing $r_D > 0$, there is asset-substitution or risk-shifting (Jensen and Meckling, 1976) in that portfolio size is greater than is efficient, $y^* > y^{FB}$, and in turn, risk is greater, $p(y^*) < p(y^{FB})$, and expected firm output is smaller, $p(y^*).y^* < p(y^{FB}).y^{FB}$.⁶

As a comparative static, it is interesting to note that differentiating the first-order condition (*foc*) in (3) with respect to r_D (and denoting the second-order condition (4) as

⁵ This benchmark model and extensions considered below are based on Blum (1999) and Allen and Gale (2000, Chapter 8).

⁶ The last inequality follows from the observations that y^{FB} maximizes $p(y).y$; $p(y).y$ is a concave function of y ; and, $y^* > y^{FB}$.

soc) yields $(soc) \frac{dy^*}{dr_D} + \frac{\partial(foc)}{\partial r_D} = 0$, so that

$$\text{sign} \left(\frac{dy^*}{dr_D} \right) = \text{sign} \left(\frac{\partial(foc)}{\partial r_D} \right) = \text{sign}(-p'(y)), \text{ which is positive. That is, an increase in the}$$

borrowing cost leads to greater risk-taking and lower expected value. The intuition is the same as that in Keeley (1990)'s insight: since financial firms are leveraged, an increase in the cost of borrowing (r_D in the model) results in a fall in the “franchise value” ($y - r_D$ in the model) that they lose if they do not survive, so that an increase in the cost of borrowing induces greater risk-taking or gambling for resurrection; conversely, a reduction in the cost of borrowing or an increase in the spreads earned on investments can enhance franchise values and in turn reduce risk-taking incentives.

Going back to the private equilibrium, and assuming investor rationality, the rate of interest charged satisfies: $p(y^*) r_D = r$. The equilibrium borrowing rate reflects the financial firm's risk-taking but since risk is chosen *after* the rate is contracted, it does not get the firm to fully internalize the inefficiency of its risk-taking.

Finally, to ensure that financial intermediaries make non-zero profits in equilibrium (implicitly their reservation utility is zero), it must be the case that $y^* > r_D$ which holds as long as $y^* p(y^*) > r$, or in other words, even though financial firms are taking excessive risks ($y^* > y^{FB}$), the expected output they generate is greater than the output earned by simply investing in the reservation investment opportunity of depositors. I will assume this condition to hold for now, but consider its possible violation later.

2. Model with competition

Consider an extension of this benchmark model with a representative bank to the model of a financial sector with n identical firms. These firms engage in Cournot competition for investments. For simplicity, I model directly the (gross) return each financial firm earns on investments after competition as $f(n)y$ where y is the size of intermediation or investments made or originated (also the total output realized in the economy on these investments). For simplicity, I suppress any competition on the liabilities side in raising deposits since it would qualitatively lead to similar results. I make the natural assumptions that $f(n) > 0$, $f(1) = 1$, $f(\infty) = \bar{f} > 0$, $f'(n) < 0$, $f''(n) < 0$.

Then, in a symmetric equilibrium the financial firm's choice of portfolio size, denoted as $y^*(n)$, maximizes expected equity value $p(y).[f(n)y - r_D]$ where r_D is as before the (gross) cost of borrowing of the firm. Then, the first-order condition for optimal $y^*(n)$ is given by

$$f(n)p(y) + [f(n)y - r_D]p'(y) = 0. \quad (5)$$

As before, I continue to obtain that $\frac{dy^*(n)}{dr_D} > 0$. Next, differentiating the first-order condition in (5) with respect to n (which is legitimate as a comparative static even though n takes on integer values, and denoting the corresponding second-order condition as (soc^*)) yields

$$\frac{dy^*(n)}{dn} = -\frac{1}{(soc^*)} [p(y) + yp'(y)] f'(n) > 0 \quad (6)$$

since $(soc) < 0$, $[p(y) + yp'(y)] < 0$, $f'(n) < 0$, where the second inequality follows from the fact that private risk-taking exceeds the social risk-taking (along the lines shown for the benchmark model). Intuitively, competition reduces financial firms' margins on

investments and therefore their franchise values. With less to lose when they gamble, competition enhances risk-taking by financial firms beyond that in the benchmark case.

A corollary of this effect of competition on risk-taking is that from a social standpoint full competition is in general not desirable. Note that the expected social output is given by $n p(y^*(n)).y^*(n)$, or nV_n^* , where V_n^* is the expected total output from each financial firm's investments. The optimal size of the financial sector is given by the n that satisfies the condition (or the value of n beyond which condition turns negative):

$$V_n^* + n \frac{dV_n^*}{dn} = 0. \quad (7)$$

Due to excess risk-taking by financial firms, $\frac{dV_n^*}{dn} < 0$, so that some competition is desirable from social standpoint, but not excessive competition due to the deleterious effect of competition on franchise values and induced risk-taking. The intuition is that increasing competition has two opposing effects: on the one hand, it increases the number of participants (and hence due to enhanced competition, potential total output), but on the other hand, this leads to more excessive risk-taking by each firm and this reduces the expected economic output from intermediation of each firm.

In practice, however, governments often adopt policies that largely deregulate competition in the financial sector. As per the model, such deregulation erodes, rather than enhances, franchise values, and induces excess risk-taking. To show that such deregulation is desirable for a government operating as a “shadow bank” (as explained in the introductory remarks), suppose that instead of maximizing expected output, the government maximizes the potential *size* of the output. Formally, instead of maximizing the social objective $n p(y^*(n)).y^*(n)$, the government maximizes the size of economic

activity $n.y^*(n)$. There are several reasons to believe this is a reasonable characterization of governments (as also explained in the introductory remarks).

Then, the size-maximizing government's optimal level of competition in the financial sector is full competition ($n \rightarrow \infty$) since

$$\frac{d(ny^*(n))}{dn} = y_n^* + n \frac{dy^*(n)}{dn} > 0. \quad (8)$$

An alternative interpretation is that a government focused on current activity ignores the risk of financial fragility altogether and deregulates the financial sector excessively so as to stimulate competition and risk-taking. Such deregulation boosts current lending and investments, some of which may be populist in nature (e.g., housing loans) and some that allow creation of large financial centers and jobs, but at the cost of poor quality of investments in terms of future risks. Such costs are not always internalized by governments because they have short-term objectives or are catering to specific constituencies for political gains. The model implies that when such deregulation is undertaken, there should be a competitive “race to the bottom” in risk-taking between incumbent and new financial firms since the incumbents' franchise values get eroded.⁷

3. Government guarantees

Besides liking “large” financial sectors, governments worldwide accord substantial guarantees to the financial sector. To understand this preference for guarantees, suppose in the benchmark model that the representative financial firm were a government-sponsored enterprise (GSE) or effectively had full explicit or implicit government guarantee (such as market's perception in case of a too-big-to-fail or too-systemic-to-fail firm). Let us call it GSE for sake of convenience. Then, the borrowing

⁷ This is consistent with the evidence of Hellman, Murdock and Stiglitz (2005), who also build a model generating this effect. The contribution of the model is to explain why deregulation with such perverse effects is undertaken, namely due to governments wishing to operate banks to their own objectives.

rate for the GSE is simply r assuming that creditors are fully bailed out ex post (but not the GSE's equity holders who are wiped out). The risk choice of the GSE is given by $y^*(r)$. Then, the government or the resolution authority such as the Federal Deposit Insurance Corporation (FDIC) bears a cost of bailout of $[1 - p(y^*(r))] \cdot r$ since in the failure state of the GSE, creditors are bailed out fully at gross rate of return r . The (perceived) cost may even be higher if injection of these funds crowds out alternative fiscal expenditures in states where government borrowing constraints are binding.

Note that subsidizing the borrowing cost of the GSE enhances its franchise value and in fact *reduces* its risk-taking incentives since equity holders want to preserve the enhanced franchise value. As a result, it might in fact be attractive from a welfare standpoint for the government or the FDIC to provide such an unconditional guarantee (even without charging an ex-ante premium for it). The potential social gain from the guarantee is given by the following expression:

$$V^*(r) - V^*(r_D) - [1 - p(y^*(r))]r \quad (9)$$

where $V^*(r) = p(y^*(r)) \cdot y^*(r)$, $V^*(r_D) = p(y^*(r_D)) \cdot y^*(r_D)$, and as discussed before

$r_D = \frac{r}{p(y^*(r_D))}$. Since $V^*(r)$ is declining at $r = r_D$, the gain can be positive for $r < r_D$.

More generally, the government guarantee can be imperfect with a probability of creditor bailout that is less than one so that the equilibrium rate of borrowing is between r and r_D .

However, even when such gain from insuring the creditors of a monopolistic financial sector is positive, it may no longer be positive from social standpoint in a financial sector with high enough competition. This is because risk-taking gets

increasingly more severe with competition, $\frac{dp(y^*(n))}{dn} < 0$, and the bailout costs become

progressively larger. In particular, the social gain (per financial firm) is now given by

$$V_n^*(r) - V_n^*(r_D) - [1 - p(y^*(n, r))]r \quad (10)$$

where $V_n^*(r) = p(y^*(n, r)) \cdot y^*(n, r)$, $V_n^*(r_D) = p(y^*(n, r_D)) \cdot y^*(n, r_D)$, and where

$r_D = \frac{r}{p(y^*(n, r_D))}$. It follows that government guarantees may not be desirable from a

societal standpoint when competition in the financial sector is sufficiently high, as the provision of guarantees is too expensive relative to the risk reduction they produce. That is, guarantees simply end up being costly transfers to creditors of financial firms. More generally, the optimal government guarantee when competition in the financial sector is high would consist of a lower probability of creditor bailout than without competition, and possibly consist of no bailout possibility.

In case of a government operating as a shadow bank, the gain in its objective (per financial firm) from government guarantees is given by

$$y^*(n, r) - y^*(n, r_D). \quad (11)$$

Since guarantees reduce risk-taking, I have that $y^*(n, r) < y^*(n, r_D)$, so that the

government would not find it optimal to offer government guarantees. This, however, assumes that the government does not deregulate the financial sector further when it

subsidizes its cost of borrowing. To entertain this possibility, note that the government

wishes to deregulate to the fullest ($n \rightarrow \infty$), but must meet the participation constraint of

the intermediaries that $f(n)y^*(n, r_D) \geq r_D = \frac{r}{p(y^*(n, r))}$, or in other words that

$f(n)p(y^*(n, r_D))y^*(n, r_D) \geq r$. Let n^* be such that this constraint is just met (or in integer-based analysis, the smallest n such that constraint is violated at $n^* + 1$).

Then, the government maximizing $n y^*$ would like to increase n further but is constrained in its ability to do so by the participation constraint. Now, a way for it to relax the constraint is to subsidize the cost of borrowing through implicit or explicit forbearance towards creditors, that is, bring down r_D to r , expand franchise values to $p(y^*(n^*, r)) \cdot [f(n^*)y^*(n^*, r) - r]$, but since the government prefers to deregulate fully, this only implies that equilibrium competition rises to a higher level $\bar{n} > n^*$ such that $[f(\bar{n})y^*(\bar{n}, r) - r] = 0$. The increased competition leads to current activity $\bar{n} \cdot y^*(\bar{n}, r)$, which must exceed $n^* \cdot y^*(n^*, r_D)$, the activity in absence of guarantees, for the government to find it attractive to guarantee the financial sector and deregulate further. It can be shown after some algebra that this holds whenever the level of competition n^* is sufficiently high.⁸

To summarize, a government operating as a shadow bank to maximize economic activity subsidizes the financial sector's cost of borrowing to the fullest and then deregulates it sufficiently so that competition erodes all profits of financial firms. In the process, it ensures financial firms compete fiercely to keep their market shares and

⁸ Formally, note that $\bar{n} \cdot y^*(\bar{n}, r) = \frac{\bar{n} \cdot r}{f(\bar{n})}$ and $n^* \cdot y^*(n^*, r_D) = \frac{n^* \cdot r}{f(n^*)p(y^*(n^*, r_D))}$. Then, a sufficient condition to have $\bar{n} \cdot y^*(\bar{n}, r) > n^* \cdot y^*(n^*, r_D)$ is that the function $g(\bar{n}) < g(n^*)$, where $g(n) = \frac{n}{f(n)}$. This in turn holds whenever $n > \left(\frac{f'(n)}{f(n)}\right)^2$. Since $f(n) \geq \bar{f}$ and $f''(n) < 0$, this condition is met for sufficiently high n .

preserve franchise values (even though they do not succeed in equilibrium). This way, the government achieves its desired objective of maximizing lending or financial investments, once again at the expense of substantial future risk of failures of these investments.

4. Prudential risk controls

Next, consider prudential regulation in the form of risk controls. Given the risk-shifting problem induced by leverage and competition, a simple prudential rule that would increase expected social output is that y not exceed some upper limit \bar{y} (greater than or equal to y^{FB} and lower than the private optimum y^* absent risk control), if such a rule could be feasibly enforced. For example, a practical counterpart of this rule in the context of mortgage lending would be not allowing loan to value ratios to exceed 80%. Another counterpart would be restricting the size of loans that some financial firms such as the GSEs can invest in, e.g., the so-called “conforming loan limit”, so that the total size of the market they participate in is limited in size.

While it is clear that perfect risk enforcement could eliminate the risk-taking problem altogether without even the need to enhance franchise values, what is striking is that in practice, governments often encourage, rather than limit, risk-taking in specific asset classes such as housing. This may be achieved through explicit guidelines (“mandates” or “norms”) to GSEs to lend to lower-income households (“affordable housing” or “priority sector lending”) in the form of high loan-to-value mortgages. Indeed, this would be a direct way for the government to get the financial firms to “lend down the quality curve” and expand current economic activity. Formally, in the model, if there are limits to encouraging competitive entry, the government could simply require

financial firms to meet a requirement that its portfolio must contain lending beyond the “quality” y^* . Since this would make the franchise values smaller, monopolistic or oligopolistic financial firms would indeed resist such mandates and to the extent possible, not necessarily meet them, but a highly competitive financial sector would accede to such pressures willingly as they see risk-taking as a way of preserving their franchise.

5. Leverage choice and capital requirements

Finally, competition and government guarantees may exacerbate not just the level of risk in financial firms’ portfolios, but also the level of their leverage in order to enhance the size of their gamble even further, but at little private cost since leverage costs do not rise substantially with risk due to the guarantees. Again, prudential regulation would want to impose capital requirements in order to increase the financial intermediaries’ stake in their franchise and thereby discourage risk-taking. However, in practice, capital requirement harmonization often gets politicized, with introduction of favorable treatment for certain asset classes. For instance, Basel capital requirements accorded before the crisis of 2007-09, and continue to do so, greater leverage (lower capital requirements) on housing-related assets (e.g., the 20% Basel risk-weight on AAA-rated residential mortgage-backed securities, without such equivalent favorable treatment for other asset classes such as corporate loans).⁹ Such government interventions to meet its populist or short-term goals can lead to substantial threat to financial stability, even as prudential regulators ensure that capital requirements are met since the design of

⁹ Indeed, the current Basel III debates in a world of low economic growth in the Western economies has once again raised the prospect of adopting laxer standards to boost current output levels. While some of this forbearance may be justified, it is clear that the primary focus of political debates surrounding the Basel III rules is focused on current levels of lending rather than the high risk from lending in times of heightened growth uncertainty.

requirements has been compromised and lending directed to be excessive in favor of certain asset classes and sectors.

Combining these observations, a socially efficient financial sector should feature as a combination some but not excessive competition, with some risk controls if they are enforceable, and finally, with limited government guarantees given their costs to the taxpayer. What is observed in practice is often the opposite of these outcomes, specifically a credit boom coincident with heightened current economic activity fueled by a highly competitive financial sector, with lax capital standards and encouragement for lending to riskier asset classes, all covered by a huge blanket of explicit and implicit government guarantees. As shown above, these can all be rationalized when the government acts as a shadow bank to maximize current economic output without appropriately accounting for associated risks and bailout costs.

III. Governments as shadow banks: The case of GSEs¹⁰

As a leading example of governments operating as shadow banks, the following presentation focuses on the government-sponsored enterprises (GSEs) in the United States, primarily Fannie Mae and Freddie Mac. It traces the origins of Fannie Mae and Freddie Mac; what special features of these enterprises caused the financial markets to treat them specially in that their debt was always assumed to be implicitly guaranteed by the United States government; what allowed them to register their staggering growth, especially since early 90's when their capital requirements were substantially lowered compared to the private sector and at the same time their ability – in fact, requirement – to

¹⁰ The discussion in this section borrows heavily from Chapters 1-3 of Acharya, Nieuwerburgh, Richardson and White (2011).

take on riskier mortgages was enhanced; and, finally, how the private financial sector engaged in a race to the bottom in risk-taking with the GSEs during 2002-2007.

Several of these aspects fit with the model of section II. Indeed, data presented below are highly suggestive of distorted government objective function behind these outcomes, at least since 1968 - when Fannie Mae was privatized and its debt taken off government's balance-sheet, and particularly since 1992 - when both Fannie Mae's and Freddie Mac's ability to take on unbounded housing bets was effectively endorsed by the government. The string of government initiatives taken since 1968 all appear focused on short-run populist schemes for housing, disregarding the substantial risk of financial instability that was being created through GSE quality of assets and leverage.

Brief introduction to the GSEs

The GSEs are engaged in two somewhat related businesses: residential mortgage securitization (currently about \$3.5 trillion) and residential mortgage investment (currently about \$1.7 trillion). Both Fannie Mae and Freddie Mac provide guarantees to investors in their residential mortgage-backed securities (MBS) against the risk of default by borrowers of the underlying mortgages. In return, both charge a "guarantee fee". They also buy and hold residential mortgages (or more often their own MBS). The funding for these investments comes overwhelmingly from issuing debt. They earn net income on the "spread": the difference between the interest yield on the mortgages that they hold and the interest rate on the debt that they have issued. Because their debt is implicitly guaranteed by the U.S. government, GSE debt is relatively risk-insensitive. Further, the GSE shareholders do not pay a premium for these government guarantees nor

bear the full cost of their failure. Hence, from the GSEs' standpoint, the cost of issuing debt is less than the costs of issuing equity, and they have a strong incentive to try to leverage themselves as much as possible – to issue as much debt and as little equity – to the extent that their creditors and regulators will permit.

There have been five somewhat distinct, even if partly overlapping, phases in the evolution of the GSEs: (i) *Beginnings* in the Depression era, which help understand how and why the federal government established a foothold in mortgage finance; (ii) *Privatization of the GSEs* starting in the late 1960s, which paved the way for their expansion on the back of (now implicit) government guarantees but expansion remained checked in 1970s and 1980s due to the relatively tight ring-fencing of the nature of risks the GSEs could take on; (iii) *Drowning in Debt* starting 1992 when the GSEs were accorded highly favorable regulatory treatment with regard to their leverage; and, (iv) “*Mission*” goals mandates for the GSEs also starting 1992 which combined with the implicit guarantees and favorable regulatory capital treatment implied a virtually unbounded capacity for the GSEs to lend “down the quality curve”; and, (v) *Race to the bottom* starting 2002, when the private-label MBS market overtook GSEs in growth of leverage and securitization (we explain why this was possible), but the GSEs attempted to get back their share by going “all in”, which ultimately culminated in the housing crisis starting 2007.

1. Beginnings

The origins of Fannie Mae and Freddie Mac go back to the era of the Great Depression. The stock market crash of 1929-1933, and the failures of over 8,000 commercial banks, as well as thousands of savings and loan (S&L) institutions (which are

frequently described as “thrifts”) inflicted widespread economic misery across the U.S. Among the victims of this trauma was the residential mortgage lending system. By early 1930s, many lenders were unwilling to refinance, and many borrowers could not repay. Home foreclosures were widespread; and the losses on the foreclosed loans contributed to the failures of those thousands of banks and S&Ls.

The first piece of legislation to address these issues came in 1932 when the Congress created the Federal Home Loan Bank System: 12 regional Federal Home Loan Banks (FHLBs) that were owned by the S&L institutions and a few life insurance companies in the regional territories of the FHLBs. The FHLB System could borrow funds in the capital markets, and the individual FHLBs could turn around and lend the funds to their member-owners, who were the primary originators of mortgages at the time. Because the FHLB System was a creation of the federal government, it could borrow at favorable rates, and the FHLBs could pass those favorable rates on to their member-owners. In an important sense, the FHLB System was an early “government-sponsored enterprise” (although that term wasn’t used until decades later). It reflected for the first time what was to become a distinguishing feature of the U.S. housing finance for next eight decades: borrowing in the name of the government (explicitly or implicitly) to promote household borrowing in the form of mortgages.

It was the Roosevelt administration’s “New Deal” that created the Federal Housing Administration (FHA) in 1934 to offer mortgage insurance to lenders on qualified mortgages, and the Federal National Mortgage Association (FNMA or popularly “Fannie Mae”) in 1938 to purchase FHA-insured mortgages. Funding for these purchases came through the FHA’s issuance of bonds in the capital markets.

Over the next two decades, Fannie Mae's scope was expanded to buy the mortgages insured by the Veterans Administration (VA), another creation of the Congress, the powers of which included the guaranteeing of the mortgages of veterans. Then, Fannie Mae's status as a government agency was confirmed, and it was made exempt from state and local income taxes, a substantial competitive advantage relative to private financial firms. As another advantage, the Federal Reserve Banks were required to perform various services for Fannie Mae. And Fannie Mae was to provide "special assistance" for certain kinds of mortgages, a precursor to the "mission" regulation of the GSEs in the 1990s and 2000s. The debt that Fannie Mae issued came to be known as "agency" debt, or just as "Agencies" (a label that persisted through the subsequent morphing of Fannie Mae, and has applied to Freddie Mac's debt as well).

From its chartering in 1938 through the middle of the 1960s, Fannie Mae was a relatively minor presence in the overall residential market; its presence was more symbolic than substantive. The major institutional holders of residential mortgages during this period were S&Ls, commercial banks, and life insurance companies. Somewhat paradoxically, Fannie Mae grew the most on the back of the U.S. government only when the government began to "disown" it, but never fully as is explained next.

2. Privatization of the GSEs

By far, the most important legislation affecting Fannie Mae was its conversion into a private company in 1968. It was primarily for accounting purposes. The Johnson Administration wanted Fannie Mae privatized, so as to remove its debt from the federal government's books, thereby reducing the size of the national debt. In addition, a change

in federal budgeting procedures at the time would have counted Fannie Mae's net purchases of mortgages as current government expenditures, which would have meant that those net purchases would have added to recorded federal budget deficits. This is generally something that no presidential administration seems to want if it can avoid doing during its own term.

The privatization meant that Fannie Mae was spun off to the private sector and became a publicly traded company, with its shares listed on the New York Stock Exchange (NYSE). However, Fannie Mae retained its federal charter and the special status and privileges that went with the charter. Fannie Mae also had its own special regulator: the Department of Housing and Urban Development (HUD), which had been created as a cabinet-level department in 1965 and retained some regulatory powers over Fannie Mae. Another prominent indicator of the specialness of Fannie Mae, despite its apparent structure as just another private (publicly traded) company, was the power of the President of the United States to appoint five members to the board of directors. No other company listed on the NYSE had presidential appointees on its board.

Simultaneous with the spinning off of Fannie Mae into the private sector, the same 1968 legislation created the Government National Mortgage Association (GNMA, which was subsequently dubbed "Ginnie Mae") within HUD as an agency that would securitize FHA- and VA-insured mortgages. And next to arrive on the scene was Freddie Mac in 1970. Ownership of Freddie Mac was placed with the Federal Home Loan Bank System, which was owned by the S&L industry. The three board members of the Federal Home Loan Bank Board became the board members and de facto regulators of Freddie Mac. (Shares of Freddie Mac would be made available to the general public almost two

decades later.) Freddie Mac was expected to buy mortgage loans from the S&L industry and securitize them, although it was not restricted from buying mortgage loans from other originators. GNMA and Freddie Mac (like Fannie Mae) were also GSEs.

Fannie Mae too received authorization to expand its mortgage purchases to encompass mortgages that were not insured by FHA or VA. However, both Fannie Mae and Freddie Mac were restricted (by HUD and the Bank Board, respectively) in the size of mortgage loan that they could purchase, either for securitization or for holding in their portfolios. This maximum loan size came to be known as the “conforming loan” limit. Mortgages that exceeded the conforming limit came to be known as “jumbos”. In 1975-1977, for example, the conforming loan limit was \$55,000; by 1980 the limit was raised to \$93,750 and was subsequently linked to an index of housing prices. For comparison purposes, the median price of the sale of an existing house was \$35,300 in 1975 and was \$62,200 in 1980; the median price of a new house was \$39,300 and \$64,600 in those two years, respectively. Thus, the conforming loan limit was substantially above median prices, whether measured by sales of existing homes or new homes; this pattern has continued to prevail to the present day, explaining the reach of the GSEs in affecting housing finance of a substantial proportion of the U.S. households.

These series of steps – privatization of Fannie Mae while preserving reasons to believe their debt was implicitly guaranteed, further inroads in mortgage finance through creation of additional GSEs, expansion of existing GSE (Fannie Mae) to purchase mortgages – seem to all point to a government desire to expand the size of housing market on the back of cheap government-guaranteed finance. To the extent that much of the GSE debt (Fannie Mae and Freddie Mac, in particular) remained outside of

government's debt ceiling, the only substantial constraint on the GSE expansion remained in the form of "ring fencing" of their asset base to conforming loan limits, and that given lack of substantial competition, the GSE franchise remained one that could be called duopoly or at best an oligopoly and hence something worth preserving through appropriate risk management at the GSEs. These things, however, soon changed.

The interest rate squeeze and a poorly structured deregulation of the industry in the early 1980s led to rapid growth in non-traditional investments in the mid 1980s and the eventual insolvencies of hundreds of S&Ls by the late 1980s and early 1990s. The federal government, through yet another agency (the Federal Savings and Loan Insurance Corporation, or the FSLIC), was guaranteeing the deposit liabilities of the insolvent S&Ls. The bill came to about \$150 billion. What is not commonly known is that financial difficulty was experienced also by Fannie Mae in the early 1980s. Like the S&Ls, Fannie Mae too was squeezed by the high interest rates of the late 1970s and early 1980s. Holding a portfolio of long-lived fixed-rate mortgages that had been originated at lower interest rates than were prevailing in the early 1980s, it ran net losses in the early 1980s. Although it remained solvent on a book-value basis, there was widespread recognition that it was insolvent on a market-value basis. It survived the experience, however, and lower interest rates after 1982 eventually provided financial relief.

In response to the bloodbath, the "President's Commission on Housing", issued a report on April 29, 1982, calling for greater deregulation of mortgage banking and an increased role for capital markets in the secondary market for mortgages. It was widely noted that despite the creation of mortgage-backed securities (MBS) markets by GNMA, Freddie Mac and Fannie Mae, the secondary market for mortgages was so illiquid that

financial firms were stuck holding mortgage loans, creating huge dislocations as conditions worsened. Ironically, one of the conclusions of the Commission was that this deregulation would put an end to the government-sponsored enterprises (GSEs) like Fannie Mae and Freddie Mac: “Eventually, the Commission believes, both FNMA [Fannie Mae] and FHLMC [Freddie Mac] should become entirely private corporations, without special access to the deep pockets of the Treasury.”

At the end of 1981, when the Commission was starting its work, Fannie and Freddie represented just 7.1% of the residential mortgage market, and held \$64.8 billion worth of mortgages in their portfolios and guaranteed an additional \$20.6 billion. A decade later, their market share had grown to an extraordinary 28.4%, with corresponding portfolio holdings of \$153.4 billion and guarantees of \$714.5 billion. And by 2002, they held \$1.21 trillion and guaranteed \$1.52 trillion, equivalent to a 44.7% share of the residential mortgage market. This growth of Fannie and Freddie is depicted in Figure 1. The left-hand side provides the total dollar value of Fannie and Freddie’s commitments to the mortgage market through their portfolios and their net MBS issuances, while the right-hand side represents their share of the mortgage market.

How did the Commission get its prediction so wrong? When mortgage markets were deregulated, Fannie and Freddie were not meant to be the winners. The Reagan Administration at the time argued the opposite, that deregulation – the act of lessening government’s control in favor of a free market – would lead to a “*race to the top*” as private-sector firms would enter the sector and compete openly. But there was nothing free about these markets. As was already highlighted, Fannie and Freddie had a special status, which meant that the financial markets believed that there were implicit

government guarantees on any debt that they issued and on the mortgage guarantees that they provided. They paid no taxes, could borrow at cheaper rates, and were lightly regulated in that they faced low capital requirements for holding similar risks compared to private-sector counterparts. No firm could compete with Fannie and Freddie under these circumstances. Hence, their franchise was not threatened and full-scale risk-taking on back of government guarantees did not take off yet. The decade of the 1980s was in fact a period of substantial growth for Fannie and Freddie (as is explained further below).

3. Drowning in Debt

The last major legislation to impact the GSEs until the financial crisis of 2007-2009 was the Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA) of 1992. It produced a number of important rules, one in particular related to capital requirements.

In particular, a risk-based capital regulatory regime was specified for Fannie and Freddie. With respect to (i), the capital buffer that the GSEs were required to hold against these guarantees was 0.45% (i.e., 45 cents per \$100 of guaranteed mortgages), which implied that the Congress believed that residential mortgages were quite safe instruments to guarantee against credit risk – or that the Congress meant to subsidize these guarantees and was (if push came to shove) prepared to cover any losses. With respect to (ii), the GSEs were to hold 2.50% capital against their balance sheet assets (of which mortgages are by far the largest category). In comparison to any other financial institution, Fannie and Freddie were afforded extraordinarily light capital requirements. For example, the capital requirement for federally insured banks and thrifts to hold residential mortgages was substantially greater: 4%. As a result, Fannie and Freddie had much higher leverage

ratios – total assets to shareholder equity – than did comparable banking institutions. Figure 2 graphs the ratio of total assets on the balance sheet divided by the shareholder equity of the combined Fannie and Freddie (dashed line). The figure takes as a starting point the date of the 1992 legislation that set the capital requirements, and continues the ratio until the end of 2007. (Note that by the end of 2008, shareholder equity had gone negative, and the GSEs were taken into conservatorship.) Over this period, the GSE leverage ratios generally ranged between values of 20 to 40 whereas the commercial banking sector had ratios of 10 to 15. The only match to emerge for GSE leverage was from investment banks, especially during 2003-2007 -- a competitive race to the bottom that will be explained below.

However, these ratios do not tell the entire story. As shown by Figure 1, most of the credit risk of GSEs is in the form of guarantees of defaults on mortgages sold to MBS investors. These guarantees do not appear on the balance sheet of the GSEs. As a useful exercise, the solid line in Figure 2 sums up all of the credit risk that is contained in both their mortgage portfolios and their credit guarantees of MBS (i.e., the “credit” numerator is the sum of their on-balance sheet assets plus their outstanding MBS). This is roughly equivalent to what the banking sector does when it holds “whole loan” mortgages (i.e., the mortgages themselves, and not MBS) and hedges their interest rate risk. The credit-based leverage ratios now range between levels of 50 to 100 over the period.¹¹

¹¹ Even more troublesome was the GSEs’ behavior from 2002 onwards. As regulators became more aware of the mere size of the GSEs, coupled with accounting scandals in 2003 and 2004, there was a general recognition that their size and leverage had to be curtailed. And, in fact, there was some apparent success. From the end of 2001 to 2007, the “official” leverage ratio dropped from 38 to 23 and the portfolio stopped growing. But the credit-based leverage ratio that also included the off-balance sheet guarantees – the total credit risk divided by shareholder equity shown in Figure 1 -- barely budged from 72 to 69. As the figure shows, the GSEs had simply replaced growth in their mortgage portfolios with growth in guarantees of MBS. This is explained further in the discussion of “Competitive Race to the bottom”.

In a seminal study in 1996, the Congressional Budget Office (CBO) provided an estimate of the government subsidy for Fannie and Freddie in 1995. The two main factors that went into their analysis were (i) the reduced cost of financing compared to other highly rated financial institutions (e.g., 0.70% per year lower interest rate), and (ii) the lower cost of issuing MBS (e.g., 0.40%). Their estimated annual total subsidy was \$6.9 billion, a very large number fifteen years ago. Moreover, the CBO argued that at least one-third was a complete transfer of wealth from the government to shareholders; that is, only two-thirds trickled down to the mortgage market.

In a May 2001 updated study, the CBO estimated that the annual implicit subsidy had risen to \$13.6 billion by the year 2000. A few years later, Federal Reserve Board economist Wayne Passmore (2003), using a similar methodology and a standard discounted earnings model over a forward-looking 25-year horizon, estimated that the aggregate value of the subsidy ranged somewhere between \$119 billion and \$164 billion, of which shareholders receive respectively between \$50 and \$97 billion. The subsidy was almost equal to the market value of these two GSEs.¹² As is explained next, the accordance of these guarantees was further problematic as the effective cost to the

¹² Gradually, a large number of economists and policy-makers questioned the distortions that were being created by this “big fat” subsidy. In what is perhaps one of the more eloquent summaries of subsidy-related distortions, a speech on May 19, 2005, by the then Federal Reserve Chairman Alan Greenspan explains the growth of GSE balance sheets and their guarantee-driven shareholder value: “Although prospectuses for GSE debt are required by law to stipulate that such instruments are not backed by the full faith and credit of the U.S. government, investors worldwide have concluded that our government will not allow GSEs to default... Investors have provided Fannie and Freddie with a powerful vehicle for achieving profits that are virtually guaranteed through the rapid growth of their balance sheets, and the resultant scale has given them an advantage that their potential private-sector competitors cannot meet. As a result, their annual return on equity, which has often exceeded 30 percent, is far in excess of the average annual return of approximately 15 percent that has been earned by other large financial competitors holding substantially similar assets. Virtually none of the GSE excess return reflects higher yields on assets; it is almost wholly attributable to subsidized borrowing costs... The Federal Reserve Board has been unable to find any credible purpose for the huge balance sheets built by Fannie and Freddie other than the creation of profit through the exploitation of the market-granted subsidy.”

taxpayers had been going up substantially due to the deteriorating quality of GSE assets, which was partly a requirement of the government, and due to which under the model (and as per Passmore's estimates), the social value of these guarantees was questionable. That the GSE debt was never being registered on the government's balance-sheet meant that until the debt finally faced risk in 2007-08, the issue was never taken seriously by either political party in the United States.

4. "Mission" Goals to Support Affordable Housing

On October 28, 1992, President George H.W. Bush signed into law H.R. 5334, "The Housing and Community Development Act of 1992". Title XIII of the law, Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA), created rules for the two largest government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac.

On the one hand, FHEFSSA created a separate prudential (safety and soundness) regulator for Fannie Mae and Freddie Mac: the Office of Federal Housing Enterprise Oversight (OFHEO), which was lodged in HUD. It was clear to many observers at the time, however, that a policy-oriented department such as HUD was not the appropriate agency for lodging a prudential regulator. The GSEs were essentially a government-supported banking system and should have been regulated as such. On the other hand, FHEFSSA specified a set of "mission goals": essentially, efforts to help support housing for low- and moderate-income households, as well as a special "affordable goal" and serving "underserved areas" (formerly inner-city areas). It established HUD (but not OFHEO) as the mission regulator. The mission goals essentially gave the GSEs a mandate to purchase lower-quality mortgages. These riskier mortgages received the same implicit government guarantee nevertheless.

The new mission laid out in FHEFSSA was quite specific and encompassed three related goals for the GSEs. The overarching theme was for the GSEs to reach a target percentage of their mortgage purchases in terms of homeownership for lower and middle income households. The first goal was directed towards low-income housing, defined as household incomes that were below the area median. The second goal chose underserved areas as defined by census tracts with median household incomes that were less than 90 percent of the area median, or else in census tracts with a minority population of at least 30 percent and with a tract median income of less than 120 percent of the area median income. The final goal named “special affordable housing” targeted census tracts with family incomes less than 60 percent of the area median (or else in tracts with incomes less than 80 percent of the area median and also located in specified low-income areas).¹³

Table 1 provides the detailed goals for 1993 and after.

Until the late 1990s, Fannie and Freddie were mostly part of the general process of encouraging people who would buy anyway to buy more house on a larger lot (through subsidization of mortgage rates by Fannie and Freddie, given their implicitly subsidized cost of credit and low capital requirements). And they were doing most of their business in upper income communities and little in the “inner city” where poor households tended to live, and more business in the suburbs. These patterns led HUD in 2004 to step up the targets, which in turn, led Fannie and Freddie to undertake a greater proportion of high-risk mortgages. This increase followed on the heels of a large increase in targets in 2001.

¹³ Within these mission goals, there were also so-called subgoals that stipulate the fraction of the goal that must be achieved through new home purchases, as opposed to through mortgage refinancing.

To reach the targets, FHEFSSA called for a study of the “implications of implementing underwriting standards that (A) establish a downpayment requirement for mortgagors of 5 percent or less, (B) allow the use of cash on hand as a source for downpayments, and (C) approve borrowers who have a credit history of delinquencies if the borrower can demonstrate a satisfactory credit history for at least the 12-month period ending on the date of the application for the mortgage.”¹⁴ However, a study commissioned by HUD (Ambrose, Temkin and Thibodeau, 2002) found that, over the previous decade, Fannie Mae and Freddie Mac had in fact adopted more flexible underwriting guidelines in terms of (A) – (C) above. This is because while the 1992 FHEFSSA Act required Fannie and Freddie to hold only conforming mortgages, there was considerable wiggle room. A conforming mortgage had to be less than a certain dollar amount (the “conforming loan limit”), have a loan-to-value (LTV) ratio less than 80% (or, with wiggle space, a higher LTV with private mortgage insurance), and meet unspecified “investment quality standards”.

The “mission” goals combined with the ambiguity of what constitutes a conforming mortgage translated into considerably riskier credit portfolios. As an illustration of this, consider data on Fannie Mae’s year-by-year mortgage purchases over the next decade from 1992 onwards. Figure 3 graphs the share of risky mortgage loans each year, as defined by either $LTV > 90\%$ or $80\% < LTV < 90\%$. While it was commonly known that the FHA and VA made risky loans, it is less well-known that Fannie and Freddie already had a growing presence in the high LTV mortgage market during the 1990s. For example, from just 6% (\$11.6 billion) of loans having $LTVs > 90\%$ in 1992, by

¹⁴ Housing and Community Development Act of 1992, Title XIII, “Government Sponsored Enterprises”, Sec. 1354 “Review of Underwriting Guidelines.”

1995, the number of loans with LTVs>90% had doubled to \$20.9 billion and 19% of Fannie Mae's purchases. Though the percentage of loans with LTVs>90% dropped to 13% by 2001, the dollar amounts increased substantially to \$68.3 billion. Freddie Mac's data tell a similar story.

This entry of Fannie and Freddie into high-risk mortgages and lowering of underwriting standards meant that there was no turning back, and as soon as housing prices started falling in 2007, their fate was sealed. The GSEs' reputation for high underwriting standards and their low loss experience relative to the guarantee fee was because until mid 1990's they guaranteed safe conforming mortgages with generally low LTVs, good income coverage, and borrowers with high credit scores. So, even with small-to-medium downturns in the economy, mortgage defaults were not that likely. After the mid 1990s, while the GSEs' mortgage underwriting standards deteriorated and their mortgages became much riskier, there was no housing downturn, and there was only one (relative to 2007-09, mild) recession in 2001. In fact, from July 1995 to May 2006, the bellwether housing index of Case and Shiller increased by 196%, with no months experiencing a decline. But their underwriting standards suggest this was either luck or their feeding of the housing price bubble itself. At any rate, this meant that government's push to create housing-based credit in substantial quantities during the 90s and early part of 2000s was associated with significant downside risks. Simultaneously, the capital requirements for GSEs were relaxed rather than strengthened. The downside risks were not budgeted for in fiscal plans, likely explaining why the "mission" expanded steadily as it seemed free from government standpoint until (for some future government) it was not.

The eventual outcome of the GSEs in 2008 was, however, also hastened by their competition with the private sector during 2003-2007.

5. Competitive Race to the Bottom

Figure 4 graphs the tremendous growth in the mortgage market (solid line, plotted against the right axis), and the fraction of residential mortgage originations each year that were securitized by the GSEs or private-label firms, as well as the amount not securitized (dashed lines plotted against the left axis). The figure shows that the mortgage market increased dramatically in size, especially in the latter period with the emergence of the riskier mortgage lending. It also shows that mortgage securitization generally increased every year from 1995 onwards, albeit for different reasons. In the period up to 2003, the GSEs dominated the market, but, then post 2003, non-GSE MBS more than tripled from 12% to 38% of the origination market. By 2006 and 2007, the GSEs recovered some of their market share (and currently dominate the market completely). These trends illustrate well the competitive race to the bottom between the GSEs and private securitizers.

While Freddie Mac had been securitizing mortgages since 1971 (and Fannie Mae since 1981), private-label securitization did not start in earnest until the mid 1990s. As seen in Figure 4, in 1996, non-agency mortgage-backed securities (MBS) represented only 12% of all MBS originations. Their share grew dramatically from 17% in 2003 to 50% by 2006. In 2007, it fell back to 40%. Subprime mortgages were being securitized at a much higher rate than the average. In 2001, 50% of all subprime mortgages were securitized, while in 2006 this fraction had grown to 80%.

This rise of “private label mortgage-backed securities” (PLS) shown in Figure 4 posed a challenge to the GSEs. This is because the PLS involved non-conforming

mortgages (securitized, for instance, by investment banks) that were of lower quality than the mortgages that met the GSEs' usual underwriting standards or were for amounts that exceeded the GSE conforming loan limit. Borrowers who might otherwise have qualified for a conforming loan were being encouraged by lenders to borrow greater amounts (pushing them into "jumbo" territory) and/or to structure their loans in ways that wouldn't meet the GSEs' underwriting standards (pushing them into the non-conforming territory). The latter was done, for example, by the borrower's making less than the requisite 20% down payment but not arranging for private mortgage insurance, or by getting a second mortgage loan to cover some or even all of the down payment, or by getting an initial low "teaser" interest rate but with a scheduled upward adjustment after two or three years.

As such, no private firm could compete with Fannie and Freddie because of Fannie and Freddie's access to government guaranteed capital. One way that the private sector started competing was through moving down the credit curve of increasingly shaky mortgage loans as explained above –into loans that were difficult for Fannie and Freddie to compete with, given their "conforming loan" underwriting standards. And, a Lehman Brothers study from 2008 (Lehman, 2008, Figure 4) shows that over 50% of AAA-rated non-GSE MBS (which since 2002 enjoyed similar capital requirements as the AAA-rated GSE MBS) were held within the financial sector, which was highly concentrated in just a few large and complex financial institutions (LCFIs). For example, in June 2007, just prior to the start of the financial crisis, a dozen firms held almost two-thirds of all of the assets of the top 100 firms (\$21 trillion) and constitute a "who's who" of the crisis that subsequently emerged: in order, Citigroup, Bank of America, JP Morgan Chase, Morgan

Stanley, Merrill Lynch, AIG, Goldman Sachs, Fannie Mae, Freddie Mac, Wachovia, Lehman Brothers, and Wells Fargo. (Bear Stearns and Washington Mutual come in at No. 15 and 17, respectively.)

The GSE firms and these LCFIs were not identical in form. The LCFIs had a more diversified product line, were afforded greater flexibility, and increasingly were perceived to have a too-big-to-fail government guarantee -- while the GSEs had a public mission and received a more explicit government guarantee. But when one digs beneath the surface, the failure of the LCFIs and the GSEs is quite similar – a highly leveraged bet on the mortgage market by firms that were implicitly backed by the government with artificially low funding rates only to differing degrees.

Tables 2 and 3 highlight this race to the bottom. Table 2 shows the total asset growth (relative to 2003) and equally-weighted leverage (assets divided by shareholder's equity) for the five largest commercial banks (Citigroup, JPMorgan, Wells Fargo, Bank of America, and Wachovia), five largest investment banks (Goldman Sachs, Morgan Stanley, Merrill Lynch, Lehman Brothers, and Bear Stearns), and the two largest GSEs (Fannie Mae and Freddie Mac) in the U.S. during the period 2003 to 2007. Table 3 shows the return on assets (ROA) – an accounting measure of overall profitability of the firm, and return on equity (ROE) – an accounting measure of the performance of just the equity of the firm, again for these three sets of financial firms.

In a competitive race to the bottom involving financial risk-taking, one would expect that firms expand their balance-sheets (and off-balance sheet positions if faced with on-balance sheet constraints), do so increasingly with leverage, and finance assets with an increasingly risky profile. Their economic performance as a whole – debt and

equity combined – does not rise, and due to the undertaking of excessive risks, may even decline. However, the performance of their equity rises as long as bets continue to pay off – both due to higher risk that pays off in good times and to greater leverage. As the bets go bad, equity loses value first, resulting in sharp falls in its ROE.¹⁵

These economic forces play out in Tables 2 and 3, when viewed in combination with Figure 4:

- (1) Investment banks and commercial banks grew their balance sheets by a factor of two between 2003 and 2007. Interestingly, Fannie and Freddie did not grow much in terms of their on-balance sheet assets over this period and in fact shrunk somewhat. They were constrained in their asset growth (and leverage) by HUD and the prudential regulator (OFHEO) following the accounting scandals of 2003-04. This, however, is misleading because their off-balance growth was not reined in. As Figure 1 (and Figure 4) showed, their extension of MBS guarantees grew by a factor of two as well. All in all, the largest financial firms were willing to hold and guarantee mortgages and MBS at a pace hitherto unseen.
- (2) Investment banks started out with a leverage of around 23:1, slightly lower than that of Fannie and Freddie but rocketed steadily towards a leverage exceeding 30 (Bear Stearns and Lehman Brothers being the most levered investment banks). In contrast, commercial bank leverage stood steady in the range of 10:1 to 15:1 consistent with a capital requirement of 8-10% for being well-capitalized. Citigroup, however, was levered close to 20:1 by 2007. The leverage of commercial banks was significantly understated by their reported balance-sheet figures, as they had engaged in a

¹⁵ Formally, the competitive race to the bottom in the model implies (up to the competitive factor $f(n)$) (i) greater y , or the upside bet for the equity, (ii) greater downside risk or lower $p(y)$, and, (iii) smaller expected output $p(y)y$.

significant amount of off-balance sheet vehicle guarantees (see Acharya, Schnabl and Suarez, 2009, for instance). And, while Fannie's and Freddie's book leverage in fact came down over this period due to pressures from the regulator, these leverage numbers did not capture the credit risk on their outstanding MBS, as well as the risk that mortgages were increasingly of worse quality over time. And all of these numbers also don't do justice to the fact that the risk in the financial sector was becoming all too concentrated on one asset class favored by the government and capital requirements through a variety of means: housing.

(3) What is telling, however, about this asset growth (and in the case of investment banks, leverage too) is that there was little improvement in the underlying economic profitability. The ROA for commercial banks during 2003-06 was steady around 1.3%, for investment banks was 0.7%-0.8%, and in fact was declining steadily for Fannie and Freddie from 0.7% to 0.4%. However, the ROE painted a different picture to the shareholders. Since commercial banks did not ramp up leverage that much, their ROE was steady in the range of 13%-17%, that of investment banks kept rising with their leverage from 15% to 22%, and that of Fannie and Freddie in fact fell from 20% to 9%.

The strong growth in private-label subprime mortgage originations and securitizations had important consequences for the GSEs. First, as shown in Figure 4, their market share of originations fell dramatically between 2003 and 2006. Second, the loss in market share made it harder for them to meet their ever-increasing Congress-mandated quotas. To preserve the profit growth rates of the pre-2003 period and to simultaneously meet their quotas, the GSEs embarked on an all-in policy, which saw

them dramatically ramp up the risks of their portfolio. This policy started as far back as 2000-2001 with the motivation that a stronger GSE presence in the subprime market would create lower priced mortgages for some subprime borrowers.¹⁶

The data tell the story. Table 4 presents data for “risky” mortgage loans for both Fannie Mae and Freddie Mac and private label securitization for this period. For comparison purposes, let us restrict to the size of mortgages at or below the conforming limit level. For example, from 2001 to 2003, for mortgage loans with LTVs greater than 80% and/or FICO scores less than 660, Fannie Mae and Freddie Mac represented respectively 86%, 80% and 74% of this high risk activity. From 2004-2005, this changed as both the dollar volume and share of high risk lending of conforming size loans moved towards the private sector, with \$168 billion (and a 26% share) in 2003 to \$283 billion (and a 52% share) in 2004 and \$330 billion (and 58% share) in 2005.

¹⁶ Former FHFA director James Lockhart testified that both Fannie and Freddie “had serious deficiencies in systems, risk management, and internal controls.” Furthermore, “there was no mission related reason why the Enterprises needed portfolios that totaled \$1.5 trillion.” He chalked it up to “the Enterprises’ drive for market share and short-term profitability.”

And, in testimony to the Financial Crisis Inquiry Commission on April 9, 2010, former Fannie Mae CEO Daniel Mudd admitted as much: “In 2003, Fannie Mae’s estimated market share of new single-family mortgage-related securities was 45%. By 2006, it had fallen to 23.7%. It became clear that the movement towards nontraditional products was not a fad, but a growing and permanent change in the mortgage marketplace, which the GSEs (as companies specialized in and limited to, the mortgage market) could not ignore.”

Similar language can be found in Fannie Mae’s own strategic plan document, “Fannie Mae Strategic Plan, 2007-2011, Deepen Segments – Develop Breadth,” in which the company outlined its 2007 onwards strategy: “Our business model – investing in and guaranteeing home mortgages – is a good one, so good that others want to ‘take us out’...Under our new strategy, we will take and manage more credit risk, moving deeper into the credit pool to serve a large and growing part of the mortgage market.”

Consistent with the race-to-the-bottom thesis, Fannie and Freddie responded by increasing their high risk mortgage participation by recovering a majority share of 51% in 2006 and an almost complete share of the market in 2007 at 87%. Equally important, as a percentage of its own business, Table 4 shows that Fannie and Freddie's risky mortgage share increased from 25% in 2003 to 36% in 2007. Even more telling, if the above analysis is restricted to the very highest risk mortgage loans, i.e., those with LTVs>90% and FICO<620, Table 4 shows an almost identical race-to-the-bottom pattern in Fannie and Freddie's share during the 2003-2007 period, culminating in a doubling of these particularly risky mortgages from \$10.4 billion in 2006 to \$20.3 billion in 2007.

On top of this high risk lending activity, Table 4 also provides evidence that Fannie and Freddie grew their mortgage portfolio as the race to the bottom unfolded. For example, compared to \$103 billion of risky private label MBS purchased in 2003, over the next three years, Fannie and Freddie averaged \$204 billion per year even though their overall MBS purchases essentially halved. In other words, their percentage share in risky MBS for their own portfolio quadrupled over this period.

The SEC 10-K credit-risk filings of Fannie Mae are also revealing of the deterioration in mortgage loans that were purchased by the GSEs during the 2004-2007 period, either for their own portfolios or to be sold off to others. For example, 17% of the 2006 and 25% of the 2007 mortgages that Fannie bought had a loan-to-value ratio in excess of 80%. The fraction of loans with CLTVs greater than 95% went from 5% in 2004 to 15% in 2007. The borrowers also had lower credit scores: 17.4% of 2006 loans and 18% of 2007 loans had FICO scores below 660. A relatively large share was ARMs (16.6% in 2006 and 9% in 2007) or interest-only loans (15.2% in both years). The Alt-A

fraction of purchases was 21.8% in 2006 and 16.7% in 2007, up from 12% in 2004. Finally, non-full documentation loans went from 18% in 2004 to 31% in 2007. If anything, Freddie Mac's credit-risk profile was worse than Fannie's. In 2004, 11% of the loans that Freddie bought had CLTVs above 100%, which increased to 37% by 2007. Interest-only loans grew from 2% to 20%, and low-FICO-score loans from 4% to 7%. As a final indication of its all-in approach to mortgage lending in 2007, note that mortgage loans with both FICO<620 and LTV>90% reached \$20.3 billion, essentially double that of any other year.

Clearly, the quality of GSE loans deteriorated substantially from 2003 to 2007. It seems that the GSEs were able to stretch the concept of a prime, conforming loan much beyond what its regulator had intended, especially when they felt threatened in their market share and franchise by private competitors in the securitization market. All of these results are consistent with implications of the model in Section I wherein a government interested in boosting the size of current housing market for populist reasons is happy – and even encouraging – for competition between the housing GSEs and the private sector to escalate originations, even though it entails substantial future risks.

IV. Other examples and implications for financial stability

Of course, the notion that governments can heavily influence the financial sector risk-taking to meet their own objectives is not specific to the United States, even though its imprint in the housing finance may be of an unmatched scale. The *Cajas* in Spain, the equivalent of savings and thrift institutions, are effectively owned by local governments and played a central role in the Spanish housing boom (and painful bust), competing aggressively with commercial banks, while generating substantial local tax revenues

through property transactions and creating jobs through unprecedented construction activity. The *Landesbanken* in Germany which operate as regionally organized state-owned savings banks undertook aggressive risks off-shore, exploiting the grandfathered government guarantees and were among the first banks to fail when the United States housing markets crashed. State-owned banks in many Asian countries serve government objectives of central planning and investments (China) and priority-sector lending to farming and housing (India), objectives that also shape the financial regulation of their limited private sectors. The state-owned banks often crowd out, however, the private-sector banks, inducing the latter to adopt greater leverage and riskier policies. Finally, deregulation of the financial sector need not just take the form of greater competition between regulated financial institutions, but can also consist of silent endorsement in the growth of unregulated financial sector, which by virtue of its greater leverage and weaker risk controls immediately creates a race to the bottom with regulated institutions.

How can prudential regulation of the financial sector deal with this threat from government interventions? First and foremost, it may be important to recognize that government objectives while shaping laws for the financial sector may be rather short-term, and that this myopia may arise due to its own preference for high levels of current economic activity rather than influence and lobbying activities of the financial sector. While the model of this paper was silent about when government short-termism and populism would take strong foothold, it is plausible that this happens when fundamental economic growth of an economy weakens (e.g., due to a productivity shock or shift in global competition) and the government feels pressure to confront the resulting weakness

of growth and jobs with its own policies.¹⁷ Second, wherever possible, independent prudential regulators should strive to ensure that financial institutions – government-owned or otherwise – are all under the perimeter of unified regulation, so that substantial portions of the market such as housing, are not beyond their reach and scrutiny. Third, independent financial sector regulators of large financial centers may want to acknowledge and recognize that international harmonization of leverage and capital rules, as well as the threat from global banking to national government objectives, can induce regulation that ends up chasing the lowest common denominator.

In the end, of course, it would be best to have governments with more long-term objectives. While this may not be entirely feasible due to attendant entrenchment issues from long tenures, it would be useful to improve the quality of government accounting, its fair and honest dissemination to investors and voters, and sufficient adjustments for risk and leverage in our assessment of the financial sector’s operating performance. These by themselves can help contain the government moral hazard as long-run risks become apparent more immediately when short-run goals are pursued. Current reforms to the financial sector regulation have similar objectives for financial firm balance-sheets, but the principle should be carried over to government balance-sheets.

¹⁷ Rajan (2010) argues that the “jobless recoveries” following the recessions of early 1990’s and 2000-2001 might have in fact paved the way of expansionary housing policies by the United States government, especially through the GSEs. Rajan attributes the fundamental underlying shock to the increasing global competition for jobs from emerging market reforms in 80’s and 90’s, especially in China and the rest of Asia, a shock that also affected other Western economies.

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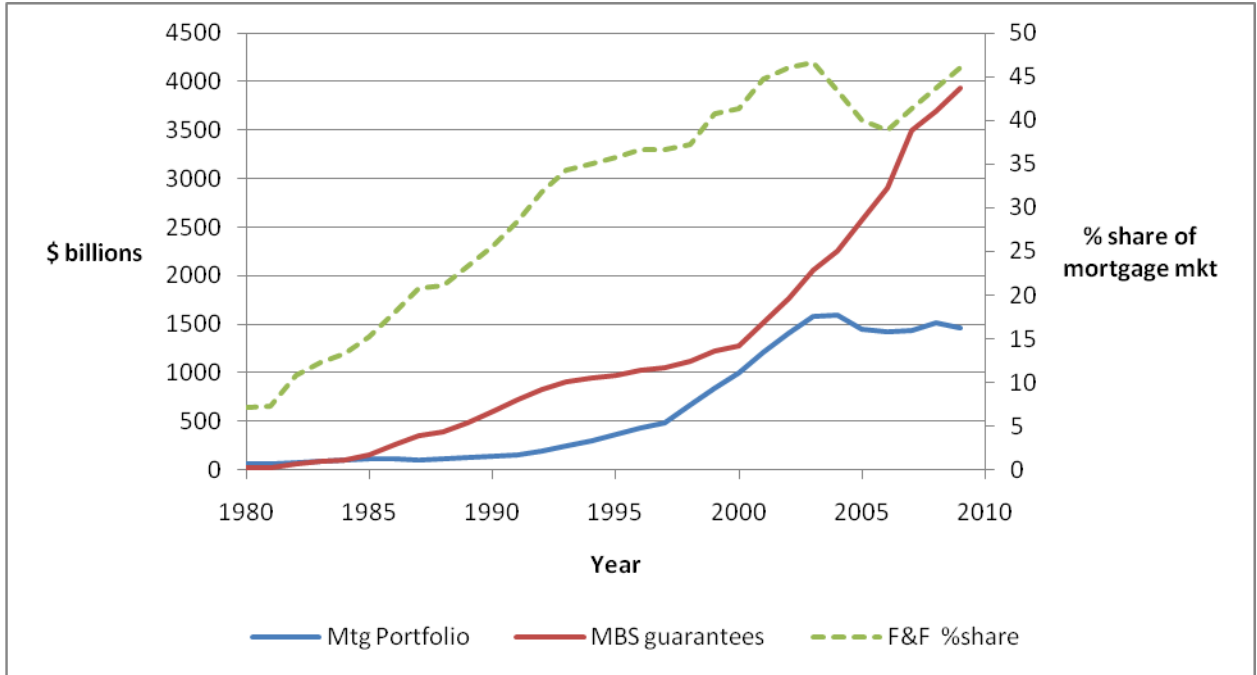
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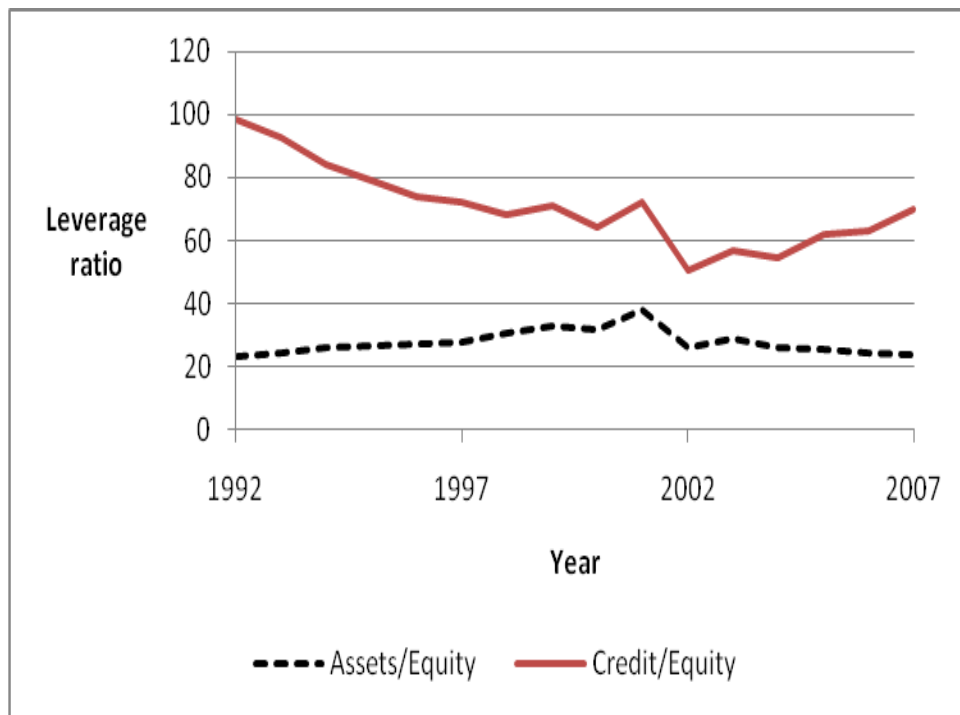
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Figure 1: Growth of the GSEs from 1980 until 2009



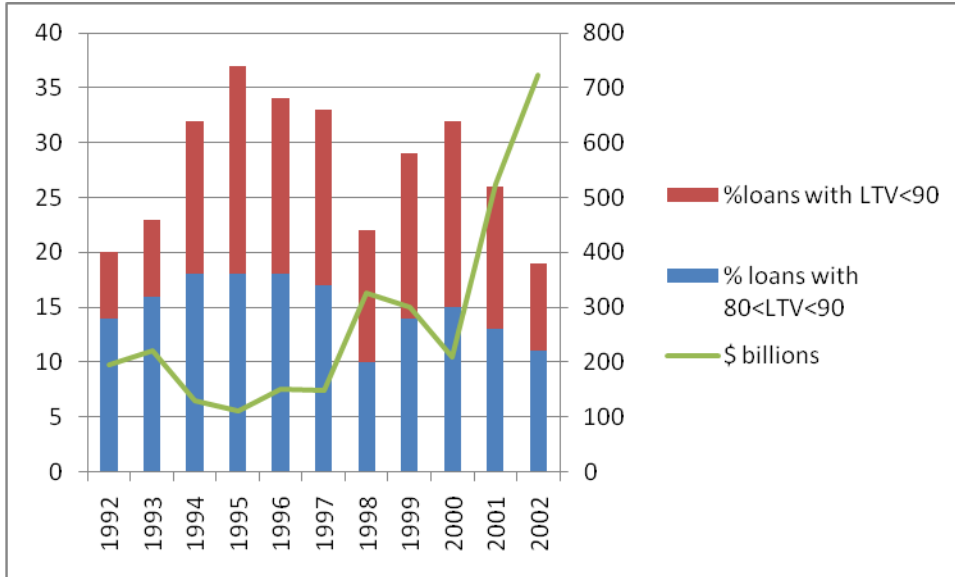
Source: FHFA and Federal Reserve

Figure 2: Leverage Ratios of GSEs



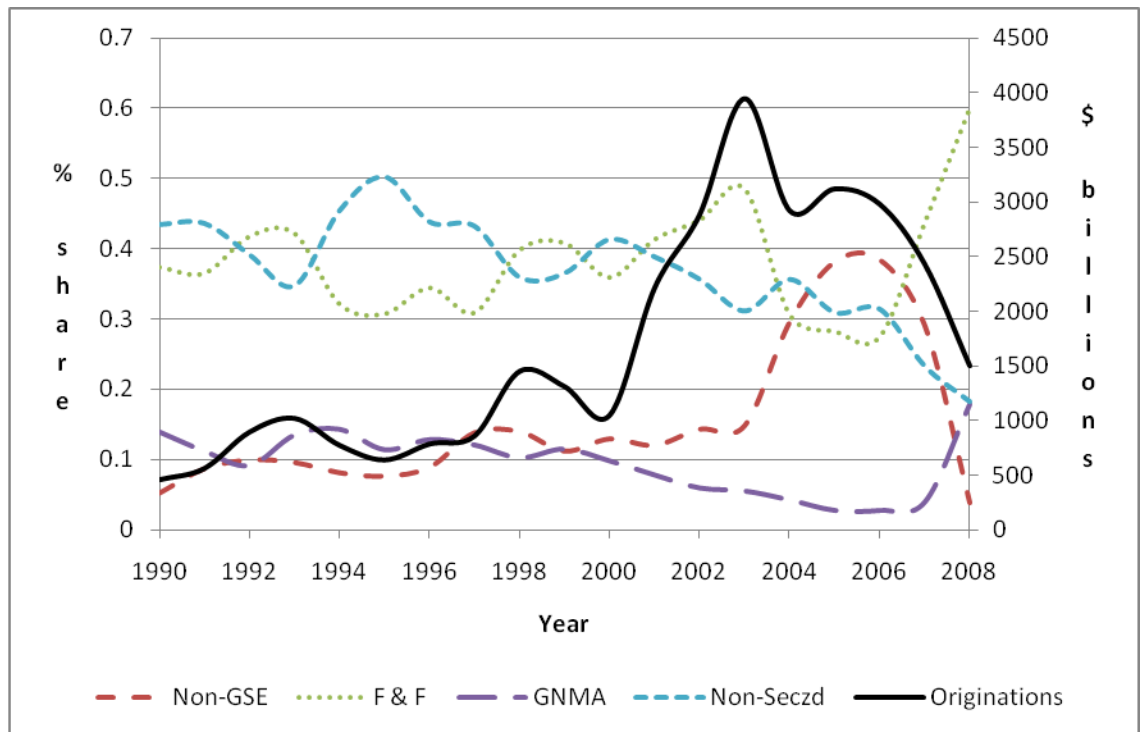
Source: FHFA

Figure 3: Fannie Mae Mortgage Purchases with High LTVs (1992-2002)



Source: Annual reports of Fannie Mae, Inside Mortgage Finance

Figure 4. Growth in Mortgage Market, Securitization, and % Share of Market



Source: Inside Mortgage Finance

Table 1: GSE Affordable Housing Goals Since 1993 (Share of mortgage purchases)

	1993- 1995	1996	1997- 2000	2001- 2004	2005	2006	2007	2008
Low- and Moderate- Income Goal	30%	40%	42%	50%	52%	53%	55%	56%
Underserved Areas Goal	30%	21%	24%	31%	37%	38%	38%	39%
Special Affordable Goal	NA*	12%	14%	20%	22%	23%	25%	27%

Source: FHFA;

*NA – Not Applicable: goals set in dollar amounts for each GSE rather than percentages.

Table 2: Total Asset Growth and Equally-weighted Leverage of the Top Five U.S. Commercial Banks, Top Five U.S. Investment Banks, and GSEs

Year	Asset Growth relative to 2003			Leverage		
	Commercial banks	Investment banks	Fannie-Freddie	Commercial banks	Investment banks	Fannie-Freddie
2003	1.0	1.0	1.0	13.4	23.0	28.2
2004	1.3	1.3	1.0	11.8	24.0	25.8
2005	1.4	1.5	0.9	11.9	24.5	25.3
2006	1.7	1.8	0.9	11.8	27.3	24.2
2007	1.9	2.1	0.9	12.6	30.9	23.8

Source: Acharya, Nieuwerburgh, Richardson and White (2011). 2003 assets are normalized to 1.0 in all sectors. Leverage is defined as book assets to shareholder equity.

Table 3: Equally-weighted Return on Assets and Return on Equity of the Top Five U.S. Commercial Banks, Top Five U.S. Investment Banks, and GSEs

Year	Return on Assets (ROA)			Return on Equity (ROE)		
	Commercial banks	Investment banks	Fannie-Freddie	Commercial banks	Investment banks	Fannie-Freddie
2003	1.3%	0.7%	0.7%	17.5%	14.7%	20.3%
2004	1.1%	0.7%	0.5%	12.7%	15.8%	11.1%
2005	1.3%	0.7%	0.6%	15.7%	16.8%	12.2%
2006	1.3%	0.8%	0.4%	15.1%	22.1%	9.2%
2007	0.8%	0.2%	-0.3%	10.2%	6.6%	-8.2%

Source: Acharya, Nieuwerburgh, Richardson and White (2011).

Table 4: The Increasingly Risky GSE Lending Activity (2003-2007)

\$ Billions	GSE New business			GSE Mortgage Portfolio Purchases		Private Market New business (Non Agency)			GSE High Risk %	GSE Share in High risk activity
	High risk (1) LTVs>80 % and/or FICO< 660	Very high risk LTVs>90 % and FICO< 620	Total (2)	Private-Label Securities (PLS)	Percentage of PLS/Total	High risk (4) LTVs>80 % and/or FICO< 660 Conforming Limit	Very high risk LTVs>90 % and FICO< 620 Conforming Limit	Total PLS (All)		
2003	466	12.1	1839	103.2	13%	168	8.9	527	25%	74%
2004	262	8.8	898	211.8	53%	283	14.1	804	29%	48%
2005	236	7.1	899	221.3	57%	330	13.9	1139	26%	42%
2006	245	10.4	877	180	52%	240	12.4	1108	28%	51%
2007	363	20.3	1012	113.5	37%	54	2.4	665	36%	87%

Sources: FHFA, OFHEO Annual Report, Inside Mortgage Finance

Notes: GSE new business represents originated guaranteed MBS plus non-private label MBS portfolio purchases; the private market new business represents all MBS financed through private label securitization.