Scope and Effects of Public Credit Guarantees in Housing Finance

The case of the U.S. government-sponsored enterprises Fannie Mae and Freddie Mac

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A. Introduction

In the debate about the **role of government** in developed economies, the U.S. is often characterized as a case of rigorous withdrawal of government from the financial sector.[2] This widely held view outside the U.S. meets financial policy controversy inside the U.S. whose central point is that de-nationalization and de-regulation is far from being complete.

At the core of concerns are different classes of financial institutions that secure public influence in the financial sector, in particular **government agencies, government corporations** and **government-sponsored enterprises (GSE)**.[3] While the first two classes of institutions are government-owned, either as part of the public administration or as legally distinct corporations, the latter are privately owned corporations enjoying special public support against operating under a public mandate defined by law or regulation.[4] Benefits for this class of institutions can take various forms; most common are explicit or implicit guarantees of their liabilities and special treatment with respect to taxation and financial regulation.

While the instrumentalities of government described above are today perceived as integral parts of the U.S. financial system, it is often overlooked that most of them were created in the aftermath of an economic history episode, which was characterized by extreme economic conditions and commanded strong public intervention, the **Great Depression**. The purpose of intervention then was to support the ailing economy by injecting liquidity into sectors of strategic relevance for economic recovery: next to agriculture and manufacturing, public infrastructure and housing were key sectors.[5] As the economy recovered, many institutions created in the process continued their life – some until today.

The subjects of this paper are the two largest government-sponsored enterprises that continue to exist in the housing sector, **Fannie Mae and Freddie Mac**. Both operate in the secondary mortgage market where they buy and either hold or sell mortgage loan pools. Taken together, in 2000 these two institutions

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[2] See Sinn (1997), pp.15-17, a contribution that was influential in the discussion about the system of Landesbanken in Germany.

[3] It has become practice to apply the term ‚agency' to the entire group of instrumentalities of government. This conceals the substantial differences in legal and financial construction. For detail see Stanton (2002).

[4] Stanton (2002) shows that the basic concept of today's american ‚government-sponsored enterprises' dates back to the foundation of the First Bank of the United States in 1791 by Alexander Hamilton. Hamilton, in turn, when formulating the Bank's charter act, was following the model of the Bank of England of 1694. The charter act of the First Bank of the United States automatically terminated after 20 years.

[5] After World War II, new target groups and sectors became added.Inter alia, veterans that were to be reintegrated into the economy, small and medium sized enterprises and the education sector. A meaningful de-nationalization of the financial sector only started in the 1970's, as fiscal constraints became increasingly binding.

held the credit risk of US$2.3 trillion – US$2,300 billion – worth of outstanding mortgage loans. This corresponds to approximately 25 % of the U.S. gross domestic product.

The **goal** of the paper is to use the example of Fannie Mae and Freddie Mac in order to review size and scope of public credit guarantees in the US housing sector. The business model of these government-sponsored enterprises and its associated social costs and benefits stands at the center of the analysis. Which financial returns and risks come with the business model? How are these distributed to private owners, government and consumers? What is the cost-benefit relation of providing government sponsorship from both a housing and financial sector development perspective? Obtaining at least tentative answers to these questions bears relevance not only for the internal housing finance reform debate in the US, but also for the assessment of the numerous attempts to implement the instrument of government-sponsored enterprises in emerging mortgage markets.

B. Scope of Government Intervention in the U.S. Residential Mortgage Market

1. A Brief History of Government Intervention[6]

Contrary to continental European countries – the UK is in a special situation here in Europe – consumer and in particular **mortgage credit plays** a **central role in economic policy in the U.S**. Absent a comparably dense system of social security and public services as in most of Europe, the realization of the „american dream" of homeownership is also a key instrument of old age provision and redistribution policy of government.

These political parameters were valid already in the early 1930's when the housing sector became central to several administrations' strategies for economic recovery. The first important step, initiated under the Hoover administration, was the creation of the system of regional **Federal Home Loan Banks (FHLB)** in **1932**. The FHLB were set up as federally chartered regional co-operatives of thrifts[7] supported by federal credit lines. Then, the mortgage market was locally fragmented, as was the funding base of the

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[6] For a detailed recent review see Colton (2002).

[7] The term ‚thrift' is used synonymously to the term ‚Savings & Loan'.

thrift industry.[8] Easier access to capital through the issue of debt by the FHLB was thought to provide sufficient incentives to support new lending operations.

However, the thrift institutions remained exposed to credit risk, as the construction of the FHLB required equity contributions and the debt instruments issued were backed by liens on their mortgage portfolios. In times of falling house prices and high unemployment, providing long-term liquidity alone was insufficient to stabilize the market. An emergency measure implemented in **1933** thus focussed on the purchase of a large share of the portfolio threatened with foreclosure by a newly established government corporation, **Home Owners Loan Corporation**[9]. To provide incentives for new lending without further expanding public mortgage holdings, in **1934** the **Federal Housing Administration (FHA)** was created as a mortgage loan insurer, an agency under the Department of Housing and Urban Development (HUD). The conditions that FHA attached to the enrollment of loans should shape the U.S. mortgage market for generations to come.[10] Eligible loans could have a value of up to 80% of the house price, enabling borrowers to purchase houses immediately rather than going through lengthy pre-savings periods.[11] To make servicing this loan amount affordable, maturities for eligible loans were fixed at 20 years and allowable loan rates were capped at 5%. FHA thus created the 20-year fixed rate mortgage that is still the predominant loan product today, by pure administrative fiat. Funding was to be obtained by the lender through a combination of interest-rate regulated savings deposits and debt issued by the FHLB.

In order to improve the funding situation of other lenders than thrifts, in particular the regional finance companies (‚mortgage bankers'), in the same year, the law for the creation of **National Mortgage Associations (NMA)** was passed. The design of these publicly sponsored enterprises was leaning on the FHLB concept; in contrast to an FHLB, NMA were allowed to directly purchase loans from finance companies rather than just fund them. However, under the economic stress situation of the time and due to resistance from the thrift industry, no private sector initiative took place. The federal administration reacted in **1938** to this situation with the creation of the **Federal National Mortgage Association (FNMA)**, Fannie Mae. As a subsidiary of the Reconstruction Finance Corporation (RFC), Fannie Mae remained a government corporation and received an own charter act. Departing from the concept behind

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8 The U.S. banking system during that time was strongly fragmented through the barriers to interstate lending and branch expansion. Deposit rates remained tightly capped until the inflation period of the 1970s. The result was that in areas of high credit demand banks were unable to obtain commensurate amounts of deposits and suffered from liquidity deficits. Many federal interventions in the housing sector targeted these policy-induced market distortions.

9 The corporation was liquidated in 1951.

10 After World War II, a separate loan insurance division for Veterans was created, Veterans Administration (VA). VA was allowed to insure loans up to 100% loan-to-value ratio.

the creation of the insurer FHA, through Fannie Mae the federal government now permanently invested in mortgage loan portfolio, funded through public debt. Combined with the sponsorship of the FHLB system, a second, wholly public capital market funding channel for mortgage loans was established.

This dual system remained essentially intact until the final phase of the Vietnam War. At this time, growing public indebtedness forced the federal administration to control the debt of government corporations. The **1968 Housing and Urban Development Act** reformulated the role of FHA designating it to insure only loans to low-income households while declaring the hitherto FHA-insured middle-income loan market as commercially viable. Fannie Mae received a new charter act that converted it from a government corporation into a government-sponsored enterprise, with the effect of moving its debt away from the government's balance sheet. In order to avoid a monopoly of Fannie Mae and create a meaningful addition to the FHLB system, in **1971** upon the initiative of the thrift industry a second government-sponsored secondary market institution was created, **Federal Home Loan Mortgage Corporation (FHLMC)**, Freddie Mac. Freddie Mac received an own charter act, endowed with similar public benefits compared to Fannie Mae. However, until a 1988 charter act reform only thrifts could hold shares in Freddie Mac. As these continued to be interested in holding mortgage assets, Freddie Mac's policies remained focused to reselling the purchased mortgage pools back to her owners, Freddie Mac's credit guaranty attached, as pass-through certificates (PC). Fannie Mae, in contrast, continued to hold mortgages in portfolio and only slowly started selling mortgage-backed securities (MBS) to investors.[12]

2. U.S. Mortgage Market Segmentation and Scope of Public Credit Guarantees

Table 1 and Figure 1 below give an overview over the institution groups and corresponding channels of the U.S. housing finance system around 2000. These have remained unchanged since the 1968/71 reforms. Three strictly separated segments of the residential mortgage market can be distinguished by housing policy target group.

- In Channel #1, through the agencies FHA and VA, the federal Housing and Urban Development Department insures loans to **low-income mortgagors** directly over their entire amount against shortfalls of principal and interest. Banks and thrifts through permanent MBS programs that carry an additional timely payment guaranty given by the HUD agency Ginnie Mae sell many of these

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[11] A system that combines lending with a prior savings phase continues to exist today in Germany and other countries of Central Europe („Bausparen“).

[12] In order to enable capital market funding of FHA-insured loans, a new agency, Government National Mortgage Association, Ginnie Mae, was created. In contrast to Fannie Mae and Freddie Mac, Ginnie Mae remains restricted from purchasing loans and thus remains limited to MBS guarantee business.

loans in the secondary mortgage market.[13] MBS carrying Ginnie Mae guarantees are „full faith and credit" liabilities of the federal government and thus - in terms of their credit risk - equivalent to treasury bonds.

In 2000, the total volume of this mortgage market segment was approx. US$620 billion, or 11% of outstanding residential mortgage loans. The maximum allowable loan volume for FHA insurance enrollment in 2001 was between US$132,000 and US$240,000, recognizing different regional house price levels. Income ceilings and target group quota are used to further refine the targeting. State and in some cases communal agencies are active with similar loan insurance programs for target groups of local interest.

- The low-income mortgage market is separated from the remaining, **conventional mortgage market** whose outstanding volume by 2000 was almost US$5 trillion[14]. Two sub-markets can be distinguished here:

  - Within the conventional market, loans below a generous volume ceiling[15] are eligible to funding through the government-sponsored enterprise system of Fannie Mae, Freddie Mac and the FHLB as **conforming conventional mortgages** (Channel #2). Unlike in the FHA/VA market, no borrower income ceilings are attached. As a consequence of this wide interpretation of mandate, government-sponsored enterprises have access to over 80% of the total mortgage market and 90% of the conventional market. When purchasing loans with loan-to-value ratios over 80%, Fannie Mae and Freddie Mac currently require additional loan insurance that is provided by a private industry with a handful of players. Contrary to the full risk taking of government in the low-income mortgage market segment, these enterprises are therefore protected by first loss credit enhancements. As a result, the total volume of mortgages funded or sold by Fannie Mae and Freddie Mac of US$2,200 billion, 40% of the total mortgage market, overstates their risk exposure somewhat. On the other hand did the FHLB with a funding volume of US$450 billion, 8% of the total mortgage market, recently undertake steps towards greater risk-taking under the Mortgage Partnership Finance (MPF) program.

  - Only 15% of the mortgage market, and fewer than 20% of the conventional mortgage market, approx. US$1,000 billion, are by regulation completely free of public credit or guaranty interventions. This segment is defined as **non-conforming conventional mortgage market** (Channel #3)**.** It caters two quite distinct target groups: first, the extremely high-income market with so-called 'Jumbo' mortgages exceeding the limits set for guarantees by government-sponsored enterprises. Second, the dynamic market for loans to borrowers with impaired credit histories or insufficient credit scoring results (sub-prime mortgages) – not reflected in Figure 1 - that do not fulfill the underwriting criteria set by the government-sponsored enterprises. The funding of both loan categories comes mainly from the issue of MBS and on-balance sheet funding by banks, thrifts and finance companies.

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[13] Compare previous footnote.

[14] Border line conflicts, e.g. between private mortgage insurers and the government agencies FA/VA are common.

[15] The ceiling is *indexed* to the average construction costs for new 1-4 family homes. This methodology ignores that secondary housing market transactions and mortgage refinancings make up the lion's share of new credit transactions, both requiring lower loan volumes. The ceiling *level* moreover was US$300,000 in 2002 – approximately double the average U.S. house price. A 50% higher level is permitted in Alaska, Hawaii, in Guam and the U.S. Virgin Islands.

Considering that a portion of the conforming conventional mortgage market is not funded and guaranteed by government-owned or –sponsored financial institutions, in a conservative calculation **at least half of U.S. residential mortgage loans, or US$3,000 billion, enjoy public credit guarantees**.

3. The Formidable Growth of Fannie Mae and Freddie Mac

The central trigger for concerns about the dimensions that public credit guarantees in the U.S. mortgage market might take is the strong growth and the high market share of the enterprises Fannie Mae and Freddie Mac (compare Figures 2 and 3).

A key initial factor was the expansion of both enterprises associated with the **Savings & Loan crisis of the 1980s**. Between the middle of the 1980s and the early 1990s, the ratio of purchases of single-family home loans Fannie Mae and Freddie Mac to total new originations in the U.S. mortgage market jumped from approx. 30% to 50%. In the same period, the market share of thrifts in loan originations shrunk from 50% to 20% while the market share of finance companies that traditionally co-operated strongly with Fannie Mae doubled from 25% to 50%. The market share of banks remained constant. As the thrift industry had held mortgage loans generally on balance while finance companies were generally loan sellers, inversely related to the decline of thrifts in originations the share of credit risk held by the government-sponsored enterprises increased. Considering in addition the share of FHA/VA insured loans, at the beginning of the 1990s government took over the credit risk of two thirds of new loan originations.

While this ratio declined somewhat over the remainder of the **1990s**, it remained significantly higher than in the 1980s - between 45 - 55%. High mortgage market growth and interest-rate volatility favored the continued expansion of market share in particular of Fannie Mae and Freddie Mac. Figure 4 below shows the development of outstanding loan volumes. Today's 50% share of Fannie Mae, Freddie Mac and FHA/VA-Ginnie Mae in total residential mortgage market credit risk exposure is more than triple the level of 1980, then only 16%. While outstanding residential mortgage loans in relation to gross domestic product did not grow quite as strongly during the 1990s compared to the 1980s – from 50.5% in 1990 to 56.9% in 2000, compared to 39.7% in 1980 - new loan originations increased drastically. A strongly contributing factor – between 1/3 and 2/3 of new originations – were mortgage prepayments, implying usually the closing of new mortgage loans carrying a lower coupon rate. Prepayment activity grew during the decade, stimulated by strong competition among originators, declining transactions costs and an increased awareness by consumers.

As a consequence of their strong growth, in 2000 Fannie Mae, Freddie Mac and the FHLB issued **debt securities and MBS** in the amount of US$992 billion. This figure corresponded to **45% of gross sales** of **fixed income securities** in the U.S. bond market. The issues of mortgage market GSEs amounted to more than 3.5 times the issuances of the federal government.

SUMMARY

The most important housing finance institutions in the U.S. today can be traced back to the New Deal policies of the 1930s. A differentiation needs to be made between:

- Government-owned corporations and agencies, which are active in the low-income mortgage market. On the federal level, these include the mortgage insurer FHA and the financial guarantor Ginnie Mae, on the state and local level numerous agencies with lending and guaranty operations.

- Government-sponsored enterprises that operate in the widely defined middle-income market. The most important housing GSEs are the Federal Home Loan Banks, Fannie Mae and Freddie Mac.

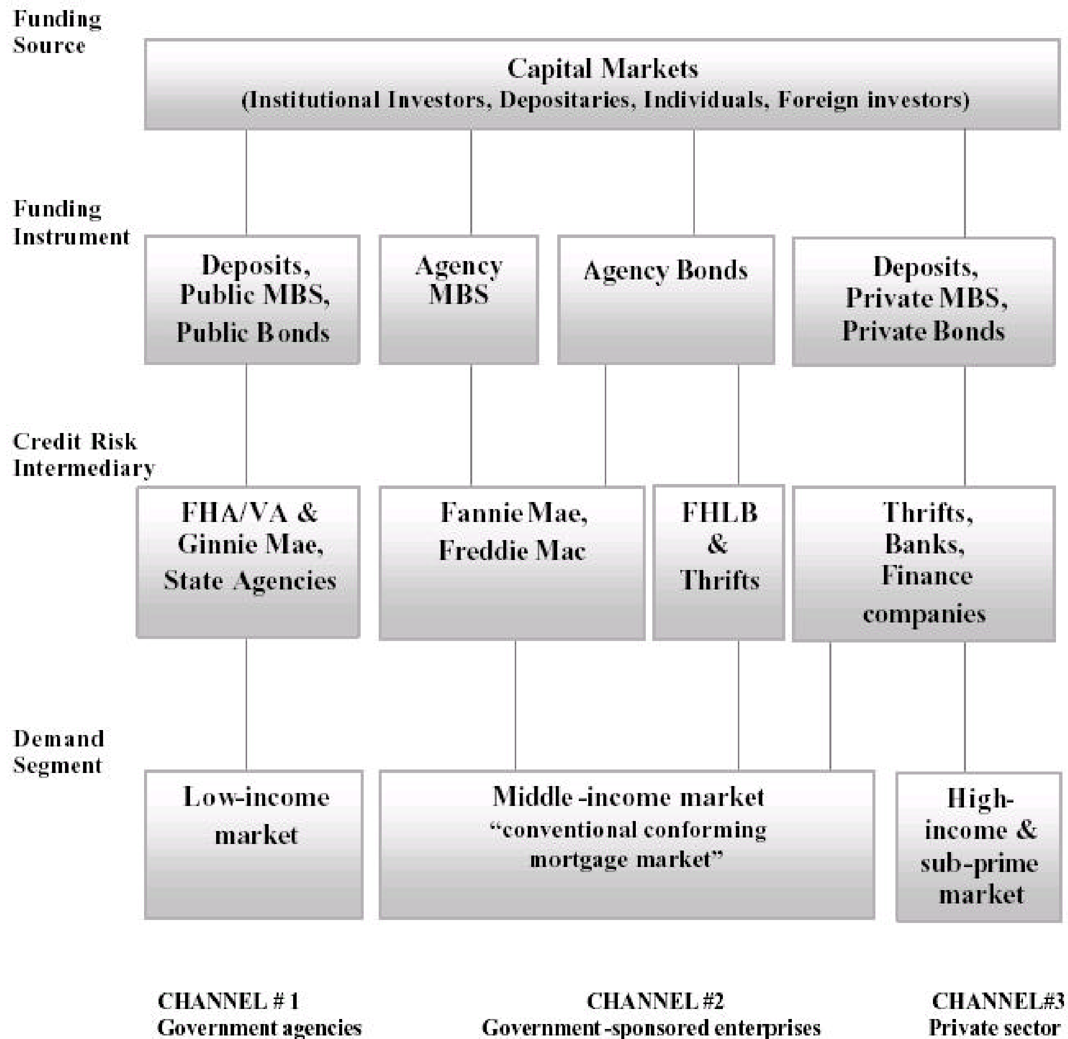
As a result of the significance of government-sponsored enterprises, the mortgage market today features a large role of government in mortgage credit risk transformation. Government holds the credit risk of approximately 50% of outstanding mortgages either directly or indirectly. In particular the government-sponsored enterprises Fannie Mae and Freddie Mac grow enormously and have expanded their market shares continuously.

Table 1: Groups of Institutions in the US Housing Finance System and their Key Characteristics

	Agency	Government-sponsored enterprise (GSE)	Ordinary enterprise
KEY CHARACTERISTICS			
Charter type	Created by federal law	Created by federal law	License under general law
	Generally part of administration	Legally distinct entity	Legally distinct entity
Mandate	Specific public mandate	Specific public mandate	Serves private purposes
	Designated business lines only	Designated business lines only	All business lines
Ownership	Government-owned	Shareholder-owned	Shareholder-owned
Sponsorship	Explicit government guarantee	Implicit government guarantee	No government guarantee
	Exempt from certain taxes and regulations	Exempt from certain taxes and regulations	Fully taxed and regulated
Market structure	Government monopoly	De-facto monopoly or oligopoly	Market structure determined by competitive forces
Termination/bankruptcy	Only by law	Probably only by law (untested)	Bankruptcy code
INSTITUTIONS			
Wholesale bank	*Fannie Mae until 1969*	Fannie Mae	Banks and finance companies
		Freddie Mac	(e.g., Bank of America, GE Capital)
	(State Housing Funds)	Federal Home Loan Banks	
Financial guarantor	Ginnie Mae	Fannie Mae	Specialized financial guarantors
	Freddie Mac until 1989	Freddie Mac	(e.g., MBIA, Ambac)
Insurer	Federal Housing Administration		Specialized mortgage insurers
	Veterans Administration		(e.g., PMI, MGIC)
	(State Housing Funds)		

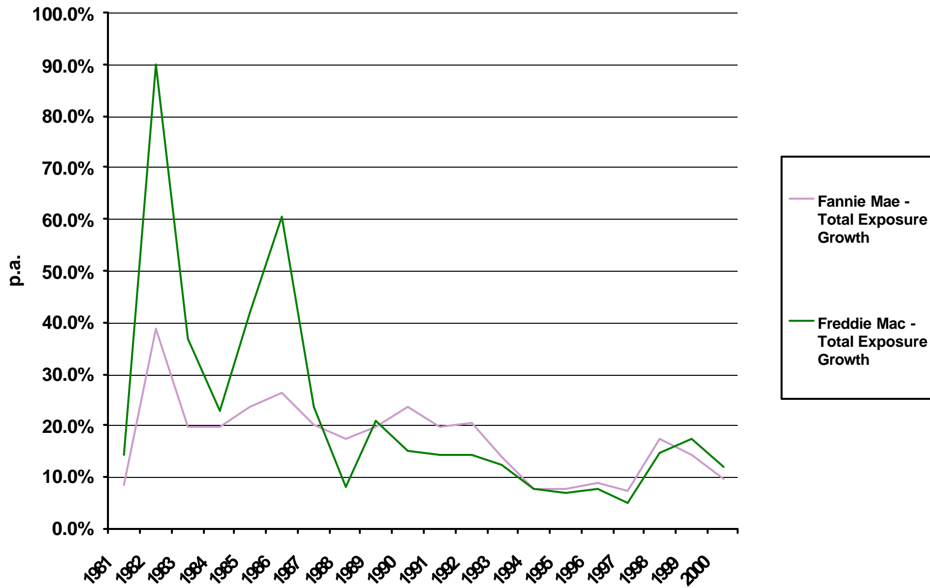
Source: Hans-Joachim Dübel, partly adapted from Stanton (2002), Table 2-3.

Figure 1 Stylized Representation of the U.S. Housing Finance System



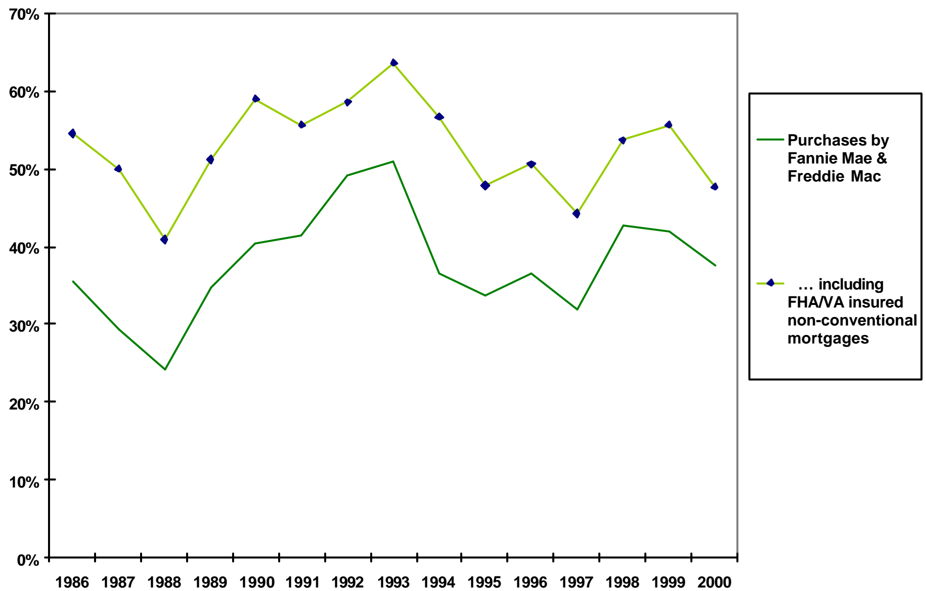
Source: Hans-Joachim Dübel. Notes: FHA: Federal Housing Administration, VA: Veteran's Administration, MBS: Mortgage - backed Securities (terminology used here includes other instruments, including Participation Certificates and structured finance products)

Figure 2: Annual Growth Rates of the Total Credit Risk Exposure by Fannie Mae and Freddie Mac, 1981 - 2001



Source: OFHEO (2001). Note: The total credit risk exposure is defined by the sum of mortgage assets held on balance sheet and the outstanding guaranteed MBS.

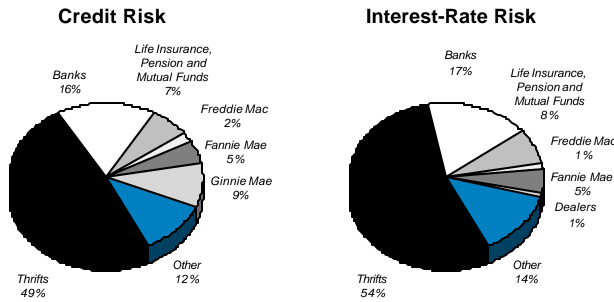
Figure 3: Share of New 1-4 Family Loan Originations carrying Public Credit Guarantees, 1986 - 2000



Source: OFHEO (2001). Note: Data reflecting the purchases of loans by both Fannie Mae and Freddie Mac are only available since 1986.

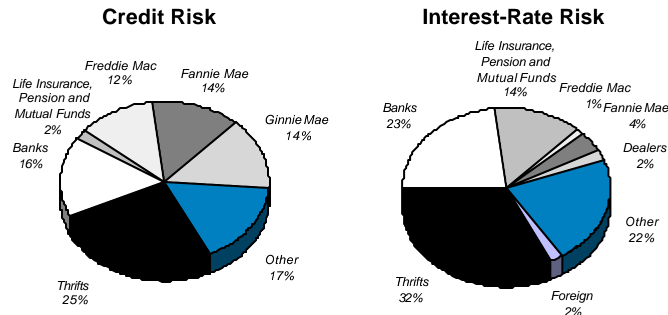
Figure 4: Freddie Mac Estimates on the Investor Structure in Credit and Interest-Rate Risk Exposures in the U.S. Residential Mortgage Market, 1980/1990/2000

1980
Residential Mortgage Debt Outstanding



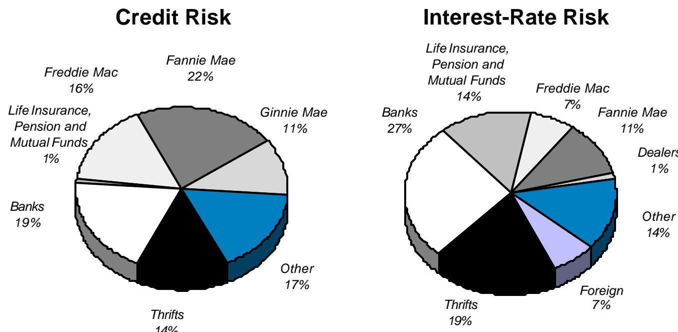
Total Residential Debt Outstanding: $1,110 Billion

1990
Residential Mortgage Debt Outstanding



Total Residential Debt Outstanding: $2,932 Billion

2000
Residential Mortgage Debt Outstanding



Total Residential Debt Outstanding: $5,622 Billion

C. The Business Model of the Government-Sponsored Enterprises Fannie Mae and Freddie Mac

1. Legal Basis

Both charter acts of Fannie Mae and Freddie Mac feature a positive definition of admissible operations similar to the constituting laws of specialized European mortgage banks. The enterprises' primary **operational focus** is mortgage credit risk transformation and funding of mortgage loans by tapping the capital market. Differences to the Europe exist in the areas of residential mortgage loan origination, which the enterprises are not allowed to undertake, and commercial mortgage finance, where the enterprises are limited to the funding of rental housing.

In the areas of **credit risk management, asset-liability-management** and **funding policies**, in contrast, Fannie Mae and Freddie Mac have comparatively large room for maneuver. Stanton (2002) shows that the limiting factor for the enterprises' operations in these areas has often not been the charter act, but rather the corporate governance structure defining the distribution of power between management, government and shareholders. For example, until the Charter Act reform of 1988, the thrift industry held the entire share capital of Freddie Mac and the federal government had more far-reaching staffing rights of management and supervisory powers in Freddie Mac than in Fannie Mae. Two direct consequences were that Freddie Mac could not undertake portfolio lending business against the interests of her shareholders, thrifts, as Fannie Mae did, and paid lower salaries, limiting the acquisition of highly paid risk management specialists. As the reform weakened the governance role of both thrifts and government, Freddie Mac immediately embarked upon adjusting its operational profile to the one of Fannie Mae.

Fannie Mae and Freddie Mac are not subject to standard **financial supervision and regulation** for banks, thrifts or insurance companies. A special financial oversight for the two institutions has been created in the Office of Federal Housing Enterprise Oversight, OFHEO. OFHEO is a department of the Housing and Urban Development Department – HUD at the same time performs the **housing policy mandate supervision and regulation** of the enterprises. Compared to other financial supervisors, OFHEO has very limited intervention powers and through the budget appropriation process is vulnerable to the enterprises strong lobbying activity in Congress. It's role is essentially confined to tracking the risk profile of the institutions and calculating risk-based capital requirements according to a recently developed proprietary standard involving market risk stress tests. Both the methodology of the standard and the resulting capital requirements differ strongly from current international banking regulations – in 2000, the

enterprises held capital between 1.4 and 1.5% of their credit risk exposure, resulting in a leverage ratio of 65 to 70 times equity that is rather unusual for the mortgage industry (see Table 2 below).[16]

2. Business areas

Credit Guaranty Business

The enterprises protect investors against the default risk inherent in the mortgage loan pools they sell as mortgage-backed securities (MBS, Fannie Mae), participation certificates (PC, Freddie Mac) or other structured finance products through **financial guarantees** of different strength. The most common is a timely payment guaranty, ruling out loss of principal and interest as well as the liquidity risk for investors in case of payment delays and ensuring a high rating of the security.

The average **guaranty premium** charged by the enterprises during the 1990's was between 20 and 25 basis points (see Figure 5). Premiums have started to decline since 2000. They are deducted from the interest margins available to loan servicers or originators. Their level surpasses by far the risk costs of the enterprises, which during the 1990's amounted on average to 3.7 basis points (Fannie Mae) and 7.2 basis points (Freddie Mac), respectively. Figure 5 suggests that the **profits** in the credit guaranty business reached record levels in 2000 – on average in the 1990s they amounted to 17.5 basis points (Fannie Mae) and 15.5 basis points (Freddie Mac), respectively.

As a result of the negligible differences between the premium levels charged, many observers suppose **price collusion** between the two enterprises. However, despite the high profits and the associated loss of interest income, selling loans to Fannie Mae and Freddie Mac remains advantageous for originators. An alternative scheme set up by the Federal Home Loan Bank of Chicago – the Mortgage Participation Certificate Program – and similar pool insurance programs of private mortgage insurers to undercut premiums were so far unable to make significant inroads into the market of Fannie Mae and Freddie Mac. The key reason is that both enterprises can use their specific funding cost advantages - reviewed further below - to overcompensate for any excess credit guaranty costs.

Portfolio Lending Business

The interest-rate risk associated with the mortgage portfolio bought by the enterprises is only partly passed through to investors through the sale of loan pools. The enterprises **buy and hold large amounts of**

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[16] Details of the latest capital requirements are periodically published on OFHEO's website (see links in the annex).

mortgages and own mortgage-related securities on balance sheet, rendering them in part full intermediaries of credit and interest-rate risk comparable to European mortgage banks. The most important types of interest-rate risk faced by a U.S. portfolio lender are prepayment risk and extension risk.[17] The main instruments that the enterprises use to funding and manage mortgage portfolio carrying these risks are unsecured long-term non-callable bonds, unsecured long-term callable bonds, short-term debt and derivatives.

By 2000, the share of mortgage assets held on balance sheet already amounted to **45% of the total credit risk exposure** of the enterprises, which includes mortgage-related securities sold with financial guarantees. As Figure 6 shows, in the 1990s this share grew dramatically relative to the credit guaranty operations. Facilitated by the corporate governance changes described above, Freddie Mac for the first time developed a significant balance sheet portfolio while Fannie Mae returned to its historical role as a portfolio mortgage lender.

The strong balance sheet growth of the enterprises coincides with two **capital market trends** in the 1990s to which the enterprises reacted by changing flexibly their **issuance** and **hedging policies** and adopting new funding instruments:

- **Inflation and interest-rate decline**

  A first trend was the strong interest-rate decline and the associated large volumes of mortgage prepayments that hit the U.S. mortgage market between 1992 and 1994. Because the prepayment models in use at that time had not anticipated the scale of refinancing activity taking place at the time, securities that passed through prepayment risk became temporarily difficult to sell or expensive to issue. The enterprises reacted by increasing the issuance of structured finance products, in particular **Collateralized Mortgage Obligations (CMO)** which protected investors to some degree by varying the allocations of prepayments. By 1994, CMO had risen to 30% of new issuances of the enterprises.

  However, at the same time, due to the **increase in the prepayment risk premium** it became more profitable for the enterprises to **retain mortgage portfolio** and develop proprietary funding strategies to manage the risk. As Figure 6 shows the period of 1992 to 1994 for both enterprises marked the turning point for portfolio lending operations.

- **Government bond appreciation**

  Towards the end of the decade, the dominant capital market trend was high demand for non-callable U.S. government debt by investors as a result of the successful fiscal consolidation in

[17] Prepayment risk can be defined as the risk of loss that occurs if assets valued above par are repaid for par, which is typically the case if interest-rates drop. Extension risk can be defined as the risk that assets valued close to or below par are held longer than expected leading to losses, which is typically the case if interest-rates rise. In the presence of either risk, asset duration becomes a variable, requiring a strategy to adjust the duration of liabilities.

the U.S. and a series of emerging capital market crises. This created incentives for Fannie Mae and Freddie Mac to create debt securities similar to government bonds.

As unsecured debt issued by the enterprises was perceived to be government guaranteed and the derivative and hedge market needed for the management of prepayment risk had considerably grown in depth, the enterprises embarked on ambitious unsecured '**agency bond'** programs. A key element of the strategy was to position the debt instrument in the agency segment, usually reserved to issuances of government-owned entities, and not - as would be appropriate for a privately owned corporation - in the corporate bond market.[18] In order to reap the benefits of the new asset class quickly, in 1998 the first benchmark issues were launched that created liquidity levels closer to treasury issues[19].

The result of this policy change was a drastic increase in the share of non-callable debt outstanding – for Fannie Mae to 51% of total assets and for Freddie Mac to 26% of total assets in 2000. In a mirror effect, CMO lost significance as a funding instrument while MBS issuance stagnated.

3. Risk-Taking and Profitability

Despite the high profitability of the credit guaranty operations, the **portfolio lending operations** have developed into the **main source of revenue** for the enterprises. Figure 7 shows that the net interest margin in 2000 was 1% in the case of Fannie Mae and 0.85% in the case of Freddie Mac. Due to balance sheet growth, the profits from interest-rate risk taking by 2000 exceeded the profits from credit guarantees by a factor of 4 (Fannie Mae) and 3 (Freddie Mac) – in 1990, profits from both sources were still the same. As a result, the enterprises continue to develop their portfolio lending business with force.

How do the enterprises manage the increased interest-rate risk arising in these circumstances? The balance sheet perspective of Table 2 suggests that the significantly lower net interest margin achieved by the newcomer Freddie Mac can be explained by more conservative risk management standards compared to the traditional portfolio lender Fannie Mae. In fact, Freddie Mac uses to a much larger degree expensive hedging instruments such as interest-rate derivatives and callable debt. However, prepayment and extension risk is hedged only partially against at Freddie Mac, as the cost of hedge instruments are being gauged against the residual risk.[20] The bottom line is that the **high revenues** of the **portfolio**

[18] A European issue of Freddie Mac was deliberately placed in the agency market segment, where public agencies such as KfW or government-owned banks such as Landesbanken issue, and not in the private Pfandbrief market segment.

[19] Issue size over US$3 billion.

[20] Freddie Mac is leading in the financial mathematic modelling and hedging of prepayment and extension risk. It's current policy is to hedge fully against the first order derivative of the value of the mortgage portfolio to interest-rate changes, but not fully against the second order derivative. Next to cost arguments it is argued that hedges against second order risks are not necessary since particularly strong rate decreases are not only associated with prepayments but also conseqeuently declines in credit risk, creating a built-in stabilizer for the portfolio.

lending business imply, in particular in the case of Fannie Mae, **high risk taking.** The potential sources are interest-rate and inflation risk as well as the risk of misestimating borrower's prepayment behavior is concerned. A potential realization of risk as losses is exacerbated by the high leverage of both institutions.

With low losses occurring in the past decade, however, both enterprises were able to reach **returns on equity** that top the scale in mortgage banking worldwide. In 2000 return on equity was 25.3 % with Fannie Mae and 22.8% with Freddie Mac. Even if considering both market and market share growth rates, the stock market capitalization of the enterprises is very high relative to book values. It is likely that the main source of revenues, the portfolio lending business funded by agency bonds, will continue to strongly develop, in particular if the supply of U.S. government debt should fall in the future.[21] The extent of risk taking by the enterprises, and thus their issuance and hedging policies will be primarily determined by the risk premiums fetched on the market, in particular credit and prepayment risk premiums, and the continued existence of the advantages they enjoy as government-sponsored enterprises.

4. Impact on the Primary Mortgage Market

While Fannie Mae and Freddie Mac focus their operations on purchasing and selling residential mortgages ('secondary mortgage market'), their market power enables them to **determine** to a great extent **market structure** and **business standards** in the U.S. primary mortgage market:

- **Loan origination**. Since the enterprises cannot directly originate loans, banks, thrifts, credit unions and mortgage companies take over this role - usually against a fixed origination fee. Which loan is eligible for the secondary market is increasingly determined by automated underwriting systems, computer programs which capture the characteristics of the properties to be financed and consumers to be underwritten, and provide the originator with a positive or negative funding signal. Freddie Mac has pioneered the technique with its Loan Prospector. The share of loans underwritten with automated systems in secondary mortgage market purchases has reached 55% in 2000. As the screening function is automated, the role of originators becomes focussed on data verification and monitoring on behalf of the enterprises.

- **Loan Servicing**. After a loan purchase, the enterprises traditionally remained tied to the originator with a servicing contract.[22] However, a large market has developed in which servicing rights are sold from the originator to third-party specialists. The servicers' assets consist of the present value of the future interest margin streams, corrected by his servicing costs and those

[21] Around 2000 a vivid discussion about the future of the U.S. bond markets took place. It centered around projections that expected new issuances by government-sponsored enterprises in housing would exceed new issuances of the federal government by the middle of the decade. See Fleming (1999). As fiscal surpluses have in the meantime turned into deficits, the discussion has become muted.

[22] Loan servicing comprises loan administration, collection of payments and management of default and foreclosure.

elements of credit risk which are not transferred to the enterprises, i.e. cost arising from technical collection and loan administration errors. Fannie Mae or Freddie Mac covers costs arising from default; however, servicers receive financial incentives geared towards maximizing loan recoveries, e.g., by curing the loan through workouts with the borrower.

It is interesting to note that the servicing market is both increasingly technologically sophisticated and economically concentrated in the US. This has lead to an increase in the bargaining power of servicers vis-à-vis the enterprises over the level of credit guaranty premiums deducted from the margins, which as a consequence are gradually declining.

- Finally, the enterprises can be held to create the market for **private mortgage insurance** through their LTV underwriting limits for loan purchases. A handful of nationwide diversified loan insurers are active in this market. As the enterprises' credit risk management technology has become increasingly sophisticated, a debate over the validity of the guidelines, and hence the future of private insurers, has developed.

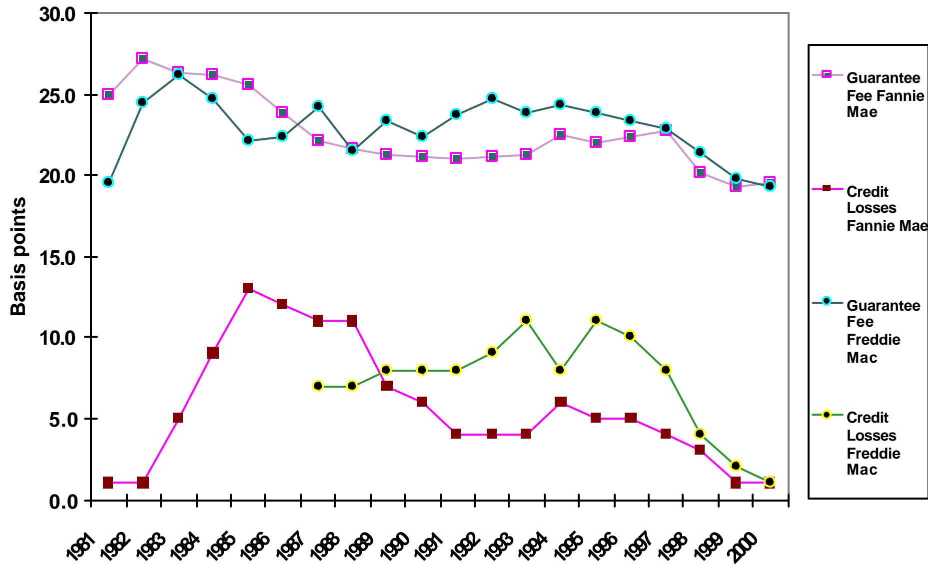
SUMMARY

The charter acts of the housing GSEs Fannie Mae and Freddie Mac limit their operations to the funding of residential mortgage loans, including rental housing loans. Being similar in that regard to European mortgage banks, the enterprises command significantly greater degrees of freedom than their counterparts concerning credit risk management, asset-liability management and funding options, which - after a series of legal and corporate governance changes - they are able to exploit fully.

Their core business areas are financial guarantees for mortgage-related securities issued in their name and portfolio investment in mortgage assets. In the former area, both enterprises obtain moderate profits taking relatively low credit risk; in the latter they obtain high profits taking moderate to high interest-rate risk, in particular prepayment and extension risk. According to the market prices of the different risk, the enterprises vary the importance of both business areas. Fannie Mae and Freddie Mac differ in their risk-taking behavior as a matter of individual strategy. The enterprises high profitability – 20-25% return on equity – is closely related to their low capital holdings of just 1.4-1.5% of total credit exposure, resulting in a leverage ratio of 65-70 times capital that is unusually high for the mortgage industry.

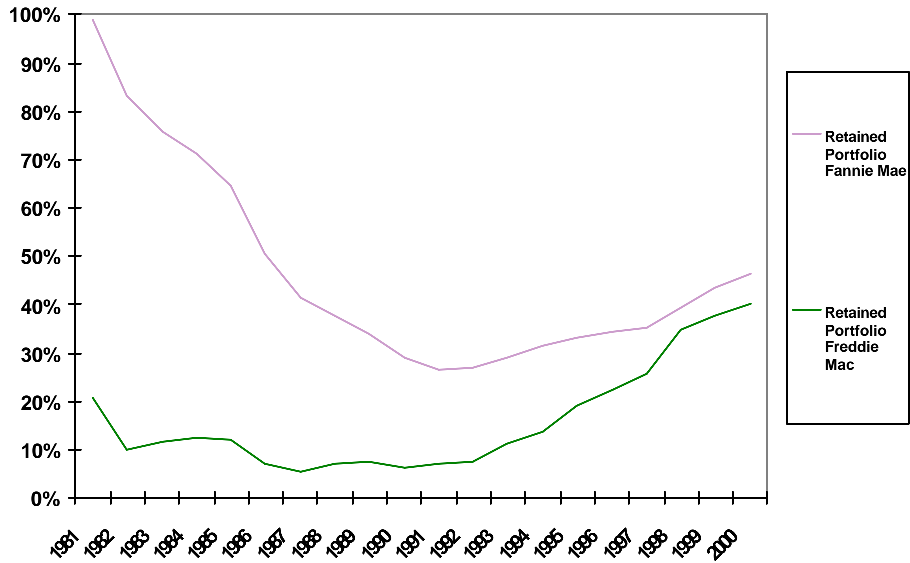
As a result of their strong market power in the secondary mortgage market and despite their charter focus on the secondary mortgage market, the enterprises determine to a large extent market structure and business standards in the primary mortgage market.

Figure 5 Credit Guarantee Premiums and Credit Losses of the Enterprises, 1981 - 2000



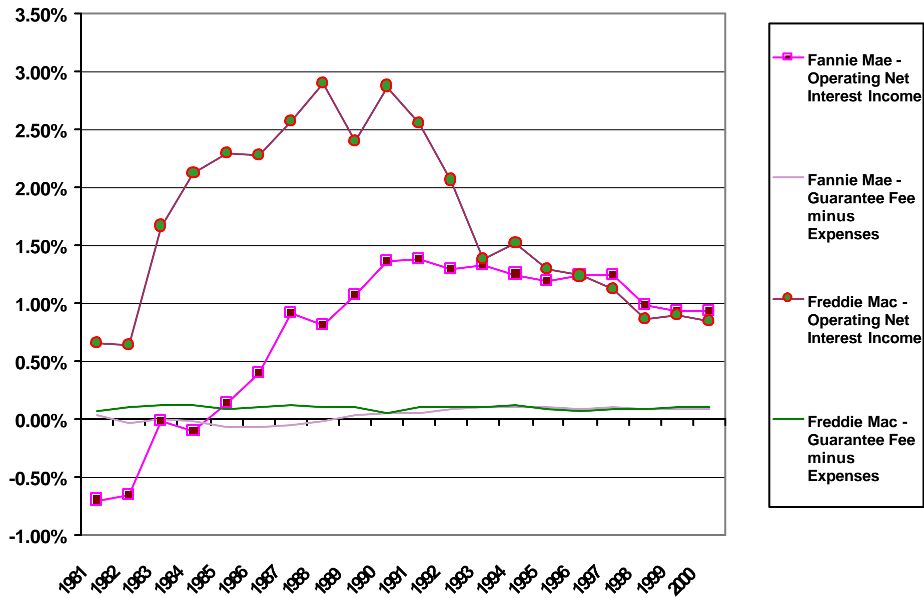
Source: OFHEO (2001). Note: Credit loss data for Freddie Mac not available prior to 1987.

Figure 6 Share of Retained Portfolio in Total Credit Exposure of the Enterprises, 1981 - 2000



Source: OFHEO (2001), author's calculations.

Figure 7 Operating Margins of the Enterprises in Credit Guaranty and Portfolio Lending Operations, 1981 – 2000



Source: OFHEO (2001), author's calculations. Note: Net interest income is divided by retained portfolio of mortgages and MBS.

Table 2: Basic Business Model Data of Fannie Mae and Freddie Mac

in million US$, 2000	**Fannie Mae**		**Freddie Mac**	
	total	%, mult.	total	%, mult.
Balance Sheet Analysis				
Retained mortgage portfolio	610,122	90.38%	385,451	83.92%
Other assets	64,950	9.62%	73,846	16.08%
Total assets	675,072		459,297	
Equity	20,838	3.09%	14,837	3.23%
Liabilities	654,234	96.91%	444,460	96.77%
Portfolio leverage		31.4		30.0
Guaranteed MBS outstanding*	706,684		576,101	
Portfolio & guarantee leverage		65.3		68.8
Capital ratio		1.51%		1.43%
Credit Risk Analysis				
Retained & guaranteed mortgage credit	1,316,806		961,552	
Protected by third parties**	267,312	20.3%	305,774	31.8%
Credit losses		0.01%		0.01%
Guarantee fee income*	1,350		1,060	
Guarantee fee level		0.193%		0.191%
Market Risk Analysis				
Debt outstanding	642,682		426,682	
Total effective long-term debt > 1yr	545,637	85%	328,545	77%
.. of which callable	234,078	36%	226,696	53%
Derivatives position	319,690		794,225	
Net interest income***	5,670		3,270	
Net interest margin		1.01%		0.84%
Profitability				
Net income	1,165		663	
Return on equity		25.3%		22.8%

*on MBS not retained in portfolio only

**by third parties, e.g. insurers. Partial protection included.

***includes credit spread earned on retained portfolio, % of total assets

Source: OFHEO (2001), author's calculations.

D. Costs and Benefits of Public Support For Government and Consumers [23]

1. Costs for Government

- **Tax and direct debt funding advantages**

While Fannie Mae and Freddie Mac are private enterprises, they are treated from a taxation perspective as fully federally owned agencies or corporations. Their profits are therefore exempt from **federal, state and local income taxes**. According to estimates of the Congressional Budget Office (CBO), in 2000 the value of the tax benefits was US$760 million.

The debt issued or guaranteed by the enterprises is **classified** under the Securities Exchange Act of 1934 as **public debt securities**. As in the case of public debt, the U.S. Treasury Department authorizes the issue and the Federal Reserve System is the responsible tax authority. Also, the securities are free from registration with and payment of registration fees to the Securities and Exchange Commission (SEC), leading to cost savings of 2000 approx. US$151 million. Finally, the agency status on the capital market saves rating costs of 2000 estimated US$25 million.

- **Indirect debt funding advantages**

Today a rather symbolic support, but historically important, is the support of the enterprises through a **federal line of credit** of US$2.5 billion each, at favorable conditions through the U.S. Treasury Department.[24]

The decisive funding cost advantage today stems from the assumption of the capital markets that **debt and the U.S. federal government implicitly guarantees MBS issued by the enterprises**. This contrasts with the government's demand from Fannie Mae and Freddie Mac to explicitly state in their issuance prospectuses that the issues are „not backed by the full faith and credit of the U.S. government". However, given the multitude of tax and regulatory special treatments, the special financial and housing policy supervision regime, and the size and importance of the enterprises that are inextricably linked to the role of government in housing finance, the capital market assumes the contrary.

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[23] Estimates presented in this chapter refer to CBO (2001), unless otherwise indicated.

[24] The FHLBs enjoy such credit lines, too, in addition, they have special liens on the assets of their members in crisis situations. („superlien"). The U.S. Treasury Department has emphasized recently that federal credit lines are voluntary and can be cancelled at any point in time.

Particularly relevant for this assumption are **regulatory special treatments** that have put potentially competing and tighter regulated institutions, in particular depositaries, at a disadvantage and created large incentives for these to sell their portfolios to Fannie Mae and Freddie Mac. Two aspects excel:

- **Capital arbitrage**

  MBS and debt securities issued by Fannie Mae and Freddie Mac and held by U.S. depositaries underlie the Basel regulatory capital rules, requiring capital to be held in the amount of 1.6% of the asset volume. If this value is added to the average capital held by both enterprises of 2000 1.4 – 1.5% (see Table 2), the result is a total capital burden for mortgage loans of 3%.[25] Since under Basel I depositaries are required to hold a minimum capital ratio of 4% for mortgage loans, an asset swap of a mortgage pool against an agency MBS results in a significant regulatory capital advantage for the selling bank or thrift.

  For comparison: if a German bank or Sparkasse sells assets to a mortgage bank and repurchases its Pfandbriefe, under Basel I the total capital requirement is 4.8% (50% for the mortgage loan held by the mortgage bank plus 10% held by the bank for the Pfandbrief issued by the mortgage bank). As a result, an asset swap of mortgages against Pfandbriefe would be disadvantageous from a regulatory capital perspective.

- **Circumvention of counterparty risk limits**

  The dynamics of loan sales from depositaries resulting from regulatory capital arbitrage were limited were the issues of Fannie Mae and Freddie Mac not exempt from large exposure limits that are otherwise valid for corporate counterparty exposures for a wide range of institution classes. In the case of banks, the derogation is specified in an amendment to the National Banking Act, overriding the usual limits of 10% or 15% of capital, for corporate bond or corporate loan exposure respectively.[26] In 1999, U.S. banks held 11% of their assets and almost 100% of their capital in MBS and debt issued by government-sponsored enterprises of the housing sector.[27]

  In fairness, it needs to be said that European mortgage bond issuers have sought similar derogations to enable national capital market demand for their securities. However, this should be seen against the context of much smaller capital markets. Also, the U.S. derogations seem to be far more comprehensive.

These special treatments result in a very favorable market environment for the enterprises. However, the weakening of regulatory standards could result in a **default** by Fannie Mae or Freddie Mac on their

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[25] This calculation is based on average capital held by the enterprises. For their off-balance sheet exposure (MBS programs), the enterprises only need to hold 0.45% capital, increasing the regulatory capital advantage further. A small upward adjustment should be made in the calculation for the 20% of enterprises mortgage portfolio which are privately mortgage insured as a result of high loan-to-value ratios. Suc h a change, while changing magnitutes, will not alter the basic relations.

[26] MBS and debt issued by the enterprises are moreover fully eligible for discount, open market and repo operations of the Federal Reserve System.

[27] Source: Gensler (2000). The figure includes a small share of FHLB debt.

liabilities having a **severe impact on the liquidity and solvency of the American financial system**[28]. Since the government - driven by the motive of sponsoring the housing sector - is putting internationally established standards for minimum capital holdings and risk partition of financial institutions out of force, the conclusions drawn by investors concerning a special responsibility of government for the liquidity and solvency of the enterprises does not appear far-fetched.

In the past 15 years, an abundant body of academic literature has been published that makes attempts to **calibrate** these **implicit government guarantees** for the liabilities of the GSEs, based on different methodologies.[29] Also, the U.S. Congress has developed a special interest for the issue because of its potential impact for the federal government budget, and has consequently published a series of own studies. CBO (2001) estimates the funding cost advantages as follows:

- In the case of debt issued by the enterprises, the yield advantage over comparable issues by private financial institutions is determined. To this end, CBO considers issues of financial institutions rated AA and A to reflect its assumptions of a stand-alone rating for the enterprises, which currently does not exist.[30] With this methodology, a **funding cost advantage** estimate for the **portfolio lending operations** of **41 basis points** is reached. This figure reflects the weighted average of funding cost advantages of short-term debt (15 basis points) and long-term debt (47 basis points).
- In the case of mortgage-related securities guaranteed by Fannie Mae and Freddie Mac, direct yield comparisons are difficult due to differences in guaranty structure among the enterprises and between the enterprises and the private sector. As an instrument, an estimate of the excess profits obtained in the guaranty business is made (5 basis points), adjusted by the estimated funding cost advantages passed through to mortgagors (25 basis points, see below). The resulting **funding cost advantage** estimate for the **credit guaranty operations** are **30 basis points**.
- If these results are weighted with the share of both operations in total assets (approx. 50/50, see Figure 6), a **funding cost advantage** estimate over the **total credit exposure** of **35 basis points** is obtained.

A multiplication of these data with the new issue volume of debt in 2000 yields that all government-sponsored enterprises – including the FHLB system – received US$8.8 billion in subsidies, of which Fannie Mae and Freddie Mac collected US$6 billion. In analogy, the subsidies for mortgage-related securities – instruments only issued by Fannie Mae and Freddie Mac – amounted to US$3.7 billion.

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28 Similar exemptions exist for the insurance industry as well as the pension fund industry which has particular relevance in the U.S. for old-age provision.

29 An overview is provided by Feldman (2000), see also annex.

30 For the sake of simplicity, the same methodology is applied to the issue of callable debt. The somewhat heroic, implicit assumption is that agencies do not enjoy advantages in purchasing interest-rate options in the capital market.

Combining the indirect debt funding advantages with the direct debt funding and tax advantages yields an annual subsidy for **Fannie Mae and Freddie Mac alone in 2000 of over US$10 billion**. Moreover, with the rapid growth of the secondary mortgage market, these subsidies grew between 1995 and 2000 with an annual growth rate of 18% p.a. For comparison, the growth rate of the primary mortgage market during the same period was 14% p.a.

➢ **Indirect equity funding advantage**

Not contained in the above calculation is a quantification of the **incentives of shareholders and managers to exploit the debt funding advantages**, in combination with a high admissible leverage, by pursuing particularly risky operations to the detriment of government. Given that liability of shareholders is limited to their capital, the value of this option is considerable. In a mirror effect, it reflects the downside risk for government, which can be seen as underwriting a bankruptcy option.

The **option to increase the downside risk for government** could be exercised, for example if management of the GSE decided to increase funding mismatch or expand business activities to the clients with impaired credit histories. Since the public guaranty almost eliminates the economic pressure to assess new business activities on a risk-adjusted basis, and capital requirements are very low, an increase in interest income by entering into high-risk activities will transfer almost directly into higher profits.

Due to the methodological problems in quantifying equity funding advantages relative to debt funding advantages, examples of subsidy calculation are not presented here. However, as discussed above, both enterprises display unusually **high ratios of stock market capitalization to book value** (Table 3), in 2000 4.2 for Fannie Mae and 3.3 for Freddie Mac. Very few financial institutions in the U.S. have a market capitalization in excess of double of the value of their book assets. The resulting unaccounted equity is a pivotal cushion for the enterprises, in particular in crisis situations: for example, in the catastrophic year for the mortgage market in 1981, when Fannie Mae became technically insolvent, running a negative book value of minus US$10.8 billion. At the same time, Fannie's stock market value was still positive US$500 million.

2. Benefits for Consumers

Who are the beneficiaries of the discussed funding advantages? These include the **groups of mortgagors** as well as the GSEs **owners**, in the case of Fannie Mae and Freddie Mac private stock market investors, in the case of the 12 FHLBs they include the thrift - and more recently also commercial bank - owners.

In order to estimate the **benefits accruing to mortgagors**, a standard procedure is to compute the yield difference between Jumbo mortgage loans - in 2000, loans with a volume over US$ 300,000 - and the 'conforming' mortgages.[31] Using this methodology, CBO (2001) arrives at the estimate that mortgage rates in the 'conforming' market are reduced by **25 basis points** as a resut of the subsidies. Comparing this result with the debt funding cost advantages of 41 basis points and the advantages of MBS funding of 30 basis points yields the conclusion that the enterprises retain subsidies in considerable proportion: in portfolio lending operations approximately 40% of subsidies are retained, in the credit guaranty business approximately 20%. **In relation to the total credit exposure, 28.5% of the advantages are retained by the GSE.** As discussed above, this is a conservative calculation that does not reflect the option of GSE management to increase risk, and by implication retain larger shares of subsidies as profits.

Including the FHLB in the calculation, which feature a particularly large share of retained subsidies, the **government-sponsored enterprises** in the housing sector **in 2000 passed on little more than half of the total subsidies to consumers**, approx. US$7 billion, through lower interest-rates (compare Table 4). The difference can be considered as subsidy of the owners, in the cases of Fannie Mae and Freddie Mac US$3.9 billion, in the case of the FHLB US$2.7 billion. If the GSE would pass on all funding advantages they receive, interest rates for conforming conventional mortgage loans could be 35 basis points lower than for wholly privately funded Jumbo mortgage loans.

SUMMARY

Fannie Mae and Freddie Mac use their status as government-sponsored enterprises to present themselves in the debt market as public and in the equity market as private corporations. Given the numerous and significant tax and regulatory advantages they receive, the existence of a separate financial and housing policy supervision, and their size and market power the capital markets assume that the liabilities of Fannie Mae and Freddie Mac carry an implicit guaranty by the U.S. government.

U.S. Congress estimates for the year 2000 calibrate the direct and indirect debt finance advantages for Fannie Mae and Freddie Mac in credit guaranty operations at 30 basis points, in portfolio lending operations at 41 basis points. Of the average debt funding cost advantage of 35 basis points, the mortgagors receive 25 basis points. The remaining 10 basis points – approx. 30% of the funding advantages - are retained and considered as the oligopoly premium of the enterprises.

The debt funding advantages indicated above do not consider the value of the option that management of Fannie Mae and Freddie Mac has to actually use the advantages to the detriment of government and benefit of private shareholders, by increasing the risk-taking of the enterprises.

[31] For the computation, data for jumbo mortgages are corrected by the effect of the funding cost advantages of the FHLB which – contrary to Fannie Mae and Freddie Mac – are allowed to fund them.

Table 3: Comparison of Book and Market Values of Fannie Mae and Freddie Mac, 1994 - 2000

Billion US$	1994	1996	1998	2000
Fannie Mae				
Market value	19.9	39.9	75.9	86.6
Book value*	9.5	12.8	15.5	20.8
Mkt to book ratio	2.1	3.1	4.9	4.2
Freddie Mac				
Market value	9.1	19.2	44.8	47.7
Book value*	5.2	6.7	10.7	14.4
Mkt to book ratio	1.8	2.8	4.2	3.3
Fannie Mae & Freddie Mac				
Market value	29.0	59.1	120.7	134.3
Book value*	14.7	19.5	26.2	35.2
Mkt to book ratio	2.0	3.0	4.6	3.8

*Core capital

Source: OFHEO (2001)

Table 4: CBO Calculations on Federal Subsidies to Housing GSEs, 1995-2000

Federal Subsidies to the Housing GSEs, 1995-2000 (In billions of dollars)

	1995	1996	1997	1998	1999	2000
Subsidies by GSE and by Source						
Fannie Mae						
Debt	1.7	1.5	1.8	3.2	3.3	3.6
Mortgage-backed securities	1.5	1.7	1.7	2.3	2.1	1.9
Tax and regulatory exemptions	0.3	0.4	0.4	0.5	0.6	0.6
Freddie Mac						
Debt	0.8	1.1	0.8	3.3	2.4	2.4
Mortgage-backed securities	1	1.3	1.1	1.1	2.1	1.8
Tax and regulatory exemptions	0.2	0.2	0.2	0.3	0.4	0.4
FHLBs						
Debt	1.2	1.1	2	2.6	4.5	2.8
Tax and regulatory exemptions	0.2	0.2	0.2	0.2	0.2	0.2
Total	6.8	7.4	8.1	13.5	15.6	13.6
Subsidies by Recipient						
Conforming mortgage borrowers[a]	3.7	4.1	4	7	7.4	7
Fannie Mae and Freddie Mac	1.8	2.2	2.1	3.9	3.9	3.9
FHLB stakeholders[b]	1.3	1.1	2	2.6	4.3	2.7
Total	6.8	7.4	8.1	13.5	15.6	13.6

SOURCE: Congressional Budget Office.
NOTE: The subsidies to GSE debt and mortgage-backed securities are present values. The annual savings from tax and regulatory exemptions are for the current year only.
a. Conforming mortgages are loans that are eligible for purchase by Fannie Mae and Freddie Mac with an original principal amount no greater than a stated ceiling, which is currently $275,000 for single-family mortgages.
b. The estimates assume that conforming mortgages financed by FHLB members were a constant share of members' portfolios from 1995 to 2000.

Source: Congressional Budget Office (2001)

E. The Structural Policy Role of Fannie Mae and Freddie Mac

1. Housing Sector

How do the costs for government of the subsidies that housing GSEs receive compare to the social benefits derived from fulfilling their housing policy mandate?

One of the strengths of the enterprises as housing policy instruments is the **potential to address private market failure in the mortgage market directly**, by influencing access conditions for low-income and minority household groups to the market. For example, the enterprises are credited for the fact that the introduction of automated underwriting systems has not resulted in a discrimination of these groups, leading to a broad distribution of the productivity gains of the new technologies.[32] Similarly, supported by their national risk diversification capacity, Fannie Mae and Freddie Mac in the past did react less rigidly to regional economic crises compared to private banks that were often held responsible for credit crunch situations developing in the aftermath. It is strongly debated, though, whether the 'affordable housing' goals imposed by the federal Housing and Urban Development Department for lending to minorities and low-income households are set realistically. Stanton (2002) argues that these quota are set so low that Fannie Mae and Freddie Mac arrive at even lower market shares in these segments than their private competitors.

A second interesting feature from the housing policy perspective is that the enterprises protect the fixed-rate mortgage product with prepayment option. Large prepayment waves materialize when interest-rates fall, a situation that is characteristic for phases of slow growth or recessions. The resulting cash windfall from reduced costs of housing can **potentially stimulate the housing production**, if consumers decide to trade up their houses and maintain the same costs, or **alternatively** will stimulate **private consumption**. In both cases, the economy will be stimulated in an anticyclical fashion. As private investors were historically reluctant to take prepayment risk in adverse market situations, it is an open question whether the fixed-rate mortgage market in its current form could survive if Fannie Mae and Freddie Mac would not remain government-sponsored. A key stabilizing factor for a private market would

[32] See JCHS (2001).

be a cost-covering price of the prepayment option - under the current system, consumers pay an interest mark-up of approx. 70-100 basis points for the option.[33]

The greatest weakness from a housing policy perspective is that **interest-rate reduction benefits** for mortgagors are distributed in a **regressive** manner. The limitation of business to mortgages with a volume under US$300,000 excludes the enterprises only from 10-20% of the mortgage market. Within the lenient allowable limits, higher benefits accrue to high-income mortgagors financing high loan volumes. The regressive incidence of the funding subsidies is exacerbated by the generous deductibility of mortgage interest-rate and property tax payments as well as capital gains tax exemptions from income tax. These are key contributing factors to the high growth of the enterprises, in particular through the growth of upscale housing consumption.[34]

Finally, deplorable from housing policy perspective is the **leakage of subsidies to non-housing purposes**, with detrimental effects on overall consumer indebtedness. For consumers, the benefits from the combination of lower interest-rates, long loan maturitie s and interest-rate deductibility from the income tax base create incentives directed against savings for housing downpayments. Tax shielded home equity loans and similar instruments in addition allow the uncomplicated withdrawal of equity, resulting in higher debt-financed consumer expenditures and higher mortgage default risk at the ultimate expense of the federal housing budget. Between 1980 and 2000, so the ratio of debt to the market value of American homes rose from 30% to over 45%. The stimulation of indebtedness through the housing channel can thus be held to contribute significantly to the **low household savings ratio** in the U.S. While these problems root directly in the tax system, the housing GSEs must be held indirectly responsible since they form a powerful lobbying group working in favor of their perpetuation. The less brilliant side of the housing policy wonder machine is thus a latent potential debt crisis of private households.

It goes beyond the purpose of this paper to calibrate the housing policy effects and net them out against the costs for government. However, it would appear that the **housing policy benefits** of the current system are **limited,** compared to the annual costs of US$15 billion that Congress estimates and compared to alternative s. A key reason is that the mandate targets prescribed to the enterprises are hardly restrictive and seem politically impossible to tighten. While exclusion from mortgage credit continues to play a role in the US, giving the enterprises a potentially powerful role to play, the questions must be asked whether the

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[33] See Dübel and Lea (2000) for a review on the subject. There is only one more country worldwide that offers a similar mortgage product, Denmark. While the funding system is fully private, there are idiosyncrasies of the system – especially concerning the mortgage bond demand of institutional investors - that lead to questions about whether the prepayment option is correctly priced.

[34] In 2002 the upper volume limit for loans eligible for mortgage interest deductibility was US$1 million.

high subsidies could not be better invested in alternative instruments; for example into the support of targeted housing policy programs for the poor, or an improved support infrastructure for the small and expensive urban private rental housing sector.

2. Financial Sector

The structural policy debate about the role of the GSEs in the financial sector focuses on the **impact** of government support **on mortgage pricing** and **mortgage market structure**. In the light of the strong innovation capacity of the U.S. financial system, the initial role of Fannie Mae - the development of a national diversified capital market funding mechanism for mortgages that was not achieved by the private sector - has completely lost relevance.

The two greatest points of critique are the **duopoly position** of Fannie Mae and Freddie Mac in the market for financial guarantees in mortgage credit and the recent tendency to achieve the same position in portfolio lending. Entry of private financial guarantors, an industry that is highly developed in the U.S. and exports its services to Europe and emerging financial systems, does not take place. Excluded are also private U.S. mortgage insurers who could possibly – following the Australian example – offer pool insurance contracts for the conventional conforming mortgage market as a competing product to the guarantees offered by Fannie Mae and Freddie Mac. While the enterprises currently reinvent their roles as portfolio lenders, a decentrally organized, capital market based wholesale mortgage finance system comparable to the European mortgage bank system continues to be a missing element. Access by a European mortgage bank to the secondary mortgage market would be hard to realize, given the GSE funding advantages. Realistic entry conditions under current conditions exist only for other government-sponsored or government-owned financial institution: against the background of the high profitability of Fannie Mae and Freddie Mac in portfolio operations, Ginnie Mae is demanding an expansion of its mandate to allow buy and hold of mortgage assets; and as mentioned above, the FHLB have started an own guaranty product. While from the perspective of mortgagors the results of the duopoly situation in terms of higher spreads is overlaid by the effect of the subsidies that are passed on to them, from the perspective of private competitors the market is perceived as highly distorted.[35]

Looking at the history of the enterprises, it must be accepted that in an initial phase of the introduction of new technologies or products they exercise a healthy standardization pressure on the mortgage market.

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[35] Industry groups of banks and insurers exist that focus on lobbying against Fannie Mae and Freddie Mac, e.g., Fannie Mae Watch (see link in the annex)

However, at a more mature stage of the mortgage market this asset turns in to a liability as their power also **blocks innovations** if these do not fall into the enterprises' business schemes. For example, Fannie Mae and Freddie Mac do not purchase call protected mortgage loans, which are the most common mortgage product in Europe and Canada. Smaller match-funded mortgage lenders – potential competitors for the GSE – need call protection features since they cannot build up the infrastructure for prepayment risk management. For the consumer, a potentially interesting product – saving the prepayment option costs – is lost, for originators, a potential area for product diversification.

On the other hand is the existence of oligopolies and even monopolies in financial guaranty markets not uncommon, unless these are regulated to preserve competition. This observation holds true for markets with neither direct nor indirect role of government, such as the U.S. market for municipal bond guarantees that is dominated by the private insurer MBIA. The underlying theoretical argument is that markets that trade information of many households must be expected to hold large productivity gains through specialization and accumulation of data. In the case of Fannie Mae and Freddie Mac this **unique specialization** lies in the **development of large databases** that provide accuracy for the determination of underwriting guidelines, the assessment of borrower behavior many aspects, and hence the pricing of credit and prepayment risk. In the case of MBIA the corollary is a tight surveillance system of municipal and state households. But while entry costs into the financial guaranty market are high, it is still likely that given the sheer size of the U.S. housing market and free access to technology the elimination of subsidy distortions would bring about a higher number of secondary mortgage market players.

Particularly cumbersome is the impact of the duopoly situation in the area of **financial regulation**. Fannie Mae and Freddie Mac undertake much stronger **lobbying activities** than comparable financial institutions. Their regulator, OFHEO, while technologically up to date, operates under an institutionalized conflict of interest between housing policy and financial supervision mandate of the HUD. At the same time, many obvious measures to improve regulation and supervision as well as market structure are suppressed with the argument of the housing policy relevance of the enterprises.

SUMMARY

Fannie Mae and Freddie Mac are subject to housing policy mandate targets - inter alia with regard to lending to low-income households and minorities – that they are required to fulfill in exchange for the subsidies they receive. Both their performance on these targets and the target definitions themselves are controversial. In conjunction with the U.S. tax system that favors indebtedness, the subsidies passed on to consumers work in a regressive fashion; they moreover increase the indebtedness of American consumers by providing consumer finance with mortgage collateral. The threat of a latent household debt crisis undermines the potentially stabilizing housing and economic policy effects of the fixed-rate mortgage with prepayment option, which the enterprises underwrite.

The duopoly position of Fannie Mae and Freddie Mac in the credit guaranty market and the subsidization of their risk taking in portfolio lending effectively blocks the market entry of private financial guarantors, mortgage insurers and mortgage banks. Also, their standardization power- an asset in an emerging market - limits product innovation in a mature market.

The implicit government guaranty minimizes the incentives of the enterprises for developing and maintaining high levels of asset quality and financial strength, characteristics of highly rated private financial guarantors. The institutionalized conflict between housing policy goals and private profit maximization interest finally weakens the options for a meaningful financial supervision of the enterprises. A contributing factor here is the high lobbying expenditures targeted at maintaining the status quo.

F. Reform Approaches

Since the beginning of the 1990s, an intensive debate took place in the U.S. about the current and contingent fiscal costs of the government-sponsored status of Fannie Mae and Freddie Mac, and to a lesser extent of the FHLB. A cornerstone was the publication of Stanton (1991) who in the midst of the most critical phase of the Savings & Loan crisis warned about potential consequences of the extensive transfer of mortgage credit risk to GSEs that took place during the 1980s and hinted to the fact that the enterprises had no **formal supervisory body**. Impressed by the scale of the costs of the Savings & Loan crisis, these concerns led to the creation of the supervisor OFHEO in 1992 by Congress.

A second impetus for debate was the first comprehensive study launched by Congress in 1996 that in 1998 gave rise to an investigation by the Subcommittee on Banking and Financial Services. Led by Congressman Richard Baker (R-LA) the Subcommitee forced the enterprises by the end of 2000 to subscribe to a **voluntary commitment** that focused on measures to increase transparency and adjust minimum capital requirement set by OFHEO to the standards in vigor for mortgage banks under **Basel I**. To fill the gap between actual capital and Basel standards at least for the portfolio credit operations, Fannie Mae and Freddie Mac committed to permanently issue subordinated debt commensurate in size.[36] Remarkable about the arrangement is that Congress implicitly challenged the credibility of the supervisory body, OFHEO. On the other hand, proposals to subject the enterprises to a genuine financial supervisor, e.g. under the U.S. Treasury Department or the subordinated Office of Thrift Supervision, were declined.

Other currently discussed proposals focus on strategies to **improve the management of government subsidies**:

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[36] The transparency measures agreed on included the regular request of a stand-alone rating, considering the absence of public guarantees, and the publication of the results of internal interest-rate and credit risk stress tests. Instead of an abolition of the Treasury lines of credit, the enterprises committed to creating liquidity reserves of sufficient size to make a use of the credit lines unlikely.

- One set of proposals asks for the levy of a **charge compensating for** the **debt funding advantages** that the enterprises enjoy. Such a charge could be formulated as a guaranty fee computed on the basis of outstanding debt; the resulting revenue could be used to fund housing subsidies to low-income households. In analogy to a model proposed for the Canada Mortgage & Housing Corporation (CMHC), the enterprises could be asked to pay a royalty on the basis of an estimate of the public equity that government holds in the enterprises. The subsidies that the enterprises receive could moreover be activated as expenses in the federal housing policy budget, which would improve their visibility and the incentives for their control.

- Directly aimed at **improving market structure** would be a conversion of the currently implicit to explicit government guarantees for debt and MBS funding conventional conforming mortgage loans. These explicit guarantees would be scaled down and offered to all market participants, for a tender-determined guaranty fee. The approach would imply the abolition of the special charter acts and other advantages of Fannie Mae and Freddie Mac.

- Measures aimed at directly or indirectly **limiting the growth of the enterprises**. These could include more restrictive investment limits, most important would be a reduction of the maximum loan volume eligible for GSE funding. Ceilings placed on total debt issued could limit the enterprises' interest-rate risk taking. An elegant indirect constraint would be the completion of the adjustment of the regulatory environment of the GSE to commonly accepted financial regulations by imposing large exposure counterparty risk limits to the investors in their debt and MBS. Due to the current size of the GSEs this measure could only be implemented gradually, unless these would be split up in paralle into smaller entities; however, it would be a most effective tool in scaling down the enterprises in the mid-term.

Going forward, a **comprehensive housing finance reform plan** should be designed, engineering a **re-organization of the conventional mortgage market** in the sense of a complete separation from the public housing policy instrument set. While such far-reaching reforms are certainly not easy to propose to U.S. policy makers, given the political importance of the middle class, in the light of current fiscal and financial fragility risks they should be given thought. A re-organization would not imply abolishing public lending and guaranty instruments per se; it would rather start from a more precise definition of the role of government in the mortgage market, and a commitment to shift subsidies from the middle-class to the low-income market. The current mortgage market segmentation between conventional and low-income market could be retained until a more diversified low-income housing policy approach focusing on those unable to obtain even moderate quality homeownership is developed. The government-sponsored system in the 'conforming' middle-income market would be replaced by a decentral system of wholesale mortgage institutions, very much following the original intentions of the National Mortgage Association Charter of 1934. In order to support such a bold move, regulatory changes would be necessary that enhance the success chances of private market entry to the conventional conforming mortgage market: inter alia, the introduction of enabling laws for mortgage-related securities, including private-label covered bonds and MBS, a supervisory structure for wholesale institutions specialized on issuing this debt, as well as transition arrangements for the housing GSE system leading to its downsizing and full privatization.

SUMMARY

A reform debate with the goal of reducing the amount of public support Fannie Mae and Freddie Mac receive coincided with the most critical phase of the Savings & Loan crisis. Until today, it resulted in the creation of a supervisory body in 1992, a tightening of transparency standards and an approximation to international capital standards applicable to the global mortgage industry. Bolder steps that would lead to more efficient management of the public guarantees, for example through guaranty fees charged to or limitations of growth of the enterprises, have not materialized. Moreover, no comprehensive reform plan is in sight that would engineer a withdrawal of government from the conventional mortgage market and shift of subsidies to the low-income market.

G. Conclusions for the United States

In the discussion about the costs and risks of public interventions in finance, the activities of private enterprises sponsored by government with public credit guarantees plays an important role. In the U.S., **government bears** implicitly or explicitly the credit risk of **more than 50% of outstanding mortgage loans** and therefore behaves – contrasting with a widely held belief to the contrary – particularly interventionistic.

The government-sponsored enterprises Fannie Mae and Freddie Mac purchase the lion's share of these loans. On the asset side, they pursue fee-based financial guaranty and portfolio lending operations, taking partly high interest-rate risks in the latter business area. On the liability side, the enterprises enjoy deep funding advantages, most prominently stemming from the assumption of implicit public guarantees of the liabilities that is held by the capital markets. The debt **funding cost advantages** that the enterprises reap through their government-sponsored status are estimated at 35 basis points of which only 25 basis points reach mortgagors. Moreover, both enterprises hold less capital than comparable mortgage lenders and their issues are exempt from large exposure limits for important investor groups. With this direct and indirect circumvention of internationally accepted financial regulation standards and fuelled by results of the Savings & Loan crisis, in the past 20 years incentives were created to transfer credit risk from the banking system on a massive scale to government-sponsored enterprises. The secondary mortgage market, recommended as a model to many emerging markets, can be interpreted as publicly sponsored **special American avenue of housing finance** resulting from historical coincidence.

The legal form of a government-sponsored private enterprise enabled by individual charter laws stems from the times of British mercantilism which saw the creation of new private enterprises chartering new territory in the public interest. It endorses explicitly the creation of economic monopolies or oligopolies in exchange for committing the enterprises to social, economic or financial policy targets. The **construction as government-sponsored enables** Fannie Mae and Freddie Mac **to appear**, at the same time, **as**

public in the debt markets and as private in the equity markets. A conflict of interest is created which leads to the formulation of a corporate strategy that minimizes the costs of reaching the public housing policy goals and at the same time maximize the risk exposure of government by expanding leverage and increasing risk taking, for the benefit of profit maximization. In order to convince public decision makers to defend the status quo, Fannie Mae and Freddie Mac redistribute a considerable part of the profits reaped in this way to lobbying activities. These incentive problems are by construction more pronounced in the case of government-sponsored enterprises than in the case of government-owned agencies or corporations who redistribute profits to the government, rather than the private sector. Under today's technological capacities, the government-sponsored construction of Fannie Mae and Freddie Mac represents a potential threat to the fiscal and financial sector stability of the U.S.

A sunsetting of this sensitive financial policy construction in order to protect government from risk in the long-term, still the rule in the 18th and 19th century when the first government-sponsored enterprises were created in the U.S., did no longer take place in the 20th century. This allowed Fannie Mae and Freddie Mac over the decades to gain both market and political power and decide largely internally about business focus, scope and scale, risk-taking policies and thus ultimately the subsidy levels they receive. As a result of these dynamics, it is increasingly difficult for policy makers to limit the fiscal risks of the system effectively. While **progress has been made** in the past ten years in that regard, the **main targets** of **improving market structure** and **eliminating the implicit public guarantees** are **missed**.

As reform efforts are too slow to correct developments, the **economic and political bottom line result** of the secondary mortgage market must be seen as **mixed**: a **technologically forerunning** wholesale funding and guaranty system for mortgage finance which on the other hand generates **limited housing policy benefits**, **distorts competition** in a key segment of financial and capital markets development, and carries **high fiscal costs and risks**.

H. Conclusions for Transition Countries in Central and Eastern Europe

Are government-sponsored secondary mortgage market institutions a suitable model for the development of mortgage markets in the transition countries of Central and Eastern Europe? A look at the **current practice** of promoting these institutions outside the US – so far, all took place in **emerging mortgage**

markets[37] - suggests that the business model and the tax and regulatory environment of Fannie Mae und Freddie Mac are usually implemented on a 1:1 scale to the host country:

- **Investor structure.** With few exceptions, the model of a monopolistic, government-sponsored private enterprise is chosen, and not the one of a government agency. While in most cases, the private investor base is composed by local banks, which are assumed to be interested to sell assets to the new institution and thus jump-start its business, in some cases international investors, primarily from the US, are added. The latter are deemed necessary to enable capital and technology transfer, however, at least as likely is that US investors are attracted by the high returns on equity generated by their GSEs at home. The World Bank daughter, IFC, and/or the respective government hold temporary shares or provide low-interest loans to the newly created institutions.

- **Financial sector environment.** As in the US, the chartering of the new institution takes place outside the banking and insurance system on the basis of a special act. This means that the enterprise is taken out of the general financial regulation and supervision framework of the country in question, including the international agreements that directly or indirectly govern it such as Basel I. Similarly, the founders ask for derogations from existing bank and insurance legislation that will help to maximize the market for the securities among banks, insurers and pension funds and create a competitive advantage over other funding instruments for the mortgage market. In addition to the implicit public support that any monopoly financial institution enjoys when reaching large scale, additional incentives are created for the financial system to sell assets to the new enterprise and repurchase its MBS and debt, fuelling its growth.

- **Housing policy environment.** A pivotal element of the implementation strategy is the streamlining of housing policy instruments that is needed to support the growth of the enterprise. With little regard to aspects of housing needs, tenure structure, income distribution and fiscal cost, recommendations are made to focus resources on promoting homeownership. Particularly important is the instrument of mortgage interest rate deductibility for which generous, or no, limits are demanded.

Over a decade into the transition, almost all countries of **Central and Eastern Europe** have successfully fought inflation and introduced minimum legal and regulatory standards for mortgage loans. A banking sector based mortgage market with a diversified funding instrument set, including bank bonds, covered (mortgage) bonds and mortgage-backed securities, is developing. Housing agencies have been created in most countries that are designed to fund mortgage loans targeted to low-income households through agency bonds. The implementation of the 'Fannie Mae model' in these countries is thus highly problematic:

- First, in the current situation most **banks have little interest** in a government-sponsored institution for funding mortgage loans. Either the capital market is still too small and volatile to

[37] Since the mid-1990s, in particular the US international development agency USAID, the World Bank and its private sector arm IFC have promoted the model of Fannie Mae and Freddie Mac internationally. A key reason for this division of labor is the inability of Fannie Mae and Freddie Mac, enshrined in their charters, to invest abroad themselves. Inter alia, institutions were created in South Korea, Hong Kong, Brasil, Colombia, Argentina and South Africa. In other countries, existing government-owned or –sponsored housing lenders aim at expanding their activities to the secondary market along similar lines, for example in India and Malaysia. Attempts in transition countries - so far unsuccessful - have been made in Poland and Russia.

make the issuance of bonds or MBS an attractive option, cementing the funding advantage of deposit funding for mortgages. In this case, the bonds issued by a **government-sponsored enterprise** will have to be **highly subsidized** Or private capital market instruments have been introduced already whose development, initially fraught with fragility, will be seriously impaired by the development of a government-sponsored competitor.

- Secondly, from the perspective of private mortgage lenders mortgage markets in many transition countries continue to be **distorted** through **competition from government-owned banks**. For example, public or only partially privatized banks exist in Poland, Russia, Slowenia, Slovakia and Bulgaria. New public credit guarantees, whether implicit or explicit, do not address this problem, introduce additional market distortions and lead to more difficult negotiations over the accession to the European Union.

- Moreover, the high current and contingent **fiscal costs**, especially the asymmetric distribution of risk between investors and government, are a warning for transition countries. Given the financial weakness of government and the backlog in public investment in transition countries, the transfer of mortgage credit risk from the private sector to government could mean a significant impairment of stability and growth perspectives. Even through mortgage markets are currently small, and thus risk is limited, experience has that the amount of risk transferred can grow very rapidly if market size increases fast, regulatory transfer incentives are large and asset quality is meager.

  The guaranty instrument can be useful in targeted mortgage finance programs, for example to those at the threshold of affordability but unable to get access to finance; however, grants and to some extent tax instruments are more transparent and their costs can be more effectively capped at the level provided for in the government budget.

- Finally, any housing policy instrument - including housing GSEs - should be subjected to the **local housing policy context** and its implications. In many transition countries, the housing sector remains distorted by subsidies and rent controls. As stock transactions are sluggish under these conditions, finance subsidies primarily support new construction, where only households with relatively high income are active. Before effective housing sector reform is implemented, the substition effect of the subsidies transferred by housing GSEs is large, and their housing policy benefit is small.

In **conclusion**, for most transition countries being at an intermediate stage of financial sector development, the introduction of a U.S. GSE-type funding instrument for the mortgage market institution has the potential to be highly distortive. The situation may be different in cases where the banking or insurance market is still not developed, although careful consideration should be given to contain the subsidies attached to the institution as well as limit its government-sponsored lifespan. Centralized mortgage market institutions can be of interest in those transition countries where private banks can develop a stable common economic interest in them; this could be the case in constellations of relatively small banks of similar performance and size seeking liquidity gains from joint bond issuances. The Swiss Pfandbriefzentralen or the French Caisse de Refinancement Hypotecaire are valid examples in that regard; in both cases, beyond initial support, **government-sponsorship** along the lines described in this paper **was not needed** to obtain the intended results.

I. Appendix

1. List of Abbreviations

CBO	Congressional Budget Office
CMO	Collateralized Mortgage Obligation
Fannie Mae	Federal National Mortgage Association
FHA	Federal Housing Administration
FHLB	Federal Home Loan Banks
Freddie Mac	Federal Home Loan Mortgage Corporation
Ginnie Mae	Government National Mortgage Association
GSE	Government-sponsored enterprise
HUD	Housing and Urban Development Department
MBS	Mortgage-backed securities
S&L	Savings & Loan institutions
SEC	Securities and Exchange Commission
VA	Veterans Administration

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3. Interesting Links

Fannie Mae	http://www.fanniemae.com/
Freddie Mac	http://www.freddiemac.com/
Federal Home Loan Bank System	http://www.fhfb.gov/FHLB/fhlbs_districts.htm
Office of the Housing Enterprises Oversight (Supervisory body of Fannie Mae and Freddie Mac)	http://www.ofheo.gov/
Federal Housing Finance Board (Supervisory body of the Federal Home Loan Banks)	http://www.fhfb.gov/
Federal Deposit Insurance Corporation (Public deposit insurer, publishes analyses of the Savings & Loan crisis)	http://www.fdic.gov/
Federal Reserve Board (Central bank system)	http://www.federalreserve.gov/default.htm
Office of the Thrift Supervision (Supervisory body of the thrift industry)	http://www.ots.treas.gov/
Securities and Exchange Commission (Supervisory body of the capital markets)	http://www.sec.gov/
U.S. Congress, Congressional Budget Office	http://www.cbo.gov/
U.S. Treasury Department	http://www.ustreas.gov/
U.S. Housing and Urban Development Department (sets the housing policy performance standards for GSEs, „affordable housing goals“)	http://www.hud.gov/offices/hsg/index.cfm
American Enterprise Institute, Shadow Financial Regulatory Committee (Anti-GSE lobby group)	http://www.aei.org/shdw/

Fannie Mae Watch (Anti-GSE lobby group) http://www.fmwatch-observer.com/

4. Overview: Studies on Subsidies and Implicit Guarantees for Fannie Mae and Freddie Mac, by Feldman (2000)

Study	What was Reviewed?	Method	Findings
General Accounting Office (1996a)	Savings from tax and SEC registration exemptions	Apply average state tax rate and registration fee and assume GSEs do not change behavior	$400 million in 1995
Kane and Foster (1986)	Value of implied federal credit support for Fannie Mae from 1978 to 1985	Mark Fannie's balance sheet to market and compare to market capitalization	From $600 million to $11 billion
Schwartz and Van Order (1988)	"Exploitation" of implied guarantee by Fannie Mae from 1978 to 1985	Options pricing to examine audit period and asset volatility	Partial exploitation; longer audit period and higher volatility correspond to periods when Fannie is financial weak
Pozdena and Martin (1991)	Update Schwartz and Van Order from 1986 to 1990.	Options Pricing	Partial exploitation even when conditions support Fannie profitability
Cook and Spellman (1992)	Value from implied support for a housing GSE	Options Pricing	Subsidy depends on capitalization and "bailout premium" assumptions; lower estimates around 20 basis points found to be the most likely
Gatti and Spahr (1997)	Value of implied guarantee on Freddie Mac MBS in 1993	Options Pricing	Range with point estimate of 8.3 basis point or $410 million
Thygerson (1990)	Value of implied guarantee for Freddie and Fannie in terms of reduced cost of funds	Comparison with banks' cost of funds and break-even investment rate	Implicit guarantee provides a 70 to 154 basis point cost advantage to the GSEs
Hemel (1994)	Cost advantage for GSEs in issuing MBS	Compare yields of top-rated private conduit MBS with GSE MBS	Fannie and Freddie save 30 to 40 basis points in the MBS market due to GSE status
Ambrose and Warga (1996)	Fannie and Freddie's cost of funds advantage due to GSE status	Match GSE debt with similar non-GSE corporate debt; Determine weighted cost of capital for Fannie if it had riskiness of non-GSE financial firm	If Fannie/Freddie debt was rated 'AA' w/o GSE status, debt costs rise by 100 basis points in 1993. If F/F had 'A' rated debt, costs would rise by 200 basis points; cost of capital would increase by $3.6 billion in 1993 if Fannie is 'A' rated.
Congressional Budget Office (1996)	Fannie and Freddie's cost of funds advantage from GSE status; Value of implied federal support	Compare yields on GSE securities to non-GSE securities; Mark GSE balance sheets to market and compare to market capitalization	Savings on debt and MBS were about $6.5 billion in 1995 for Fannie and Freddie ; Mark to market puts average value of the implied support at $7.8 from 1993 to 1995.
Teasury Department (1996)	Estimate value of Fannie and Freddie's explicit and implicit subsidies	Compare yields on GSE securities to non-GSE securities plus GAO estimate of direct subsidies	The value of the subsidies for Fannie and Freddie was $5.8 billion in 1995 with range of $5 billion to $6.5 billion

Cotterman and Pearce (1996), Hendershott and Shilling (1989) and ICF, Inc. (1990)	Reduction in rates on one to four family mortgages due to GSE activity	Use regressions to determine the difference between rates of conforming and nonconforming mortgages	A conforming mortgage is about 30 basis points cheaper than a nonconforming mortgage