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Is FHA the Next Housing Bailout?

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I. Introduction

Yes, is the answer to the question posed in the title of this report. That will seem a brave conclusion to some, given that the Federal Housing Administration (FHA) has not needed a direct recapitalization from Congress since its founding over three-quarters of century ago. However, it is highly likely, given FHA's current condition.

FHA's present state is precarious. For the past two years, it has been in violation of its most important capital reserve regulation, under which it is supposed to hold sufficient reserves against unexpected future losses on its existing insurance-in-force. To be barely compliant with this rule would have required just over a $12 billion capital infusion in fiscal year 2010, and that presumes that future losses are not being underestimated by FHA. This report suggests that they are by many tens of billions of dollars, so that the recapitalization required will be at least $50 billion, and likely much more, even if housing markets do not deteriorate unexpectedly.

Rather than requesting that Congress strengthen its capital resources as the housing bust deepened, FHA decided to pursue a strategy of growing out of its problems beginning in 2008. Aggregate insurance-in-force more than tripled since then, from $305 billion at the end of the 2007 fiscal year to just over $1 trillion according to the latest data available from July 2011.[2] This is nearly 7% of aggregate national output for the United States, so the potential pool of risk now is very large. FHA has not increased its capital resources commensurately. In fact, it has more than doubled its own operating leverage in recent years, as there is less than half the capital backing each dollar of insurance guarantee than there was only a few years ago. Unless one believes that the risk of the mortgages it insures has declined substantially, FHA has become a much riskier organization.

That the riskiness of its mortgage insurance pool has grown, not declined, since 2007 is evident from FHA's expansion during a time of declining nominal house prices and rising unemployment. Research shows negative equity and job loss to be the two most important triggers of mortgage defaults.[3] It is estimated below that more than half of FHA's current insurance-in-force is on mortgages taken out by owners who presently have negative equity in their homes (i.e., the house value is below the outstanding balance on the mortgage). And, unemployment remains stubbornly high, with many forecasters (including the Office of Management and Budget) now projecting unemployment rates at or above 9% well into 2012.

This combination of increasing leverage at the entity level (i.e., FHA having far less capital per dollar of insurance guarantees) and among the homeowners being insured (many with negative equity in their homes) has made FHA a very risky proposition for taxpayers, who bear the downside risk if its expansion strategy does not work out. That it will not work out is highly likely because the risk of future defaults, and the losses associated with them, is being systematically underestimated. This makes the projections of FHA's main insurance fund value look far rosier than really is the case. No model is perfect, and it is unreasonable to expect FHA's model and estimation to be without fault. However, a combination of unrecognized risks in recent large pools of insured mortgages, an important error in estimation strategy, and an unsubstantiated administrative decision to down weight the influence of an empirically important variable that predicts higher future defaults leads to future losses being underestimated by many tens of billions of dollars. This leaves a quick and substantial economic and housing market recovery as the primary way for FHA to avoid generating substantial losses for American taxpayers. That certainly is to be hoped for, but hope is not a sound foundation on which to run what is now a trillion dollar entity.

The plan of the report is as follows. The next section provides background information on the history of FHA and its operations. This is followed in Section III with a more detailed discussion of the recent, extraordinary growth of FHA. Section IV then analyzes how and why default risk and insurance losses are being underestimated. That leads to the key conclusion that FHA's main insurance program is materially undercapitalized, with the likely amount of capital infusion required being in the $50 billion–$100 billion range, even if there is no unexpected deterioration in housing markets.

II. Background on FHA

The founding of FHA dates back to 1934, during the Great Depression. Its overarching goal then was much as it is now—namely, to help maintain liquidity in the housing market by insuring lenders against losses following defaults on the principal balances of mortgage loans they issue. Its current focus on doing so via insuring the loans of borrowers with low down payments and those purchasing their first home is due to more recent legislation. Unlike the more prominent housing-related government-sponsored enterprises, Fannie Mae (the Federal National Mortgage Association) and Freddie Mac (the Federal Home Loan Mortgage Corporation), which also ran huge mortgage investment programs, FHA's only function is to guarantee mortgages.

While FHA's structure helps mitigate some of the risks to which it can expose taxpayers, it does not eliminate all risk, and this report concludes that its future losses will be quite high. Nevertheless, it is a fact that FHA has not required a formal recapitalization by Congress in its 77-year history. This does not mean it has not faced significant financial challenges over those eight decades. The agency was in some distress following the real estate downturn of the late

1980s, when a review by an outside accounting firm concluded that FHA technically was still solvent but would not be able to survive going forward without being recapitalized in the absence of a substantial restructuring (Price Waterhouse (1990).

That report set the stage for the National Affordable Housing Act (NAHA) of 1990, which established the framework under which FHA operates today.[4] This act not only set core goals for FHA to serve the needs of first-time homebuyers and those with low down payments, it also worked to ensure that FHA's main insurance fund, the Mutual Mortgage Insurance Fund (MMIF), would be self-supporting going forward. This was to be achieved in two ways: (1) by raising the allowable premiums that FHA charges for the insurance it provides; and (2) by establishing a capital buffer in case of unexpectedly high losses.

Presently, FHA charges an upfront premium of 1% of the original balance on the loans it insures and an annual premium of 0.85%–0.90%, depending upon certain loan traits. More detail on how fees have changed over the past decade is provided in Appendix #1, Table A.1.[5] FHA typically allows the upfront premium to be financed in the mortgage (subject to maximum loan-to-value restrictions), so in a true economic sense this fee is paid in monthly installments over time. However, FHA's accounting rules allow the full amount of the upfront premium to be booked at the time of loan origination. This means that accounting income is higher the more new loans FHA insures, but that does not immediately raise the insurance fund's true cash position commensurately. Consequently, one always has to distinguish carefully between reported income and actual cash resources in all FHA accounting statements.[6]

To better understand the second major reform of the NAHA of 1990, which required FHA to maintain a capital buffer to meet unexpected losses, Table 1 reports information on the value of the main FHA insurance fund from the most recent outside actuarial review (Integrated

Financial Engineering, Inc. (2010)). These figures are for its single-family Mutual Mortgage Insurance Fund (MMIF) for fiscal year 2010.[7] The data in the first column reports cash and other liquid assets net of immediate liabilities at the beginning of that year. They indicate that FHA had $30.461 billion in Total Capital Resources to meet its normal operating needs and to cover any losses that it might incur. The second column then reports that Total Capital Resources had risen slightly to $30.522 billion at the end of the fiscal year.[8]

The next row then subtracts off $25.392 billion of what is termed "PV of Future Cash Flows" (where PV stands for Present Value). This is IFE's estimate of the net cash flows FHA will receive on the mortgages it has already insured. It expects FHA to suffer $25.392 billion in net losses on its outstanding books of business. That is, expected insurance premiums on existing loans will not cover expected losses on defaulted loans by a wide margin. Note that this is not the loss expected for the next year (or any single year), but the present value over the lives of all the outstanding mortgages that FHA insured. Because FHA predominantly insures thirty-year mortgages, this present value calculation extends out thirty years to reflect the maximum term of the most recently insured mortgages.

After deducting these expected losses over the next thirty years, the so-called Economic Value of the MMIF is $5.160 billion. One interpretation of this number is that it is the value left in the fund after reserving for expected losses of $25.392 billion, presuming FHA will not receive any net benefit from future insurance it issues.[9] Alternatively, one could think of this as the amount of resources available to deal with any unexpected losses above and beyond the $25.392 billion anticipated by the actuarial review.

The drafters of the 1990 NAHA thought of it in this second way and concluded that the Economic Value should be at least 2% of outstanding insurance-in-force if taxpayers were not to have to recapitalize the fund at some point in the future.[10] Table 1 indicates that FHA presently is in violation of this capital guideline, as there were $879.875 billion in outstanding insured mortgage balances at the end of fiscal year 2010, so that the capital ratio was only 0.59% of outstanding insurance-in-force.[11] FHA actually fell below the 2% guideline in the previous year, dropping to 0.42% in 2009 from 3.22% in 2008.

This does not mean FHA will "run out of money" this year or next. To do so would require immediate losses of more than the $30.522 billion in Total Capital Resources. As is discussed more fully below, that is highly unlikely. What it does mean is that FHA has become much riskier, as capital buffers so small indicate that even modestly higher default and loss rates could bankrupt the insurance fund over the medium- to long-term. The risk of this happening is significant, as FHA essentially made a huge bet on growing out of its problems by ramping up its exposure to the housing market since 2007.

III. FHA Today

Tables 2 and 3 document how FHA's role in the housing market has waxed and waned over the past decade. Table 2 reports on FHA's share of the home purchase market. This only captures part of FHA's activity since it also insures refinanced mortgages, but it highlights how important FHA has become to the housing industry. It insured 30% of all new home purchases in 2010, up fivefold from only 6% in 2007. The rise in the share of existing home purchases is nearly as stark. In terms of all home purchases, FHA insured the mortgages of 19.1% of them in 2010, which is almost five times the percentage in 2007.[12]

Table 3 then documents how the number and mortgage balances of insured loans have changed over the past decade. The first column reports the number of new single-family home loans insured (or endorsed in the language of the insurance industry) each year since 2000. The early part of the last decade was a time of expansion for FHA. It increased the number of loans insured by 46% from 831,546 to 1,218,934 between 2000 and 2003, as the housing boom began to build. The next four years then saw a sharp decline to barely 400,000 new loans endorsed in each of 2006 and 2007. FHA then more than doubled its endorsement volume in 2008, and increased it another 80% the following year. The data for the latest available fiscal year (2010) still show an aggregate loan amount that is 60% above the 2008 level and 400% above the 2007 level. The figures in the second column on the initial outstanding balances of these loans show much the same pattern. The third and fourth columns of Table 3 show how the balances of new insured loans are broken down by whether the borrowers used them to finance a home purchase or to refinance an existing loan. There are sharp jumps in both categories since 2007.

The final two columns of this table show how the stock of these loans and loan balances accumulate over time as new loans are insured but existing ones pay off, refinance, or default. The 6,629,376 outstanding single-family loans insured at the end of fiscal year 2010 is 1.77 times the amount in 2007. And, the outstanding balances on these loans rose by even more, from $305.449 billion in 2007 to $879.875 billion in 2010 (or by 188%). The latest available data from July 2011 shows FHA to have 7,203,809 insured loans in total, with an aggregate outstanding balance of $1.003 trillion.[13]

It has been suggested that FHA has replaced Fannie Mae's and Freddie Mac's role in the mortgage insurance business. This is not accurate, as neither of those entities' insurance exposures actually shrank in 2007–2010, when FHA was expanding rapidly.[14] However, those two entities did virtually stop guaranteeing and buying extremely high loan-to-value (LTV) ratio mortgages, leaving FHA as the dominant guarantor of such loans.[15]

Table 4's data on the share of FHA-insured loans with high LTVs in recent years show that around four-fifths of all loans have less than 10% equity down payments at origination, with the typical loan having less than 5%. In the last fiscal year (2010), over two-thirds of the insured pool had 95%+ LTVs. By definition, there is $19 of mortgage debt for every $1 of equity down payment invested by the borrower on a 95% LTV mortgage (as $95 of debt/$5 of equity = 19). Many market analysts use a different metric called the leverage ratio. This is defined as one divided by the share of equity, or 1/0.05 = 20 in this case, which implies a leverage ratio of 20. The typical loan is even more highly leveraged, of course, since more than half the pool in each year has LTVs above 95%. If the typical loan has a 97% LTV, the 3% down payment implies a leverage ratio of 33.3 (1/0.03 = 33.3). Essentially, FHA's standard business involves insuring 30-to-1 (or greater) leveraged investments in the housing market.[16] For readers not familiar with just how high that ratio is, it is about the same level employed by Lehman Brothers and Bear Stearns before they failed.

Practically speaking, what this means is that, if home prices fall, there is very little equity to cushion borrowers before they are "underwater" on their homes. House prices have been falling consistently, as documented in the first two columns of Table 5, which report the change in the national house price indexes produced by the Federal Housing Finance Administration (FHFA) and S&P/Case-Shiller dating from early 2005 through the second quarter of 2011 (the latest available data).

The final two columns of that table show the net equity at the end of the second quarter of 2011 on a standard, thirty-year, fully amortizing, fixed-rate mortgage with an initial balance of $150,000 that was taken out at a 97% LTV at the beginning of each period at the then-prevailing interest rate as reflected in Freddie Mac's rate survey. Gross equity in the home includes the 3%

down payment plus the equity build up from all scheduled amortization. Net equity, which is reported, is the sum of the change in house prices since the loan was originated and gross equity. The borrower of this typical loan, which FHA has insured in each of the past six years, is underwater in 9 of the 10 cases reported in Table 5, so that negative equity predominates among initially highly leveraged borrowers.

Combining these results with some additional assumptions allows us to estimate that over half of the existing FHA-insured portfolio suffers from negative equity.[17] The share is so high because FHA bet on future books of business bailing it out of its problems beginning in 2008. The outstanding balances on its 2008, 2009, and 2010 insured mortgage books amount to 76.5% of all outstanding exposure at the end of fiscal year 2010 (p. 31, IFE (2010)).

Tables 4 and 5 are useful in illustrating just how risky are the loans FHA has insured. However, they do not tell the full story of how FHA's own risk profile has changed over time. FHA could have increased its own capital sufficiently to compensate for the high risk it is assuming when it insures loans on purchases that have a typical leverage ratio of over 30 in an environment of declining house values and high unemployment. Table 6 documents that no such thing happened.

The first two columns of that table report Total Capital Resources and Outstanding Insurance-in-Force at the end of each fiscal year since 2005. The third column, which reports the ratio of the latter to the former, shows that there was $14.41 in insurance-in-force for every dollar of capital resources (as 1/.0694 = 14.4) in 2005. By 2010, this had doubled to $28.83 of insurance-in-force per dollar of capital resources.

The next two columns of Table 6 illustrate another way FHA's risk profile has increased. This involves its bet on subsequent books of business. FHA and its outside reviewer project that about $300 billion of new mortgages will be insured for each of the next seven years. They also project that those books will make a lot of money for FHA, in stark contrast to the substantial losses projected for existing books of business. Column 4 shows the projected value of the subsequent seven years of books for each fiscal year dating back to 2005.[18] The next column then reports the ratio of Total Capital Resources to this projected value. In fiscal year 2005, there were $6.75 in capital resources per $1 of value in future books of insurance business. By 2010, this had fallen to $1.09 per dollar of future book value, and that is up over 20% from the previous two years. Future value from as yet nonexistent books of business is now as large as total liquid capital resources available to the MMIF.

The final two columns of Table 6 report annual estimates of the Economic Value of the MMIF and the capital ratio, as described above in Table 1. As the housing boom built to its peak in 2005–2007, capital ratios hovered around 7%, well above the 2% minimum recommended in the 1990 NAHA. The beginning of the bust in 2008 saw the ratio fall to 3.22% and then plunge well below 2% over the past two years.[19] In 2009, it would have taken an infusion of $10.388 billion to meet the 2% minimum capital ratio and an infusion of over $40 billion to reach the presumably safe 7% levels that existed in 2005–2007. In 2010, FHA would have needed an extra $12.43 billion to meet the 2% capital ratio guideline and over $56 billion to reach the 7% level.

Even though FHA has become much riskier, its strategy of trying to grow out of its problems was a seductive one for it. Its accrual-based accounting policy allows it to recognize all the upfront income from that new business, even if not yet received. And, mortgage default rates start out very low and build over time, so claims and losses initially are very low, making the growth strategy sure to look good early on in an accounting sense. Its risks only become apparent over time. That said, the Department of Housing and Urban Development (HUD) decided to allow FHA to expand, rather than ask that it be recapitalized. The relevant issue now is whether or not that decision will work to the benefit or detriment of the taxpayers. That depends to a large extent on the answers to two questions: (1) Will the losses on past books of business, especially the very large ones from 2008, 2009, and 2010, be greater than those projected by FHA and its external reviewer? And, (2) will the financial benefits from future books be as large as they expect?

IV. Issues in the Overestimation of MMIF Value

IV.A. Overoptimism Regarding the Value of Future Books of Business

The place to start in answering these questions is the most detailed recent analysis provided by FHA's independent outside reviewer, Integrated Financial Engineering, Inc. (IFE). Its 2010 actuarial review suggests that all is likely to be well. One reason to be skeptical of this conclusion is that the outside reviewer looks to be systematically optimistic about the future. The same firm has been involved in the annual studies for many years, and going back to the 2005 actuarial review finds that over the past six actuarial reviews through 2010, all 42 of the individual out-year forecasts were projected to be of positive value to the fund.[20]

It is not hard to envision why the 2005 review's forecasts for each of the seven years from 2006 to 2012 were positive. The housing boom was still building, and one would have had to be very insightful to forecast declining housing market conditions in future years that would make (say) the 2010 book of business have negative value. However, the boom ended, and some of the then-future books of business that originally were expected to bring positive value to the MMIF now are in existence and are forecast to generate billions of dollars of future losses to the fund.[21] One would expect that experience to lead to adjustments that would cause at least one future book of business to have negative value. That it did not suggests that something is wrong with the model, the estimation technique, and/or the underlying assumptions that are causing IFE's forecasts to be upwardly biased.

It is easiest to address the issue of the underlying assumptions. These involve factors such as the future path of interest rates and house prices over periods as long as thirty years. Nobody knows the future of these variables, so all we can really count on is that those assumptions will be wrong. The best one can hope for is that there is no systematic bias. All else constant, it simply is the case that losses will be higher (lower) if housing market and other economic conditions are worse (better) than the estimates used as inputs into the reviewer's model. That said, absent some obvious bias, it makes no sense to criticize estimates that nobody could get exactly right.

Thus, our focus will be on correctable deficiencies in the model, estimation strategy, or data that could account for upward bias in the estimates of MMIF value. That there are such defects is clear from the analysis of downside risk scenarios in the 2010 actuarial review by IFE and the discussion of those results in HUD's annual report to Congress on the FHA insurance program (HUD, 2010). Very briefly, Section V of the 2010 actuarial review reports on MMIF value sensitivity to alternative scenarios to the baseline model. One of those scenarios is termed "Complete Collapse, Depression" and presumes a cumulative 33% peak-to-trough decrease in house prices from their highest level in 2007 (p. 57, IFE (2010)). Since the forecast period begins in the second quarter of 2010, this effectively involves a further 24% decline in values since then. It is, indeed, accurate to describe as a depression a scenario that involves an additional one-quarter drop in house prices on top of the declines that had already happened prior to the middle of 2010.

In that scenario, the Economic Value of FHA's main single-family insurance fund (the MMIF) does, in fact, go negative in the 2010 fiscal year (in the amount of –$17.796 billion) and remains negative for four more years. However, it steadily improves throughout this period, turns positive in 2015, and is $9.155 billion to the good in 2017 (the final year of the forecast). Thus, after a second catastrophic decline in house prices, the MMIF is projected to end up being worth $4 billion more than it actually was estimated to be in the 2010 fiscal year before prices began their additional 24% decline.

This is not the sign of robustness for the MMIF that the outside reviewer and HUD leadership interpret it to be. Rather, it is a clear signal that something is seriously wrong with the underlying model and estimation strategy, which is leading to large, upwardly biased estimates of MMIF value over time. In the face of another 20%+ drop in house values, there is only one reasonable outcome for an entity such as FHA, whose core business is insuring 30-to-1 leveraged investments on homes—namely, it should go broke and stay broke.[22] Any analysis that concludes otherwise should be viewed with considerable skepticism, and what is driving such an implausible result should be identified. It is to that effort we now turn.

<u>IV.B. Assuming Away Unobserved Credit Risk and the Underestimation of Default Probabilities and Losses Going Forward</u>

The starting point for any potential loss to FHA is a default on an insured mortgage. Future defaults are forecast based on results from an underlying regression model that uses past data to estimate how likely a given borrower will stop paying (i.e., default) at any particular point in time.[23] The model controls for a large number of variables that might influence a borrower's decision to continue paying on the loan or to default on it. Most of these variables are intended to measure risk because riskier loans are likely to default more frequently and generate losses to the insurance fund. For example, financially stronger borrowers should default less than weaker ones, all else constant. Hence, the model includes credit scores of borrowers. Traits of the loan, not just the borrower, should matter, too. Hence, the model also includes variables such as the loan-to-value at origination. The underlying regression model identifies how likely borrowers and loans with different types of risk characteristics will default and generate losses to the MMIF. Those propensities are then used to forecast defaults and losses of similarly situated borrowers in the future.[24]

We computed the probability of default in a given quarter by a typical single-family, fixed-rate, thirty-year loan (FHA's dominant mortgage product) with the following traits (among others that are described in Appendix #2): (A) The borrower has a FICO score between 600 and 639. This is a ranking of borrower credit quality by what was formerly called the Fair Isaac Corporation (hence, the term FICO, which is now the official name of the company); the possible range runs from 350 to 850, with a low score signaling low credit quality or a high-risk borrower. A score from the middle of the range reflects a relatively risky borrower who is right around the 620 cutoff often used to denote subprime borrowers.[25] (B) The loan-to-value ratio at origination was between 95% and 97%, which is typical for FHA-insured loans. (C) There is virtually no probability the loan is underwater. The variable controlling for this is an estimate of the probability that there is negative equity on the house. We use the lowest probability that IFE allows in its estimation, 0%–5%. (D) The borrower funded the entire down payment out of her own funds, so there was no down payment assistance from any outside source. (E) The loan is presumed to be issued in a stable time for underwriting standards and housing markets, which means the 1997–2001 period, based on IFE classifications (see below for more on this).[26]

The implied probability that this baseline mortgage/borrower combination transitions from being current to being in default is quite low—well under 1% on an annualized basis. While that is not unreasonable for loans from an earlier time period, it clearly does not capture the risks associated with more recent loan vintages, especially those associated with the final years of the boom and the ensuing bust. This means that the higher defaults experienced on newer mortgages cannot be predicted by readily observable borrower or loan traits such as those listed above and all the others used by IFE in its underlying regression model. Stated differently, more recently issued loans have higher so-called unobserved risk.[27]

Because the model fit is so poor in this regard for more recently issued mortgages, IFE includes another variable that reflects whether the loan was originated after 2006.[28] Its goal for this variable is to capture the unobserved higher credit risk of more recent loan pools, and it does so in the sense that the variable is very influential in predicting higher defaults. The impact of this control nearly doubles the implied quarterly default probability for the borrower in the baseline case described above. That is, IFE estimates that loans originated after 2006 tend to have defaulted at roughly twice the rate of otherwise observationally equivalent loans (i.e., with the same borrower FICO score, loan-to-value ratio, etc., described above) that were originated prior to the housing crisis.[29]

This is a relatively crude way to control for risk, as one would like to have explicit measures of the loan, borrower, or market traits that actually account for the higher defaults. However, if such information is not available, including this variable is far superior to doing nothing. Not including it would mean making forecasts of losses on more recent loan pools using unbelievably low expected default rates (in this case, from a time long gone). Nevertheless, that essentially is what IFE's forecasts do because the impact of this empirically critical variable is assumed away over time. More specifically, its influence on projected defaults (and thus future losses) weakens in 2012 and 2013, before it goes to zero by the first quarter of 2014.[30]

The implication of this administrative decision to down weight the influence of this one variable is that there will not be any unobserved higher default risk in the future, even though it has not proved possible to accurately control for such risk on recent pools of mortgages with other variables. No theoretical result or empirical evidence is presented to justify such a conclusion. HUD (2010) and IFE (2010) include detailed discussions on how rising FICO scores are making recent mortgage pools less risky, and that truly is one of the unabashedly good things happening regarding MMIF risk.[31] However, that cannot justify the decision to assume away the influence of the variable controlling for unobserved credit risk. That effect holds after controlling for borrower FICO scores. In addition, there is no reason to believe that those scores accurately reflect all there is to know about borrower credit risk.

Given that the impact on projected losses is likely to be very large because it involves roughly a doubling of default probabilities for typical borrowers in the FHA insurance pool, it is vital to determine how likely it is that unobserved high credit risk on post-2006 mortgage pools will be a thing of the past. That it will not be is evident from the fact that the underlying regression model does not control for unemployment, one of the main causes of defaults. This is not because HUD or FHA does not think it matters. They know it does. In fact, HUD's most recent report to Congress on FHA explicitly notes a doubling from 25% in early 2007 to 49% in late 2010 of the fraction of lenders reporting unemployment or an income shock as the reason for the onset of mortgage delinquency (Table 13, p. 26, HUD (2010)).

The statistical problem that prevents them from using it in their underlying regression model arises because becoming unemployed typically precedes the stopping of payments by a considerable amount of time. The gap is even greater before FHA incurs a claim loss. Moreover, it is very hard to track employment status over time, as borrowers are not required to report this after the loan has been issued. Hence, IFE does not find that unemployment is helpful in predicting defaults or losses. To reiterate, this does not mean that a borrower's becoming unemployed does not lead to higher defaults and losses for FHA. It does. But the relationship cannot be estimated accurately because of measurement error.[32]

One of the reasons the special control for whether the mortgage was issued after 2006 is so influential in predicting higher default rates is precisely because it helps pick up the influence of unobserved (i.e., uncontrolled for) risks like this. Down weighting and then eliminating the influence of this variable in predicting future defaults (and thus losses) is akin to believing that high unemployment will not be an important risk factor going forward. Given that most forecasts, including that from the Obama Administration's Office of Management and Budget, now expect unemployment to remain at or above 9% well into 2012 at least, the inescapable conclusion is that IFE's forecasts of future losses are biased downward.

Precise estimates of how much cannot be made without access to FHA's underlying data, but there is no doubt the impact is large. For example, we know from Table 1 that the existing books of business were projected to lose $25.392 billion for the MMIF as of the end of fiscal year 2010. If defaults are going to be roughly twice as high, it is not unreasonable to expect that claims and losses will increase proportionately.[33] Some of the impact of this variable is captured in the current forecast because its coefficient is not zeroed until 2014, so something less than a full $25 billion increase in net losses probably would result. However, it is likely that losses on the existing books of business still would be higher by many billions of dollars. It is more challenging to know how this would affect future books of business, which are forecast to generate net gains of nearly $28 billion for the MMIF (see Table 6). However, its potential impact on MMIF value is likely to be substantial going forward because each future book of business is projected to be large in its own right. One can easily imagine this one factor changing aggregate loss estimates by $30-$50 billion or even more.[34] Indeed, FHA should report estimates that do not down weight the influence of this one variable so that we can put a more precise number on the potential downside risk from their administrative decision.[35]

IV.C. Other Omitted Risk Factors: Down Payment Assisted Loans in the 2009 and 2010 Books of Business

The underlying model's inability to control for unemployment is not the only reason why future losses on the MMIF are severely underestimated. Another is the unrecognized presence of high-risk loans made to borrowers who did not make the required down payment entirely with their own funds. That there are many such loans (perhaps more than 1 million, as is shown below) from the large 2009 and 2010 pools is due to the special tax credit program for first-time homebuyers, which allowed them to fund their down payments with the credit.

It is not hard to understand why borrowers who cannot make a minimal down payment out of their own funds would be much more likely to default. They have not shown the discipline to save for even the very modest equity down payment required by FHA. One reason may be that their pay and job prospects are poor. Whatever the cause, this characteristic does not bode well for their consistently making the monthly payments required on a mortgage over a period of many years.

Experience has taught FHA that the risks associated with such borrowers are high. Consequently, the presence of down payment assistance is carefully controlled for in the underlying regression model. Such assistance can come from different sources, and IFE estimates the impact of three types: (a) from relatives; (b) from what it terms a "nonprofit," by which it means an unrelated third party that often benefits financially if the purchase is consummated; and (c) from a public sector or government source. Each is found to substantially raise the probability of default. For example, if we keep all other traits constant but change the down payment assistance variable from no assistance to assistance from relatives, the probability of default increases by 35% relative to the baseline case discussed above. The analogous increases associated with assistance from an unrelated third party and government source are 72% and 44%, respectively. Thus, each of these indicates substantially higher default risk, with the largest increase coming from cases in which an unrelated third party provides the funds.

These latter cases are what FHA refers to as seller-financed down payment assistance (or SFDPA) mortgages.[36] Losses on SFDPA loans were so high (suffering three times the claims rate of cases without down payment assistance, according to HUD (2010)) that the Housing and Economic Recovery Act of 2008 effectively banned FHA from insuring loans with down payment assistance provided by any entity that financially benefits from the home sale. The latest actuarial review notes that only 0.12% of all loans insured by FHA in 2010 were SFDPA mortgages (IFE (2010)). HUD's 2010 report to Congress also specifically notes that this is a key reason why insured loans issued since 2009 are expected to generate positive net revenues to FHA.

Unfortunately, this type of risk is not actually gone from its recent books of business. It well could be greater than it was at the height of the recent housing boom.[37] The culprit is the policy to provide tax breaks for first-time homebuyers that was part of the broader $787 billion stimulus plan passed early in the Obama Administration. Most relevant for this analysis is the American Recovery and Reinvestment Act of 2009's provision of an $8,000 tax credit for first-time homebuyers who purchased on or after January 1 of that year.[38] In late May 2009, FHA announced it would allow the tax credit to be used by qualified buyers to provide the down payment on homes financed by loans it insured.[39] Because the IRS would only refund the tax credit directly to the home purchaser, and not a third party, the credit was not literally available in cash at the time of closing. Hence, FHA decided that various entities—in particular, state and local agencies involved in housing affordability programs—could provide what essentially were bridge loans in the amount of the credit, as long as there was no cash back to the buyer.[40]

While all such purchases involved down payment assistance, it is not entirely clear whether they are the economic equivalent of SFDPA cases (which will generate the highest losses to the MMIF). One key similarity is that there is an unrelated third party providing the benefits—taxpayers in the form of the U.S. Treasury, in this case, rather than homebuilders (or some other similar party). One difference is that taxpayers, unlike homebuilders, had no financial incentive to artificially inflate prices by the amount of the tax credit. However, recent research suggests the credit largely was capitalized into house prices, so the impact appears to have been similar.[41] There is no doubt that a borrower has the same amount of "skin in the game" in either case—little or none.[42]

Even without access to FHA's microloan data, which would permit the underlying regression models to be re-estimated, it is easy to tell that the underestimation of losses from this unrecognized risk is likely to be large. If these cases are more like SFDPA loans, the underestimation of default risk is three-quarters of that associated with unobserved risk associated with post-2006 pools. However, this factor only applies to mortgages from the 2009 and 2010 pools, so one cannot simply assume that the losses here will be three-quarters of the $50 billion+ extra losses to be expected from that quarter. Nevertheless, it is straightforward to show that the losses probably are going to be at least $10 billion higher than is currently projected.

One reason the losses are likely to be so high is that the program itself was large. Data from the IRS show that 2,676,732 returns processed from January 1, 2009, to October 2, 2010, were granted a tax credit toward the first-time purchase of a home. Of this amount, 2,197,110 were granted based on returns processed from September 27, 2009, to October 2, 2010. Hence, participation in this program grew rapidly over time and appears to be concentrated in 2009 and 2010.[43]

The 2.68 million credits granted since September 2009 represent 25% of the 10,761,000 new and existing homes purchased in calendar years 2009 and 2010.[44] The more relevant question here is how large a share was guaranteed by FHA. FHA insured the loans of 1,663,777 first-time homebuyers in its 2009 and 2010 fiscal years (781,680 in 2009 and 882,097 in 2010; see Table 2, p. 5, HUD (2010)). Theoretically, all of these could be tax credit–financed deals, and it seems likely that FHA got a disproportionately high share of the total. The income limitations for use of the credit naturally should have led more of them to be in FHA's insurance pool. And, the constrained nature of the rest of the mortgage market at that time also suggests that anyone using the credit would try to find a way to access the FHA market.

If the FHA share was no higher than the roughly 25% share of the overall home purchase market, that would imply that it guaranteed loans for about 416,000 households who used the credit. However, that share certainly is too low for the reasons discussed above. More likely is that one-half or even two-thirds were tax credit–financed for the reasons just discussed, although we do not know for sure.[45] Those fractions imply between 832,000 and 1,250,000 such borrowers were guaranteed by FHA. We can gauge the magnitude of the likely losses from these high-risk borrowers in a couple of ways.

One is to compare the size of the current risk exposure to the past. Here, we presume that these cases are most like SFDPA mortgages of the past. HUD's 2010 report to Congress on FHA notes that there were over 1 million SFDPA loans insured by FHA from 1998 to 2009, that realized losses on them already are over $6 billion, and that it expects another $7.5 billion based on the amount of such loans presently in serious delinquency (Section 8, p. 24, HUD (2010)). There could easily be 1 million such loans in the 2009 and 2010 books, and if their default and loss rates mimic those of the past, losses at or above $13 billion would not be unreasonable to expect.

Similarly large estimates result from back-of-the-envelope calculations of the following type. We begin by using IFE's forecast of what the claim rate will be on "regular" borrowers who used their own resources for the down payment, and then presume that the claim rate will be three times higher on SFDPA borrowers (which is the case based on past data). IFE estimates that the average claim rate over the next ten years for the 2009 and 2010 books of business will be about 8.5%.[46] That implies a 25% claim rate for SFDPA borrowers. The final assumption required is a loss rate on defaults that lead to claims. We assume 50%, which is conservative, given FHA's recent experience.

Using those assumptions, the added losses range from a low of $6.5 billion, if only one-third are SFDPA-like borrowers, to a high of $15.2 billion, if two-thirds are. If the split is 50-50, the added expected losses amount to $11.4 billion.[47] While no present value reduction is taken in these calculations, this factor alone is large enough to wipe out most or all of the $5.610 billion in Economic Value of the MMIF, reinforcing how undercapitalized this business really is.[48]

IV.D. Underestimating Negative Equity and Default Risk

Negative equity is another well-known potential trigger of default. Its influence is captured through a variable that reflects the probability that any given mortgage will be underwater during each quarter. That probability itself is estimated using data on changes in and the volatility of house prices as measured by the FHFA's repeat sales price index.[49] As expected, this variable is very influential in predicting default. If we hold all other traits of the borrower and mortgage constant at the values in our baseline case above, and change only the probability of negative equity from its lowest amount possible (0%–5%, which was assumed in our baseline example) to its highest amount possible (30% or more), the probability of transitioning from being current on the loan to being in default increases by 78%. That is roughly equal to the impact from going from no down payment assistance to seller-financed down payment assistance, and it is three-quarters the size of the increase in default probability arising from unobserved credit risk implied by the post-2006 issuance control.

Using the FHFA repeat sales price index to create this variable makes it likely that the probability of being in negative equity is being underestimated. The FHFA index captures prices on repeat sales of homes purchased with conforming loans. Not only did those borrowers make much bigger down payments than borrowers who took out mortgages insured by FHA, but other data indicate that the homes they bought are of higher quality and in better neighborhoods with stronger price appreciation trends and less price volatility overall.[50] Essentially, FHA does not insure a random sample of loans that experiences the average rate of house price growth in each market. Rather, it guarantees loans made against lower-quality homes that tend to be in neighborhoods that themselves tend to appreciate at less than the average rate in their respective metropolitan areas.[51] This suggests that the price growth on the homes underlying FHA mortgages is even weaker than that suggested by the FHFA index, so that the level of negative equity is even greater than that depicted above.

Absent both the underlying data and a different price index that better captures the price movements of FHA-insured homes,[52] one cannot put a hard dollar number on the amount by which losses are being underestimated in this case. Given how important we know that the presence of negative equity is in helping trigger defaults, it should not be a surprise that even modest underestimation of the extent of negative equity would lead to large undercounts of expected defaults and the losses associated with them.

In addition, FHA should be worried about losses associated with negative equity escalating above levels seen in the past. The past may not be a very good guide to the future in this case because of the potential for social norms to change in a way that makes default more acceptable than in the past. This seems more likely in markets where more owners are underwater, as recent research suggests that defaults become more acceptable as the number of nearby defaults increases (see Guiso, et. al. 2009)).

Whether or not such an outcome comes to pass, it clearly is very hard to precisely measure and control for how negative equity will influence default. Given that negative equity is being underestimated only reinforces the need not to down weight the influence of the variable controlling for unobserved high credit risk after 2006.

IV.E. Unobserved Risk: Streamline Refinancings and the Underestimation of Future Defaults

Yet another form of unobserved high credit risk arises from a defect in the way IFE and FHA organize their underlying mortgage data. Aragon, et. al. (2010) first pointed this out over a year ago, but no correction has yet been made. The foundation of the problem lies in how so-called streamline refinancings are treated in the MMIF risk analysis. A streamline refinance occurs when an existing FHA-insured loan is refinanced by another FHA-insured loan. Streamline refinancings do not require a completely new underwriting, which means that existing FHA loans that might violate loan-to-value ratio guidelines on new originations (and even have negative equity) can be refinanced under this program. Economically, they are the equivalent of loan modifications in the sense that the original borrower remains in place, with the terms of the original loan changed (i.e., the mortgage interest rate almost always is lower, and the new term can be longer than the remaining term on the initial loan).

IFE's treatment of such loans in its default analysis biases downward its estimates of losses. The genesis of the problem is that streamline refinancings are treated in the risk analysis as if there has been a full prepayment with no further default risk to FHA. This clearly is incorrect, as the costs of a potential default remain because the new loan is insured by FHA.[53] The end result is an underestimation of default probabilities and their associated losses. The mathematics underpinning this conclusion are difficult due to the inherent complexity of estimating default probabilities in the first place, so we leave that analysis to Appendix #2. Readers willing to take that claim on faith may proceed without that material.

A conservative reading of Aragon, et. al. (2010) suggests that true default probabilities are at least 1.5 times greater than those estimated by IFE. Presuming that the relationship between defaults and claims/losses is unchanged, we should expect claims and losses to increase by roughly the same fraction. Based on the same logic applied above, this suggests that net losses on existing books of business will be about $13 billion higher (i.e., roughly half the current forecast of $25.392 billion), with another unknown but large number associated with future books of business that will not generate the $27.886 net income forecast for them.

V. Conclusions and Summary

Default risk is being systematically underestimated, and future losses to the MMIF are likely to be many tens of billions of dollars higher than forecast. One key reason is the administrative decision to down weight the influence of a variable that captures unobserved credit risk in recent mortgage pools. This leads to dramatically lower forecasts of default—on the order of 50% for a typical borrower in the FHA insurance pool. No theoretical or empirical foundation for this decision is provided, which effectively implies that there will be no more unobserved high credit risk in the future.

That this is a major error is suggested by further analysis showing that there is substantial credit risk in FHA mortgage pools that the actuarial analysis does not fully control for. This includes completely uncontrolled-for unemployment risk, unrecognized risk from borrowers who used gifts (from taxpayers) to fund their down payments, underestimated negative equity risk, and misclassification of streamline refinancings as prepayments that completely eliminate the risk of future defaults and losses for FHA.

Precise estimates of how much losses are being underestimated are not feasible without rerunning adjusted models using the underlying FHA individual loan data. And, one cannot simply add up the losses arising from each of these factors because that would involve double counting in some cases.[54] Nevertheless, there is no doubt the MMIF is materially under-reserved by at least $50 billion, with the true figure likely higher. Depending upon how much one wanted to be above the 2% capital ratio guideline, between $50 billion and $100 billion likely is needed to recapitalize the MMIF in a safe manner. That range is based solely on correcting errors in estimation strategy and techniques, as well as data organization. If the economy and housing markets deteriorate unexpectedly, we need to be ready to infuse even more capital into the MMIF.

Fortunately, there still is little reason to expect an extreme liquidity crisis for the MMIF in the next year or so. That would require immediate losses high enough to deplete the roughly $30 billion in liquid capital resources presently available to the MMIF. That would take a huge leap in defaults and almost immediate losses that no one is anticipating (that this author knows of, anyway). The future losses computed above will happen over a period of many years, not in any one single year. However, that provides only small comfort, as one can envision a confluence of events leading to a liquidity crisis over the medium term. It only takes a few years of multibillion-dollar cash outflows to wipe out $30 billion in liquidity. That is not a preposterous scenario when one is operating a $1 trillion+ business platform, as there is little room for error when one's liquid reserves are only 3% of potential liabilities (30 billion/1 trillion = 3%). That a reasonable person should have even the remotest worry about a liquidity problem at FHA within the next few years highlights how risky the current situation is, but it is inevitable when one is running such a highly leveraged operation. I would expect those worries to arise sooner rather than later if the economy and housing markets do not recover fairly quickly.[55]

Large losses are to be expected on any entity in the business of insuring 30-to-1 leveraged investments (in housing or any other asset market). Such investments are very risky in the best of economic environments and become markedly more so in weak ones. If the country wants its government to be in that business, the only sensible strategy is to properly reserve for high expected losses, not to assume that one can grow one's way out of problems by presuming the future will be bright even though the past was dark. A policy of having proper reserves in place also makes clear the true costs of being in this business. There are social benefits of higher homeownership, but we cannot tell if they outweigh the costs of achieving it if we systematically underestimate them.

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TABLE 1: Capital Resources, Economic Value, and Capital Ratio
FHA Mutual Mortgage Insurance Fund (Single Family), 2010 Fiscal Year
($ Millions)

	END OF FISCAL YEAR 2009	END OF FISCAL YEAR 2010
CASH	$ 21,123	
+ INVESTMENTS	10,252	
+ PROPERTIES & MORTGAGES	2,291	
+ OTHER ASSETS & RECEIVABLES	50	
TOTAL ASSETS	$ 33,716	
- LIABILITIES	3,255	
TOTAL CAPITAL RESOURCES	$ 30,461	
+ NET GAIN FROM INVESTMENTS		$ 1,850
+ NET INSURANCE INCOME IN FISCAL YEAR 2010		(511)
+ NET CHANGE IN RED HOLDINGS		500
+ TRANSFER TO HECM ACCOUNT		(1,748)
TOTAL CAPITAL RESOURCES		$ 30,522
+ PV OF FUTURE CASH FLOWS		(25,392)
ECONOMIC VALUE		$ 5,160
Amortized Insurance-in-Force		$ 879,875
Capital Ratio (Economic Value/Amortized Insurance-in-Force)		0.59%

SOURCE: EXHIBIT II-2, Estimates of Forward Economic Value at End of Fiscal Year 2010, p. 16, IFE (2010).

TABLE 2: FHA Share of Home Purchases by the Number of Households Insured

	NEW HOME PURCHASES			EXISTING HOME PURCHASES			AGGREGATE HOME PURCHASES		
FISCAL YEAR	TOTAL (1000s)	FHA (1000s)	FHA SHARE (%)	TOTAL (1000s)	FHA (1000s)	FHA SHARE (%)	TOTAL (1000s)	FHA (1000s)	FHA SHARE (%)
2000	1,177	82	7.0	5,159	774	15.0	6,355	856	13.5
2001	1,104	84	7.6	5,300	785	14.8	6,405	869	13.6
2002	1,100	108	9.8	5,514	698	12.7	6,615	806	12.2
2003	1,157	116	10.0	5,991	539	9.0	7,148	655	9.2
2004	1,258	99	7.7	6,616	406	6.1	7,901	505	6.4
2005	1,370	76	5.6	7,084	269	3.8	8,454	345	4.1
2006	1,339	67	5.0	6,640	234	3.5	7,979	301	3.8
2007	1,050	63	6.0	5,942	226	3.8	6,992	288	4.1
2008	702	124	17.6	4,986	595	11.9	5,688	719	12.6
2009	446	119	26.6	4,869	875	18.0	5,315	994	18.7
2010	417	125	30.0	5,172	944	18.3	5,589	1,069	19.1

SOURCE: TABLE 1. FHA Single Family Activity in the Home Purchase Market through December 2010. The file may be downloaded at http://portal.hud.gov/hudportal/documents/huddoc?id=fhamkt1210.pdf. Market shares and new insurance volumes are computed based on the number of households served.

TABLE 3: FHA Single-Family Loan Endorsements, by Year

	ANNUAL FLOWS				STOCK: Insurance-in-Force	
FISCAL YEAR	Number of New Loans	Amount of New Loans ($ Billions)	New Loans: Home Purchase ($ Billions)	New Loans: Refinancings ($ Billions)	Number of Loans	Amount of Loans ($ Billions)
2000	831,546	$ 86.276	$ 79.397	$ 6.878	6,787,820	$ 482.30
2001	962,552	107.550	79.709	27.841	6,596,874	498.74
2002	1,168,178	136.141	91.005	45.117	6,324,842	499.39
2003	1,218,934	147.310	73.026	74.284	5,344,611	438.31
2004	892,421	107.620	66.835	40.785	4,844,634	404.87
2005	478,349	57.975	40.196	17.778	4,238,032	332.393
2006	399,903	51.732	37.102	14.630	3,895,745	298.542
2007	402,343	56.515	35.002	21.513	3,737,757	305.449
2008	1,031,580	171.805	95.373	76.432	4,379,151	401.461
2009	1,831,301	330.379	171.672	158.708	5,580,989	656.012
2010	1,666,856	297.491	191.601	105.890	6,629,376	879.875

SOURCES: Figures for 2000–2010 are taken from Table A-2 of the *FHA MMIF Programs Quarterly Report to Congress for Fiscal Year 2011 Q2*. Figures on aggregate insurance-in-force in columns 5 and 6 are taken from the *Monthly Report to the FHA Commissioner on FHA Business Activity*.
NOTE: Loan amounts and volumes in columns 1 and 2 reflect all home purchases and refinances insured by FHA, excluding home equity conversion mortgages, or so-called reverse mortgages.

TABLE 4: Initial Loan-to-Value Ratios on FHA-Insured Mortgages, 2003–2010

Year	Share with 90%–95% LTV	Share with 95%+ LTV
2003	7.1%	77.8%
2004	7.2%	78.1%
2005	6.8%	78.2%
2006	13.9%	69.2%
2007	20.9%	60.2%
2008	24.0%	57.7%
2009	19.6%	60.9%
2010	11.5%	68.2%

SOURCE: EXHIBIT IV-5, p. 40, IFE (2010).

TABLE 5: House Price Appreciation and Net Equity on Typical Home with 3% Down Payment

Time Period since Loan Issuance	House Price Appreciation FHFA Price Index	House Price Appreciation S&P\Case-Shiller Index	Net Equity Using FHFA Price Index	Net Equity Using S&P/Case-Shiller Index
2010(2)–2011(2)	–5.8%	–5.9%	–1.3%	–1.4%
2009(2)–2011(2)	–7.5%	–2.3%	–1.4%	+3.8%
2008(2)–2011(2)	–13.4%	–16.6%	–6.5%	–9.7%
2007(2)–2011(2)	–19.5%	–29.0%	–11.3%	–20.8%
2006(2)–2011(2)	–18.4%	–31.5%	–9.1%	–22.2%
2005(2)–2011(2)	–12.4%	–26.4%	–0.5%	–14.5%

SOURCES: FHFA national price index data using the U.S. Summary based on the Purchase Only Index may be downloaded from www.fhfa.gov/Default.aspx?Page=87.
S&P/Case-Shiller national price index data using the U.S. National Index Levels may be downloaded from www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexId=spusa-cashpidff--p-us----. .
NOTES: The characteristics of the underlying mortgage are as follows:$150,000 original balance, thirty-year, fixed-rate, fully amortizing mortgage taken out at the Freddie Mac survey rate from May (the middle of the second quarter) of the relevant year, with a 3% down payment. Equity buildups also are assumed from scheduled amortization. Details of all calculations are available upon request.

TABLE 6: FHA Risk Metrics

FISCAL YEAR	(1) Total Capital Resources ($ Billions)	(2) Outstanding Insurance-in-Force ($ Billions)	(3) Insurance per Dollar of Capital (2)/(1)	(4) Value of Future Insurance Going Forward ($ Billions)	(5) Capital Resources per Dollar of Future Insured Value (1)/(4)	(6) MMIF Economic Value ($ Billions)	(7) Capital Ratio (%) (6)/(2)
2005	$ 23.060	$ 332.393	$ 14.41	$ 3.414	$ 6.75	$ 21.621	6.50
2006	24.222	298.542	12.33	3.922	6.18	22.021	7.38
2007	24.903	305.449	12.27	6.629	3.76	21.277	6.97
2008	27.203	401.461	14.76	35.107	0.77	12.908	3.22
2009	30.461	656.012	21.54	34.290	0.88	2.732	0.42
2010	30.522	879.875	28.83	27.886	1.09	5.160	0.59

Source: IFE (2010) and author's calculations.

Appendix #1: Table A.1. The Structure of FHA Insurance Premiums Over Time

TIME FRAME/YEARS	MORTGAGE TYPE	UPFRONT PREMIUM	ANNUAL PREMIUM
2000	30-year, fixed rate		
	<90% LTV	2.25%	0.50%
	90%–95% LTV	2.25%	0.50%
	95%+ LTV	2.25%	0.50%
January 1, 2011–July 14, 2008	30-year, fixed rate		
	<90% LTV	1.50%	0.50%
	90%–95% LTV	1.50%	0.50%
	95%+ LTV	1.50%	0.50%
NOTE: 15-year term mortgages had the same upfront premium and a 0.00%–0.25% annual premium, depending upon the LTV ratio.			

July 14, 2008–September 30, 2008

For this brief period of time, FHA introduced a risk-based premium schedule. The template for the upfront/annual premiums by FICO score and for mortgages with terms exceeding 15 years (30 typically) is listed below. More detail is available at www.fhainfo.com/fhamortgageinsnew.htm.

		FICO SCORE					
		300–499	500–559	560–599	600–639	640–679	680–850
LTV	≤90%	1.75%/0.50%	1.75%/0.50%	1.50%/0.50%	1.25%/0.50%	1.25%/0.50%	1.25%/0.50%
	9095%	N/A	2.00%/0.50%	1.75%/0.50%	1.50%/0.50%	1.25%/0.50%	1.25%/0.50%
	95%+	N/A	2.25%/0.55%	2.00%/0.55%	1.75%/0.55%	1.50%/0.55%	1.25%/0.55%

TIME FRAME/YEARS	MORTGAGE TYPE	UPFRONT PREMIUM	ANNUAL PREMIUM
October 1, 2008–October 4, 2010			
	Mortgages Used to Purchase Homes	1.75%	(a) 0.50% for all loans with 15+ year terms and LTV's ≤ 95%
	Full Credit, Qualifying Refinances	1.75%	(b) 0.55% for all loans with 15+ year terms and LTV's > 95%
	Streamline Refinancing	1.50%	(c) 0%–0.25% for 15 year terms depending on LTV
Current Ratio since October 4, 2010			
	Mortgages Used to Purchase Homes	1.00%	(a) 0.80% for all loans with 15+ year terms and LTV's ≤ 95%
	Full Credit, Qualifying Refinances	1.00%	(b) 0.90% for all loans with 15+ year terms and LTV's > 95%
	Streamline Refinancing	1.00%	(c) 0%–0.25% for 15 year terms depending on LTV

NOTES: For more detail on FHA premium schedules for different types of homes, see the following websites:

(a) For current ratio: www.fhainfo.com/fhamortgageins.htm.

(b) For ratio from October 1, 2008–October 4, 2010: www.fhainfo.com/fhamortgageins_prior_oct4_2010.htm.

(c) For rates from July 14, 2008–September 30, 2008: www.fhainfo.com/fhamortgageinsnew.htm.

(d) For rates prior to July 14, 2008: www.fhainfo.com/fhamortgageins_prior_july_14_2008.htm.

Appendix 2: Computing Default Probabilities Using IFE Regression Model Coefficients

To gauge the impact of different variables, we computed the probability of transitioning from being current to being in default for a given quality borrower and mortgage trait combination. That borrower has the set of traits described below, each of which is discussed in more detail in Appendix A of IFE (2010). The terms in parentheses contain the variable name.

<u>Trait Set Defining Borrower/Mortgage Quality: Baseline Case</u>

(a) the borrower is purchasing a house with a price that is between 100%–125% of the Census-based median value for relevant metropolitan area[56] (rel_hp_cat_4);
(b) the LTV at origination is in the 95%–97% range (ltvcat_cat_4);
(c) the loan is for a home purchase, not a refinancing (refinance_cat_2 = 0);
(d) the probability of negative equity is in the 0%–5% range (pneqcat_cat_1);
(e) the loan is a year old; IFE (2010) estimates a piecewise-linear function that allows the impact of mortgage age to change at different points—i.e., at 2, 4, 8, 12, and 36 quarters; we use the coefficient at the four quarter point (or age2 in IFE's terminology); experimentation with other age function coefficients show no significant impact on our conclusions;
(f) the relative mortgage premium variable, which proxies for the incentive to refinance, is modest; the spread between the current mortgage contract interest rate and the current market rate is assumed to be zero (spreadcat_cat_4);
(g) the bond market environment is such that the yield curve slope as reflected in the difference between the ten-year and one-year bond rates is less than 1% (ycslopecat_cat_1);
(h) the so-called burnout factor, which is measured as the moving average number of basis points the borrower's prepayment option was in the money for all quarters during which the borrower was in the money over the previous two years, is zero or less; this helps identify borrowers who have foregone recent opportunities to refinance; our hypothetical borrower has not foregone any such opportunities (in_moneycat_cat1);
(i) the loan is presumed to have been issued after 1996; this dichotomous dummy variable is an indicator for the time period during which FHA underwriting standards were relaxed; the alternative categories for this variable are 1986–1992 and 1993–1995 (fy_1996_xxxx_cat_2);
(j) the loan is presumed to have been issued prior to 2002 before the rise of subprime and beginning of the housing crisis (this means all the so-called policy-year indicator variables are turned off in the baseline case (e.g., lm_2002_2003_cat_2 = 0; sp_2004_2006_cat_2 = 0; and df_2007_xxxx_cat_2 = 0);
(k) the borrower used her own funds for the down payment (gift_ltr_src_cat_1);
(l) the loan was issued in a state without judicial foreclosure (judicial_cat_2 = 0);
(m) the borrower's FICO score is in the 600–639 range (fico_600_639);
(n) the loan is not from the Unicon sample (unicon_loan = 0);
(o) the mortgage age variable, which is a piece-wise linear spline, is set at four quarters (age2); thus, the mortgage is not brand new
(o) the model estimated includes an intercept (constant = 1).

Each of these traits is associated with a regression coefficient, which is listed in the first column of Exhibit A-3.1 of Appendix A in IFE (2010). IFE (2010) estimates a series of binomial logit models, so the coefficients have to be exponentiated to yield the probability of transitioning from being current on the loan to being in default. Doing so yields a probability of 0.0018 (which is a quarterly number and implies a 0.18% probability of changing from being current to being in default in any given quarter), which is for the baseline case discussed in Section IV.B above. This is a very low number, even if we annualize it by multiplying by four to get a 0.72% probability, but it must be remembered that our baseline case is for a borrower/loan combination from before the housing crisis.

The rest of Section IV discusses a set of discrete changes to this baseline case. The first is to hold all other traits constant, but change trait *j* so that the loan was issued during or after 2007.[57] This doubles the probability of default to 0.0035. As discussed in the text, this variable reflects unobserved credit risk on loans issued since 2007.

A second distinct change to the baseline case involves altering the assumption about who funded the down payment. If we presume that an unrelated third party did so instead of the borrower herself,[58] the probability of default rises from 0.0018 in the baseline case to 0.0031. This is a 72% increase, as discussed in the text.

A third discrete change to the baseline case involves the probability of negative equity. This involves changing trait *d* above from there being only a 0%–5% probability of negative equity to there being a 30%+ probability. This increases the probability of default from 0.0018 in the baseline case to 0.0032, where all other variables are held constant.[59] We also discussed a different change from the baseline with this variable, this one to a 20%–25% probability of there being negative equity. That raises the probability of transitioning to default to 0.0023, which is a 28% increase over the baseline, as discussed in the text.

Changes in the propensity to default associated with different FICO scores also were discussed in the text and are computed in the same fashion. Finally, we experimented with many other changes to the baseline case. Some such as the burnout factor variable (trait *g* above) have economically important impacts on the propensity to default rather than be current on the loan. However, those discussed here and in the text seem most relevant to the issue of unobserved credit risk, which is at the core of the analysis in Section IV.

Appendix #3: Technical Appendix:

The Streamline Refinance Program and the Underestimation of Default Probabilities

Aragon, et. al. (2010) first identified the error in data organization of streamline refinanced mortgages that leads to systematic underestimation of default probabilities. In estimating losses associated with mortgage defaults, FHA follows standard practice by first distinguishing between whether a mortgage terminates or continues in existence ("survives," in the language of the default estimation literature) from one period to the next. A mortgage can terminate because it prepays or defaults. Identifying defaults is straightforward because the borrower simply does not make the scheduled payment. Prepayments are trickier and should only include cases in which all future default risk is eliminated. That is, they should only be counted as such when the loan is terminated because it was paid off with the proceeds from the sale of the home or with the proceeds of a non-FHA-insured loan. By mistakenly counting streamline refinanced loans as prepayments, FHA artificially raises the fraction of loans it thinks end in "good" (i.e., non-default) outcomes and lowers the fraction of loans it thinks end in "bad" (default) outcomes. This turns out to bias downward estimates of default, and thus of losses.

The start of the process involves estimating prepayment and default models. FHA again follows standard practice here by estimating proportional hazard models of both prepayment and default, as shows in equations A.1 and A.2:

A.1. Prepayment Model: $h^p(t|X^p{}_t) = \exp(g^p(t))*\exp(X^p{}_t\,\beta^p)$

A.2. Default Model: $h^d(t|X^d{}_t) = \exp(g^d(t))*\exp(X^d{}_t\,\beta^d)$,

where the "p" and "d" superscripts denote prepayment and default, respectively; "exp" denotes taking the exponential of the term in parentheses; the X terms represent a matrix of variables thought to influence prepayments or defaults; the β terms represent the estimated coefficients on those variables; $\exp(g^P(t))$ and $\exp(g^d(t))$ are the baseline hazards (or baseline probabilities of prepaying or defaulting); and the $\exp(X^p{}_t\, \beta^p)$ and $\exp(X^d{}_t\, \beta^d)$ terms reflect the so-called proportional hazards that capture the influence of the different factors that influence prepayment (e.g., falling interest rates) or default (unemployment status, negative equity status).[60]

The results of those prepayment and default models are then used as inputs into generating what is called a joint survivor function. This is the probability that the mortgage survives (i.e., does not prepay or default) from one period to the next. It is represented by S(t) in equation A.3:

A.3. Joint Survivor Function: $S(t) = \exp(-\sum^{t}_{j=1} h^p(t) + h^d(t))$.

The probability the mortgage has survived is 1 when it is issued, so $S(0) = 1$ by definition. The probability of surviving falls over time depending upon how high one expects prepayments (h^p) or defaults (h^d) to be in any given period.

The final step in the process is to use the survivorship estimate to forecast prepayments and defaults going forward. These equations are given in A.4 and A.5, and bear some discussion.

A.4. Default Forecast: $\text{Prob}(\text{Default}|t, T) = \sum^{T}_{j=t+1}(S(t)\, h^d(j))$

A.5. Prepayment Forecast: $\text{Prob}(\text{Prepayment}|t, T) = \sum^{T}_{j=t+1}(S(t)\, h^p(j))$

That these are forecasts of future defaults or prepayments is reflected in the fact that the time subscripts run from time t+1 (the next period presuming we are in time t) to the final period the mortgage could still be in existence or time T (this is 360 months into the future on a new, fully amortizing, thirty-year loan).

The underestimation of future defaults in equation A.4 arises from the survivorship function being too low. Even if there is nothing wrong with the underlying default model in equation A.2, expected defaults will be too low because too many prepayments are being counted as "good" terminations of mortgages, when default risk actually remains. Essentially, this error leads FHA to believe that substantial future risk has been eliminated from its insurance liabilities when it has not. The culprit is the treating of streamline refinance loans as prepayments in the same sense loans terminate because they are paid off with the proceeds from a home sale or from a new loan not insured by FHA. Mathematically, this causes $h^p(t)$ to be too high in A.3, and S(t) to be too low in A.4.

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[1] The support of Henry Olsen and the American Enterprise Institute throughout this project is much appreciated. I also benefitted greatly from conversations with Andy Caplin and Joe Tracy. Ying Chen and Wenjie Ding provided outstanding research assistance. Naturally, I remain solely responsible for all conclusions and any errors.

[2] See the Monthly Report to the FHA Commissioner made by the Office of Evaluation. It may be downloaded at http://portal.hud.gov/hudportal/documents/huddoc?id=11jul.pdf.

[3] The literature on this is lengthy. Deng, Quigley, and Van Order (2000) is a classic empirical paper on the estimation of defaults. Foote, et. al. (2009) and Elul, et. al. (2010) provide a more recent take on default following the great housing boom.

[4] In many press reports and some research papers, this law is called the Cranston-Gonzalez Act, in reference to the then–California Senator and Texas Congressman who were its primary sponsors. Weicher (1992) provides an excellent review of the events leading up to this reform, with Capone (2001) providing a more recent retrospective on those events and the NAHA itself.

[5] Those data show that FHA insurance premiums generally have come down over the past decade, although they did increase briefly in 2008 when the housing crisis began. It is noteworthy that FHA has not been able to maintain a risk-based premium schedule that charges riskier borrowers appropriately more for insuring their loans. This is a reflection of the political constraints under which the agency must operate.

[6] FHA is subject to so-called accrual-based accounting. Its import is that it permits FHA leeway to overstate cash up front and to understate future costs.

[7] The figures in Table 1 (and throughout the paper) on the MMIF exclude the home equity conversion mortgage (HECM) program that recently was rolled into FHA's main insurance fund. Thus, we focus exclusively on standard single-family, not reverse, mortgages. The latter are a very small part of FHA's insurance business, so their exclusion does not materially change any of our key findings or conclusions regarding the riskiness of future liabilities of FHA's MMIF. Finally, FHA's fiscal year runs from October through September, so this period ends in September 2010.

[8] This is after a series of adjustments pertaining to the net gain on investments, net insurance income over the fiscal year, and two special accounting adjustments that are unique to the 2010 fiscal year. The net gain on investments is a projection based on expected yields on investment in U.S. Treasury securities. Net insurance income is an accounting-based number that does not reflect actual cash flows for the reason discussed just above—namely, that upfront insurance premiums are counted here, but not actually received by FHA in the typical case. REO means 'real estate owned' and probably reflects the fact that rising foreclosures are increasing FHA's portfolio of such homes. In any event, FHA wrote up the value of these holdings in 2010. The transfer to the HECM account is done to segregate that small insurance program from the single-family MMIF. Thus, the Total Capital Resources figure in the second column is an estimate of actual liquid resources available at the end of the fiscal year. The next year's actuarial review will provide the true resource state.

[9] That is, the implicit assumption is that losses and insurance premiums on all future business are exactly offset. Not issuing any more insurance would be financially equivalent.

[10] That decision was the result of much analysis and debate, as described by the aforementioned Price Waterhouse (1990) report. We do not debate its legitimacy here, but take it as is for our analysis of the soundness of FHA.
[11] The 1990 NAHA inadvertently introduced confusion about the denominator of this ratio, incorrectly using the term unamortized insurance-in-force, when it clearly meant amortized insurance-in-force. The latter correctly reflects the outstanding unpaid mortgage balance, which represents the true potential liability of FHA. Throughout this paper, we use amortized insurance-in-force figures, although the actuarial reports include both figures.
[12] The latest data available for 2011 indicate a slight fall off from 2010 shares, but they remain quite high relative to past levels of activity by FHA.
[13] See the July 2011 Monthly Report to the FHA Commissioner, which may be downloaded at http://portal.hud.gov/hudportal/documents/huddoc?id=11jul.pdf.
[14] A review of Freddie Mac's annual reports shows $1.701 trillion in guaranteed mortgages, mortgage securities, and specially structured securities in existence in 2007, versus $1.712 trillion in 2010. The analogous figures for Fannie Mae were $2.421 trillion in 2007 and $2.700 trillion in 2010.
[15] The share of conventional single-family home purchases with LTVs greater than 90% dropped precipitously from 29% in 2007 to 9% in 2010 (Joint Center for Housing Studies, Harvard University, 2010). This reflects the virtual disappearance of the private subprime market for new originations. While FHA is the only remaining major guarantor of high loan-to-value mortgages, it is important to note that it has not replaced subprime in the sense of insuring exotic mortgages (e.g., option ARMs, no-doc loans, etc.). Its standard product was and remains a fully documented thirty-year, fixed-rate, fully amortizing mortgage.
[16] Data from other sources corroborate this. Micro data on home purchases from DataQuick, a major data provider to the housing industry, reported in Ferreira and Gyourko (2011) show that the typical LTV on FHA-insured loans is about 98% since 2005. Theirs is not a random sample of the FHA insurance portfolio, but it does contain information on all home purchases in ninety-four metropolitan areas. Besides sampling variation, the slightly higher LTV from their data is due to the fact that FHA typically reports LTVs that do not include the impact of the upfront insurance premium being financed by adding it to the loan amount. That is why actual LTVs on FHA-insured loans can and do exceed their statutory maximum (which is 96.5% today).
[17] This amounts to about $470 billion out of nearly $880 billion in total guaranteed balances (or 54%). This is conservatively estimated as follows. Starting with the 2010 pool, which has an outstanding unamortized balance of $284.551 billion according to IFE's 2010 actuarial report (Exhibit III-3, p. 31), Table 5's results indicate that loans with more than a 4.3% down payment would be in positive equity territory if the FHFA series is correct, and those with more than a 4.4% down payment would be so if S&P/Case-Shiller is correct. We know from Table 4 that 68% of the loans FHA insured that year had LTVs above 95%, so it is likely that at least that many are underwater using FHFA data, and slightly more using the S&P/Case-Shiller index. Conservatively, we presume that only 60% of the 2010 pool is underwater, which implies about $170.731 billion is so, as $285.551*0.6 ~ $170.731. Similar judgments and calculations are made for each year dating back to 2005. The presumed shares underwater in each of the other years are as follows: 2009 (50%); 2008 (80%); 2007 (90%); 2006 (90%); 2005 (80%). Those shares are multiplied by the outstanding balance remaining on each book of business as reported by IFE in the Exhibit noted just above. That yields the sum of $470.698 billion, which is 54% of all the $879.975 billion insurance-in-force at the end of 2010. That also presumes that none of the other 13.7% of the insurance pool that represents mortgages issued prior to 2005 is underwater.
[18] Each year, the outside actuary projects the value of seven years of subsequent books. Thus, the 2005 actuarial review estimated the value of those future books of business for 2006–2012. The latest review from 2010 estimated values for subsequent books in 2011–2017.
[19] FHA would have failed in the sense that the projected Economic Value of the MMIF would have gone negative had it simply returned to its average size in the 2000–2004 run-up to the peak of the housing boom. FHA's average new book of business involved insuring about $117 billion per year during that timeframe. In 2009, when FHA was well below the suggested 2% capital ratio guideline, and its projected MMIF Economic Value was $2.732 billion, it wrote insurance on $330 billion of loans, or for an extra $213 billion in mortgage balances above its earlier average. Just the lower accounting income from the 1.50%–1.75% upfront premiums pertaining to that year (see Appendix #1, Table A.1) would have driven Economic Value negative (as 0.015*$213billion = $3.195 billion and 0.0175*$213 billion = $3.728 billion, both of which exceed $2.732 billion).
[20] Each annual review forecasts seven years of future books of business.
[21] For example, the latest actuarial review, from 2010, expects each existing book of business dating back to 1999 to generate net losses to the MMIF going forward, with the 2006–2010 books alone expected to lose $19.732 billion for the fund in future years (see Exhibit III-2, p. 29, of the 2010 review for the details).

[22] One obvious counter would be if insurance premiums were raised high enough to compensate for the much greater expected defaults, thereby rendering the fund solvent. However, we know from Appendix #1, Table A.1 that that is not happening (and the projections underlying the estimates make no such assumptions).
[23] Just because a mortgage defaults does not mean that there will be losses to the FHA insurance fund. Many defaulted mortgages "cure" themselves by paying back any funds due. In addition to the estimation of the propensity to default, there is a separate regression model that estimates the propensity of a defaulted loan to lead to a claim against the MMIF. This is described in Appendix A of IFE (2010).
[24] See Exhibit A-3.1 and the discussion in Appendix A of IFE (2010) for a complete list of the variables included in the estimation model, as well as the estimated coefficients from each model. While coefficients are readily available, standard errors are not reported, and no summary statistics describing means and variances are reported. This is contrary to sound and widely accepted research practice, as it prevents readers from knowing when some variable is statistically significant in its own right or relative to some other variable. It is virtually impossible to gauge the true reliability of individual results or sets of results without this information. In this respect, the reporting of all model estimation results should be brought in line with accepted research practice.
[25] There is no formal legal definition of what constitutes a subprime borrower. Keys, et. al. (2010) and other researchers have used a FICO score of 620 as the cutoff, so our hypothetical borrower is right around that margin.
[26] A number of other traits also are controlled for, such as the interest rate environment and how expensive the home was at purchase relative to others in its market area. See Appendix 2 for more detail, as well as descriptions of how each of the default propensities discussed in the remainder of this section is computed.
[27] This terminology arose because this higher risk is unobserved by the researcher, who cannot measure it directly.
[28] The variable itself is a so-called dichotomous dummy variable that takes on a value of 1 if the loan was originated after the 2006 fiscal year, and is zero otherwise.
[29] Similar effects result for different borrower-loan combinations, including less risky ones. For example, if we presume the borrower has a FICO score in the highest possible category of 720-850, that borrower is projected to default at about 10% of the rate of our baseline case in which the borrower has a FICO score in the 600-639 range. However, the predicted probability of default still nearly doubles when we control for unobserved risk by including the post-2006 dummy variable.
[30] The only mention of this that I could find in the latest annual review is in a single paragraph of discussion under the heading "Mortgage Crisis Period" on p. A-21 in Appendix A of the 194-page report by IFE (2010). There is no discussion of how much the predicted impact of this variable is reduced each quarter of 2012 and 2013. However, it is clear that the coefficient is "zeroed out" beginning in the first quarter of 2014. There does not appear to be any other case in which the predicted impact on defaults going forward is not based strictly on the underlying regression coefficients using past data. That is, none of the other coefficients is altered to reduce (or increase, for that matter) its impact on defaults over time.
[31] The share of borrowers with FICO scores above 680 (which is well above subprime quality range, as typically measured) has doubled since 2008, when it was 28.1%, to 57.1% in 2010. And, there is every indication this did not fall in 2011. Moreover, there is almost no one in a recent mortgage pool with a FICO score below 600 (i.e., clearly of subprime borrower risk). The share with FICO scores under 600 is only 0.2% in 2010, down from 8% in 2008 (see Exhibit IV-6, p. 42, IFE (2010) and the discussion surrounding that table). These improvements in observed credit risk help generate substantially lower expected defaults and losses going forward than would be case otherwise. For example, holding constant each of the borrower, loan, and market traits presumed in the baseline example except for borrower FICO score shows that borrowers with very low FICOs, in the 500–559 range, have a propensity to default ten times higher than someone with a very high FICO, in the 720–850 range. Thus, projected losses would be much higher had those very poor credit risks not been eliminated from the FHA insurance pool.
[32] Technically speaking, the problem is that when some outcome such as defaulting is regressed on a noisy measure of a variable such as unemployment, the regression coefficient is biased down. In this case, the bias is so severe that there is no meaningful statistical correlation observed between default and unemployment status. Hence, unemployment is of no help in predicting default.
[33] The cautious language is due to the fact that one cannot be sure the increase will be proportional. There could be heterogeneity in the impact across different types of borrowers that would lead to larger or smaller changes.
[34] Another potentially useful way for FHA to help identify how big the impact could be is to estimate aggregate default and claims loss models. By this is meant market-level estimations that do not rely on individual borrower data. Unemployment rates can be measured accurately over time at the metropolitan-area and state levels. Those measures could then be used to see how correlated they are with aggregate defaults across borrowers within the same metro area or state. I am grateful to Joe Tracy for this insight.

[35] The same holds for the alternative economic scenarios they examine, as this appears to be a key reason why the MMIF Economic Value recovers and turns positive by 2015 in the Complete Collapse, Depression scenario discussed above. The timing, whereby the impact of this variable disappears beginning in 2014, fits well. Moreover, it is inconceivable that unobserved credit risk would not be very high in this scenario.

[36] One reason for the larger impact from "nonprofits" is that other research indicates that their down payment assistance gets capitalized into the purchase prices, thereby raising the loan-to-value ratio. While this may constitute fraud in some cases, it definitely raises the likelihood of there being negative equity in the home, which itself is known to increase the prospects of default. For more on this type of assistance and its effects, see GAO (2005) and Ben-David (2011).

[37] Within the FHA-insured portfolio, the share of SFDPA mortgages among first-time homebuyers rose by a factor of 18, from under 2% in 2005 to nearly 37% by 2007, as the housing boom built to its peak (see Table 12, p. 25, HUD (2010)). These figures refer to the share of down payment assistance by what HUD and FHA term nonprofit organizations. A typical example during the boom would have been a nonprofit funded by a homebuilder.

[38] The Housing and Economic Recovery Act of 2008 previously provided a refundable tax credit that functioned as an interest free loan. There were numerous extensions and revisions of these programs. See the discussion in Treasury (2011) for more detail. Aragon, et. al. (2010) also note this problem as part of their conclusion that FHA risk is higher than realized by HUD.

[39] The main qualification was income-related, with phase outs making it so that a lesser amount or no credit would be received by single tax filers with adjusted gross incomes in excess of $75,000 and joint tax filers with adjusted gross incomes greater than $150,000. Subsequent interpretations by the IRS allowed it to be applied on homes purchased throughout much of the 2008–2010 time period.

[40] Technically, these were second liens that buyers typically paid off with cash from their tax credit refunds. FHA also allowed approved mortgagees (i.e., the lenders) and some nonprofits to purchase the tax credit anticipated by the buyers. Certain rules prevented those funds from being used as the down payment, but the bridge loan mechanism was sufficient for that purpose. And, if one could not use a state or local public nonprofit for the bridge loan, a similar arrangement could be made with a family member. There was, in fact, a sharp jump in the fraction of loans with down payment assistance from what FHA terms Family Gifts: from 12.9% in 2008 to 22.7% in 2009, and then to 27.5% in 2010 (see Table 12, p. 25, HUD (2010)). HUD's 2010 annual report on FHA has a false sense of security from this increase. It is true that defaults and claims on cases when a relative provides down payment assistance are lower than when an unrelated third party funds the down payment. However, there is no reason to believe that this sharp jump in family assistance truly reflects some fundamental change in intra-familial generosity. A much more likely explanation is that individuals could promise their future tax credit refund to family members in return for using their funds for the down payment, quite possibly more cheaply than could be done with a public agency. The tax refund pays off the family member and leaves FHA (and the taxpayers) with a borrower who has not really put any equity into the property.

[41] See Brogaard and Roshak (2011). The incidence of any subsidy such as this is determined by the relative elasticities of supply and demand for housing. Supply needs to be relatively inelastic for their conclusion to hold. This seems likely, as it is difficult to change the supply of homes quickly, while the tax credit program was implemented very quickly and with relatively little forewarning.

[42] Assume an $8,000 bridge loan (that you will pay off with your tax credit funded by taxpayers) toward the purchase of a $168,000 home, which was the average price first-time buyers paid in 2009 and 2010, according to FHA (see Table 12, p. 25, HUD (2010)). A 2.5%–3.5% down payment requires $4,200–$5,880 in upfront equity. Standard closing costs of 2%–3% imply another $4,200 or so. Clearly, it is possible to use this mechanism to buy a house with little or no personal equity investment.

[43] These IRS data may be downloaded at www.irs.gov/taxstats/article/0,id=220060,00.html.

[44] Data on purchases of new homes are provided by the U.S. Census Bureau at www.census.gov/const/www/newressalesindex.html. Data on existing home sales are tracked by the National Association of Realtors and may be downloaded at www.realtor.org/research/research/ehsdata.

[45] FHA does not know either. It does not track use of the credit, presumably because it does not recognize this as the equivalent of down payment assistance. It should start doing so immediately in order to gauge the likely losses, which it should be able to estimate more precisely given its microloan data.

[46] See Appendix F, Econometric Results, Cumulative Claims Rates All Mortgages, By Credit Subsidy Endorsement Cohort, of the 2010 actuarial report for the detailed projections. We use this estimate even though the work of Aragon, et. al. (2010) and the analysis in the subsection below suggests that projected default rates may be underestimated by at least 50%. This helps makes the assumption a conservative one.

[47] The $11.4 billion figure is arrived at as follows. Start with the 1,667,777 first-time homebuyers for which FHA insured loans in 2009 and 2010. Then divide that total into the share of implied SFDPA borrowers who used the tax credit to fund their down payment and the share that did not. In the 50-50 split case, there are 833,888 borrowers in each group (as 1,667,777/2 ~ 883,888). If we presume the typical mortgage was for $165,000, that implies total mortgage balances of $137.592 billion in each group. We then apply the 8.5% cumulative claims rate for the 2009 and 2010 pools as predicted by IFE in its 2010 actuarial report to the 833,888 non-SFDPA borrowers and the 25% claims rate to the 833,888 SFDPA borrowers. This leads to claims of $23.391 billion on the non-SFDPA group and of $34.398 billion on the SFDPA group. With a loss rate of 50%, total expected losses to FHA are $23.047 billion. This is $11.4 billion more than the $11.695 billion in losses that would be expected if one believed that there were no SFDPA loans in the pools.

[48] These added losses will occur over time in the future and should be discounted back to the present to be strictly compatible with the calculation of the Economic Value of the MMIF. This cannot be done precisely without access to FHA's underlying loan data and models. However, if we presume that all the losses were realized in the middle of the ten-year period over which we used their claims projections, the present value of our estimates is 16% lower (this is based on the discount factors used by IFE in its latest actuarial review (IFE (2010), Exhibit B-6)). Thus, today's value of those extra future losses ranges from $5.5 billion to $12.8 billion. The lower end of that range still roughly equals IFE's estimate of the current value of the MMIF. Even given the back-of-the-envelope nature of the calculation, there is no doubt that this is going to be economically important to the FHA insurance fund.

[49] IFE (2010) follows Deng, Quigley,and Van Order (2000) and Calhoun and Deng (2002) in the creation of this variable. See the discussion on p. A-14 of Appendix A in IFE (2010) for more detail.

[50] Using data from February 2010–June 2011 downloaded from FHA's Single Family Snapshot file, we estimate that well over four-fifths of these recently insured loans that were made in a group of over ninety large metropolitan areas were for purchases in neighborhoods that appreciated by less than the FHFA price index for their metropolitan area in the past. The FHA loan data are available at http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/rmra/oe/rpts/sfsnap/sfsnap. The two price growth series being compared are the FHFA repeat sales index for each metropolitan area and a hedonic price index created for groups of two to three census tracts by Ferreira and Gyourko (2011). The time period is from 2000(1) to 2009(1). The FHA Single Family Snapshot files report the zip code of the home that was purchased with the underlying loan. Those loans were allocated to census tracts using a cross walk between tracts and zip codes. If a zip code spanned (say) three tracts, the loan was randomly assigned to one of the tracts. The tract-level hedonic price indexes created in Ferreira and Gyourko (2011) were then used to compare appreciation in each tract location with that for the broader metropolitan area in which that tract was located. Eighty-six percent of the loans were made on homes in tracts that experienced less appreciation than the FHFA estimates for the relevant metropolitan area.

[51] The dataset created by Ferreira and Gyourko (2011) also can be used to compare housing traits of FHA versus non-FHA homes through early 2009. The data for 2008, which capture the first year of significant expansion of FHA show that the homes bought with FHA-insured mortgages are cheaper (at a $205,923 mean price versus a $307,170 average for non-FHA-insured homes in the same ninety-four metropolitan areas) and smaller (averaging 1,534 square feet in size versus 1,831 square feet for non-FHA-insured homes in the same markets). Other quality measures such as the number of bedrooms and bathrooms also show lower numbers on FHA-insured home mortgages.

[52] FHA should use a different price index to create this variable, and it should cover more than purchases made with conforming loans, as FHA does not really guarantee conforming loans.

[53] Only if the prepayment arises from a home sale or from a refinancing that involves paying off the FHA-insured loan and taking out a new mortgage not insured by FHA is the risk from a future default truly eliminated. In addition, this problem is general in nature, but becomes more important when interest rates fall and there are more prepayments. With the sharp drop in rates in recent years, this especially affects the very large books of business since 2008, and will significantly impact the 2010 and 2011 books going forward.

[54] For example, the post-2006 mortgage pool dummy picks up some of the impact of uncontrolled-for unemployment, negative equity that is too low, etc., until 2014. Unfortunately, it is impossible to tell the precise extent.

[55] HUD's statements about FHA's cash flow position are so opaque that it is virtually impossible to ascertain its true state. One example comes from HUDs' most recent report to Congress, which notes that the MMIF paid out just over $14 billion in claims over the past four quarters, plus another $0.5 billion in property management expenses (Table 8, p. 12, HUD (2010)). That outflow is counterbalanced by the insurance premiums that the MMIF receives. The same table notes that they amount to $9.3 billion, with another $5 billion of income coming in from property

sales, so that there were no net cash outflows from the MMIF over the past twelve months. The true cash situation probably is not nearly as rosy because it is likely that the $9.3 billion figure includes phantom accounting income from upfront mortgage premiums allowed under FHA's accrual-based accounting rules. This arises because of the issue discussed earlier in the paper about FHA essentially financing the upfront premium for many borrowers. Until 2010, FHA's annual premiums were never more than 50–55 basis points. As of last year, it had just under $900 billion insurance-in-force. If it received an average of 52 basis points on its outstanding mortgage balances, that would generate only $4.7 billion in annual fees (i.e., $900,000,000,000 * 0.0052). Some of the $4.6 billion difference between this figure and the reported $9.3 billion number could be from upfront fees that really were paid and not borrowed from FHA and added to the initial loan amount to be paid back of over time. Some of it undoubtedly also reflects the annual payback of those borrowed funds. If the $9.3 billion premium in-flow counts upfront fees (as I suspect), then the true cash position could be overstated by as much as $3 billion because that is the amount of income FHA would be expected to book in an accounting sense on a new $300 billion book of business with a 1% upfront premium ($300,000,000,000 * 0.01 = $3,000,000,000). If that is the case, then FHA ran a cash flow deficit of about –$3 billion over the past year. That still is only one-tenth of its liquid capital reserves, but such deficits obviously cannot go on forever, and liquidity risk would increase sharply if we had the misfortune to experience another "black swan" event (e.g., a financial crisis in the Eurozone that spills over to the U.S. and causes a recession that leads to a spike in defaults). Going forward, FHA's cash position will benefit from the recent change of its premium structure, which now is weighted more toward annual premiums and less toward upfront fees. FHA does have $1 trillion in outstanding insurance-in-force, and, ultimately, it can expect to receive 85–90 basis points in annual income on that stock. That will generate $8.5 billion–$9.0 billion dollars annually. In that case, cash inflows and outflows would roughly balance, if defaults were not to spike for some reason. The probability of a future liquidity crisis is a race between the higher income that will arise as more of the portfolio is subject to the higher annual fee and the higher outflows that would occur if defaults and losses were to escalate for any reason. For now, it would be very useful if HUD simply published transparent figures so that we could know the true "burn rate" on cash.

[56] For homes outside of metropolitan areas, IFE (2010) uses county-level data.

[57] Technically, we now presume that df_2007_xxxx_cat_2 = 1 and use its coefficient in our computation of the probability of defaulting.

[58] In this case, all other traits are held constant except trait *j*. Technically, we use the coefficient on the categorical variable gift_ltr_src_cat_3 rather than on gift_ltr_src_cat_1.

[59] Technically, this involves using the coefficient on the categorical variable pneqcat_cat_7 rather than pneqcat_cat_1.

[6060] These equations follow the specific exponential functional forms used by IFE in its estimations. The key point about default probabilities being underestimated is not sensitive to this assumption. It would hold given any general functional form that might be used to estimate equations A.1 and A.2.