LSE Research Online

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Natacha Postel-Vinay

Debt dilution in 1920s America: lighting the fuse of a mortgage crisis

Article (Accepted version) (Refereed)

Original citation: Postel-Vinay, Natacha (2016) *Debt dilution in 1920s America: lighting the fuse of a mortgage crisis.* The Economic History Review . ISSN 0013-0117

DOI: 10.1111/ehr.12342

© 2016 Economic History Society

This version available at: http://eprints.lse.ac.uk/68127/
Available in LSE Research Online: October 2016

LSE has developed LSE Research Online so that users may access research output of the School. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LSE Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain. You may freely distribute the URL (http://eprints.lse.ac.uk) of the LSE Research Online website.

This document is the author's final accepted version of the journal article. There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

http://eprints.lse.ac.uk

"Debt Dilution in 1920s America: Lighting the Fuse of a Mortgage Crisis"

September 2016

Natacha Postel-Vinay
London School of Economics
London WC2A 2AE
n.m.postel-vinay@lse.ac.uk

The idea that real estate could have contributed to banking crises during the Great Depression has been downplayed due to the conservatism of mortgage contracts at the time. For instance, loan-to-value ratios often did not exceed 50 per cent. Using newly-discovered archival documents and data from 1934, this paper uncovers a darker side of 1920s US mortgage lending: the so-called 'second mortgage system.' As borrowers often could not make a 50 percent down payment, a majority of them took second mortgages at usurious rates. As theory predicts, debt dilution, even in the presence of seniority rules, can be highly detrimental to both junior and senior lenders. The probability of default on first mortgages was likely to increase, and commercial banks were more likely to foreclose. Through foreclosure they would still be able to retrieve 50 percent of the property value, but often after a protracted foreclosure process. This would have put further strain on banks during liquidity crises. This paper is thus a timely reminder that second mortgages, or 'piggyback loans' as they are called today, can be hazardous to lenders and borrowers alike. It provides further empirical evidence that debt dilution can be detrimental to credit.

I Introduction[1]

The recent financial crisis has reminded us of the impact that homeownership and mortgage finance can have on the economy. It has highlighted the complexity and many pitfalls of real estate lending for banking institutions. Perhaps for this reason, some have looked back at the U.S. Great Depression, examining possible parallels and emphasizing the occurrence of a real estate boom in the 1920s. Authors have convincingly shown, however, that real estate likely was not the main source of economic woes in the 1930s.[2] Real estate played a smaller part in the economy, banks generally did not securitize their mortgages, and many of them (especially national ones) held very few real estate loans as a proportion of their assets.

Nevertheless, insistence on the absolute safety of 1920s commercial bank mortgages would be misleading. While some have emphasized their surprisingly low loan-to-value ratios (usually only around 50 per cent) and their short maturities, their conservatism conceals some important, less well-known features. The aim of this paper is to examine those features, and argue that, perhaps paradoxically, these loans' contractual characteristics contributed to increased default rates. While the paper does not draw explicit links between real estate lending and commercial bank failures, it suggests that it may have contributed to the severity of banking crises in the early 1930s.

By inquiring whether borrowers could in practice make 50 per cent down payments, the paper uncovers the extent of the 'second mortgage system' (as it was called at the time), one of the most widespread – and yet least well-known – forms of debt dilution in recent economic history. While the negative effects of debt dilution are well documented in the theoretical literature, its prevalence in the 1920s U.S. commercial bank mortgage market is much less so. This is despite contemporaries, such as President Hoover, describing the second mortgage system as 'the most backward segment of [the U.S.'s] whole credit system'.[3] As few authors have analysed debt dilution empirically,[4] this paper thus also provides further empirical support to the idea that debt dilution can be detrimental to credit.

[1] I am very grateful to my advisors Olivier Accominotti and Albrecht Ritschl for their continuous support and guidance. I would also like to thank Alex Field, Price Fishback, Andra Ghent, Jonathan Rose and participants at the 2012 Lisbon FRESH meeting and at the 2013 London EHES conference, the HEDG seminar at the University of Southern Denmark, and the 2014 History and Economics Conference at Yale University for useful comments or for sharing data with me. Funding from the Economic and Social Research Council is gratefully acknowledged. All errors are mine.

[2] See, in particular, Field, 'Interwar housing cycle'; and White, 'Lessons.'

[3] J. M. Gries, and J. Ford, *The President's conference on home building and home ownership*, called by President Hoover (Home Finance and Taxation. National Capital Press, Washington D.C., 1932) available at http://babel.hathitrust.org/cgi/pt?id=wu.89047199922;view=1up;seq=7

[4] See Degryse et al., 'On the non-exclusivity'.

While borrowers were urged to 'own their own homes' in the early 1920s, banks on the other hand often would not lend more than half the price of the house. Borrowers were tempted to borrow from third parties (such as individuals or small second mortgage institutions) to help them make the high down payment. A second mortgage market flourished, benefiting more than 75 per cent of first-mortgage borrowers. In addition to the serious debt dilution problem it created for first mortgage lenders, the second mortgage system presented other aspects which only aggravated it. Indeed, second mortgage lenders charged exorbitant interest rates, and insisted that their loans be repaid before first mortgages and at more regular intervals. This meant that while second mortgages were junior before the law, they acquired a certain form of seniority in practice, putting repayments of first mortgages under further threat.

The paper starts with a brief overview of existing models of debt dilution in the economics literature. Particular attention will be drawn to Bizer and DeMarzo's model which analyses the negative impact of 'sequential banking' (the occurrence of borrowing from different lenders) on the first lender.[5] While Fama and Miller suggest that sequential banking is not a problem in the presence of seniority rules,[6] Bizer and DeMarzo effectively demonstrate that extra lending from a second bank creates an externality through the devaluation of prior debt which seniority rules cannot completely eliminate. In equilibrium, as first lenders anticipate the problem, interest rates end up higher on all debt, and so do probabilities of default.

The paper then moves on to explain how high default rates on first mortgages could have mattered for commercial banks during the Depression (section III). Providing evidence of state banks' exposure to real estate nationally in the 1920s, it emphasizes that while low loan-to-value ratios (LTVs) protected banks against significant losses, increased default rates likely put further strain on banks under certain circumstances – during bank runs in particular. This was due to long redemption periods allowed by state laws.

Section IV provides contemporary evidence of the existence and extent of the second mortgage system. Information gathered from the National Association of Real Estate Boards archives and other contemporary sources allows me to establish that around 76 per cent of first mortgage borrowers resorted to this system, so that total mortgage debt was not 50 per cent of the value of the property but rather around 75 per cent, from two different lenders. I document average interest rates and amortization terms for both types of loans in most states

[5] Bizer and DeMarzo, 'Sequential banking'.
[6] Fama and Miller, *Theory of finance*.

Finally, Section V examines data on commercial bank mortgages made in 22 U.S. cities before the Depression started, and provides some evidence that low LTVs likely led to higher foreclosure rates in those cities. The data is taken from the *Survey of Urban Housing* published in 1937 by the Department of Commerce under the supervision of David L. Wickens. While it does not allow one to analyse each mortgage individually, it exploits variation in average LTVs and foreclosure rates on first mortgages between cities. The result is a strong negative correlation: the lower the loan-to-value ratio, the higher the probability of foreclosure. Although this result would be counter-intuitive to most observers today with no knowledge of second mortgages, the existence of the second mortgage system offers a plausible explanation. This section ends with contemporary descriptions of the problem, specifically highlighting the seniority-reversal effect.

Section VI concludes that the Depression experience serves as an incentive for caution regarding the use of additional loans (such as 'piggyback' mortgages) whose debt dilution effects are difficult to mitigate. While in the 1930s increased default rates mainly mattered from a liquidity point of view, in the more recent crisis they also impaired banks' capital.

II Models of Debt Dilution

Debt dilution is one of the central topics of contract theory. It is suspected to have played an important role in a number of financial crises, such as the Latin-American debt crisis of the 1980s, the East Asian crisis of the late 1990s,[7] and even the recent worldwide financial crisis.[8]

To understand the phenomenon, consider Bizer and DeMarzo's two-bank problem.[9] They begin by describing a situation where a borrower can only take loans from one bank. In this case, additional lending from that same bank imposes an externality on prior lending. Prior debt is 'devalued' as effort to pay back the first loan is proportionately reduced -- this is often referred to as *straightforward* debt dilution. However the bank can internalise this externality by increasing the marginal price (interest rate) of each new loan, which compensates for the devaluation of prior debt.

[7] Bisin and Guaitoli, 'Moral hazard'; Radelet and Sachs, 'Onset.'
[8] See Acharya and Bisin, 'Counterparty risk externality.'
[9] Bizer and DeMarzo, 'Sequential banking.'

This contrasts with a situation in which the borrower can take an additional loan not from the first bank, but from a second bank. In that case the first bank cannot compensate for the externality that the second loan imposes on its own prior debt by charging a higher rate on that second loan. Instead, in equilibrium, it charges a higher interest rate on its own original debt, which leads to a higher probability of default on that loan. Such a result is also found by Holmström and Tirole and more recently by Parlour and Rajan.[10]

Fama and Miller initially suggested that a simple solution to this problem would be for each lender to be assigned a clear priority level in the bankruptcy process.[11] According to this theory, seniority rules would reduce the first lender's anxiety about possible debt dilution as he would be first in line to recover the borrower's assets in case of default. However since then a great number of authors have warned that seniority rules were no panacea, and that first lenders were still likely to modify their loan terms in equilibrium.[12]

Such changes can include a rise in interest rates, as in the previous case. But first lenders can also ration credit, change the maturity of loans and make them shorter, or, in the case especially of sovereign debt, make their loans harder to restructure. The latter is described in a model by Bolton and Jeanne,[13] where sovereign debt is described as excessively difficult to restructure in equilibrium, due to expectations of debt dilution. Shortening maturities is something that lenders to banks, in particular, resort to, according to Brunnermeier and Oehmke.[14] By shortening the maturity of their loans junior lenders can become *de facto* senior; but this in turn leads first lenders to shorten the maturity of their own debt: thus a 'maturity rat race' is created.[15] Finally, a number of authors point to credit rationing as a reaction to debt dilution.[16]

Which of these reactions was commonest in the 1920s? We will see that while debt dilution increased the probability of foreclosure, the channels through which this occurred varied. In some cases it is possible to ask simply whether lenders could clearly anticipate all the possible risks attendant to second mortgage lending, including the seniority-reversal

[10] Holmström and Tirole, 'Financial intermediation'; Parlour and Rajan, 'Competition in loan contracts.'
[11] Fama and Miller, *Theory of finance*.
[12] For example, it is possible that even if first lenders are able to recover 100% of their collateral in the event of default, there are still bankruptcy or foreclosure costs that they would prefer to avoid.
[13] Bolton and Jeanne, 'Structuring and restructuring.'
[14] Brunnermeier and Oehmke, 'Maturity rat race.'
[15] Brunnermeier and Oehmke's paper has wider implications than those directly linked to the debt dilution problem. Indeed, it questions the very efficiency of banks' maturity mismatch, long heralded as a liquidity enhancer and a disciplining device (see Diamond and Dybvig, 'Bank runs'; and Calomiris and Kahn, 'Role of demandable debt'). It argues that bank debt may in fact be excessively short-term and thus inefficient.
[16] See, in particular, Bennardo et al., 'Multiple-bank lending'; Degryse et al., 'On the non-exclusivity'; Kahn and Mookherjee, 'Competition and incentives.'

effect – to be described in Section V.[17] In others, such as for mortgages made in 1928, it seems that interest rates are to blame. The possibility of credit rationing makes things even more complex, as in the 1920s the very reason for the existence of second mortgages was the small size of the original loans. This means that a negative feedback effect towards smaller and smaller loans cannot be excluded.

Dilution models usually assume that the second loan is taken subsequently to the first. The 1920s case is probably unusual in that second mortgages, while junior in legal terms, were often recorded at the county register simultaneously with first mortgages (thus allowing borrowers to make their down payment).[18] Debt dilution likely still occurred, however, as the first mortgage lender found himself in much the same situation as the first bank in Bizer and DeMarzo's framework: expectations of reduced efforts on the part of borrowers to repay first loans would have led first lenders to compensate by changing the terms of their loans accordingly. In other words, first loan terms were likely stricter than if no second mortgages had been taken.

Yet one may ask why banks would accept the very existence of second mortgages in the first place. Instead of imposing on themselves an inefficient two-lender equilibrium, they could have avoided it by offering a much higher loan-to-value ratio from the start. While the question should remain largely open, at least one explanation may be offered here. Quite possibly, banks prioritized credit risk and felt safer with very low LTVs. They expected some increased default risk but saw that low LTVs would allow them to incur very few losses. This view is in fact shared by some scholars today: how could mortgage foreclosures have mattered for banks in the 1920s, given such low LTVs?[19] One of the aims of this paper is to suggest that high foreclosure rates could have mattered at least to some extent by reducing mortgages' liquidity. While mortgages' liquidity matters little in good times, its importance

[17] This would have created *straightforward* debt dilution whereby effort to pay back the first loan is reduced without full anticipation from the first lender (Bizer and DeMarzo, 'Sequential banking'). See Section V for more detail.

[18] All mortgages had to be recorded at the time they were taken. See Jones, *Treatise*, p. 343. A second mortgage covenant could even be included in case the second mortgage was due after the first and first lenders wanted to foreclose, with the risk of the second lender being entirely wiped out. In such cases, the covenant would allow second lenders to buy the first loan from the first lender and foreclose only on the second mortgage (see Reep, *Second mortgages*, p. 39). Such covenants must have rarely applied, however, given that most second mortgages matured before first mortgages (see Section IV).

[19] This argument is put forward by both Field and White. See Field, 'Interwar housing cycle'; and White, 'Lessons'.

increases during bank runs and financial panics. It is quite possible that lenders downplayed such risks (relative to credit risk) given the relatively low incidence of runs.[20]

III Commercial Banks and the Real Estate Boom

The fact that commercial banks could have suffered somewhat due to their real estate investments in the 1920s is not straightforward. First, the extent of the interwar real estate boom has only been studied recently, and some uncertainty remains as to its geographical scope. Nevertheless, some of the most recent research on the topic emphasises the broad national scope of the boom and finds popular accounts of the boom as confined to Florida and Chicago misleading. Using city-level data from the Bureau of Labor Statistics and Wickens's *Financial Survey of Urban Housing*, Brocker and Hanes find construction and value patterns as consistent with a significant mid-1920s boom which varied across places.[21] They suggest that the real estate boom and bust was not simply a side-effect of what was happening in the general economy and likely contributed to the severity of the depression.[22] An indication of the size of the boom is given by Figure 1 which shows nonfarm housing starts nationally.

<Figure 1 about here>

Second, commercial banks were certainly not the only – indeed not even the main – lenders on real estate in the country at the time. Although their participation varied across cities, in many places building and loan associations (B&Ls), mutual savings banks, life insurance companies, mortgage companies and non-institutional lenders were more prevalent.[23] In addition, national banks remained under very tight regulation with respect to mortgage lending until 1927. As a result their mortgage holdings only accounted for only 1.7 per cent of their assets in 1926, at the peak of the boom.[24]

---

[20] Emphasis on credit risk rather than liquidity risk is visible in Reep, *Second mortgages*. See in particular, in the first chapter, 'What is an adequate security?' and 'The 50 per cent margin an approximate adequate security'. See also Section III.

[21] Their figures are generally corroborated by Fishback and Kollmann's new series. See Fishback and Kollmann, 'New multicity estimates'.

[22] Brocker and Hanes, '1920s American real estate boom'.

[23] This has been documented thoroughly by Snowden, 'Anatomy'. See also Grebler et al., *Capital formation*, Tables N-2 and N-3, pp. 468-74. These institutions are not analysed here as the topic of interest is the relationship (if any) between mortgage lending and bank distress.

[24] Board of Governors of the Federal Reserve System, 1935-. *All-Bank Statistics, United States, 1896-1955*, available at https://fraser.stlouisfed.org/title/?id=39..

However the importance of state-chartered banks in contributing to the mortgage boom should not be disregarded. A quick look at Figure 2 suggests that their real estate loans greatly increased in the 1920s, reaching a peak in 1926.[25] Figure 3 shows that although many of their investments also increased in the period, the rise was largest for real estate loans. While the estimated[26] data from *All Bank Statistics* do not allow one to distinguish farm from residential and commercial real estate, data on all Federal Reserve member banks indicates that in 1928 and 1929 the proportion of farm real estate to total real estate was only 16 per cent nationally.[27]

<Figures 2 and 3 about here>

The importance of state banks in participating in the real estate boom is emphasized by White, who remarks that mortgages came to account for 25 per cent of their total loan portfolios in 1926,[28] and Eichengreen, whose work partly draws on contemporary accounts.[29] The latter notes that the 'frenzied activity' affecting Florida, Chicago, Detroit and New York City 'would not have been possible without the enabling role of the banks'. Quoting Herbert Simpson in his 1933 article published in the *American Economic Review*:

> (…) Real estate interests dominated the policies of many banks, and thousands of new banks were organized and chartered for the specific purpose of providing the credit facilities for proposed real estate promotions. The greater proportion were state banks and trust companies, many of them located in the outlying sections of larger cities or in suburban regions not fully occupied by older and more established banking institutions.[30]

Finally, some might argue that commercial banks' strict loan terms would have protected them from most economic shocks. For instance, until 1927 national banks were

[25] The figures provided here and in Figure 1 may take renewals into account.
[26] The data are estimated and therefore imperfect. This may especially be so for residential real estate loans held by state-chartered banks.
[27] Board of Governors of the Federal Reserve System, *Banking and monetary statistics*. Note that Federal Reserve members did not have to follow any specific regulations on mortgage lending, although some of them were of course national banks and had to follow national banking law.
[28] White, 'Lessons'. See also Board of Governors of the Federal Reserve System, *All bank statistics.* In the same year national banks' real estate loans only amounted to 5.4% of their assets.
[29] Eichengreen, *Hall of mirrors*.
[30] Simpson, 'Real estate speculation'.

only allowed to make city mortgages for a maturity of up to one year, and when in 1927 they were finally allowed to make 5-year, renewable mortgages, their loan-to-value ratios could not exceed 50 per cent.[31] Regulations were much less strict for state banks, except for some states, but by custom they generally would not allow their LTVs to rise much higher.[32]

This conservatism can partly be explained by a customary insistence on credit risk.[33] It can also be explained by generous redemption laws.[34] Indeed, when the allowed redemption period was particularly lengthy, court fees and property deterioration could increase banks' losses. Variation in redemption laws and LTVs by state helps to see this.

[31] The National Banking Act of 1864, whose aim was partly to bring banks under the control of the federal government and thereby to set standards of good practice, prohibited any type of lending on real estate (see White, *Regulation and reform)*. Under the Federal Reserve Act of 1913, conditions were slightly liberalized for country national banks so as to allow them to make farm mortgages for a duration of up to 5 years, which could not exceed 25% of capital and surplus or a third of time deposits (United States, *Federal Reserve Act*, p. 25). In September 1916, this act was amended to allow urban banks to make real estate loans of up to one year, though excluding banks located in central reserve cities (Chicago, New York and St Louis) (see Federal Reserve Board, *Index-Digest*, p. 44). It is only after the passage of the McFadden Act in 1927 that all national banks were allowed to loan on real estate for 5 years, to an aggregate amount of 50% of their time deposits (see Lloyd, 'Government-induced market failure'). Much of this liberalization was due to an effort on the part of the national banking system to compete with state banks (see U.S. Congress, 68th Congress, Inquiry on Membership pursuant to Act No. 503 (1926b, p. 13) and U.S. Congress, 69th Congress, 1st Ses., Hearings on S.1782 and H.R. 2 (1926a), p. 25). It is also interesting to note that Mr Bains of the National Bank of Philadelphia remarked that one reason why state banks might still be reluctant to adopt national charters was that they could not rediscount real estate paper at the Federal Reserve Banks: 'You take the State banks: the principal loans are on real estate. That may be why so many State banks do not want to go into the national system, because they have no use of the rediscount privileges. They can get rediscount from their correspondent banks, but not from the Federal Reserve bank, because most of their bonds are on real estate; that is, in Pennsylvania'. (U.S. Congress, 68th Congress, Inquiry on Membership pursuant to Act No. 503 (1926), p. 644).

[32] The only precise data available on state-chartered bank legislation comes from Welldon (*Digest of state banking statutes*), although this 1910 source should be a rather conservative one as real estate regulation had a tendency to become more lax in the following decades. According to this survey, only Michigan, Minnesota, North Dakota, Ohio, Oregon and Texas limited loan-to-value ratios to 50%. According to Morton (*Urban mortgage lending*, pp. 3-7, 178), the contract maturity of first mortgage loans rarely exceeded five years, and often only averaging three years. Most only required interest payments, with the principal payable at maturity in a 'balloon' payment. Since these figures are based on a National Bureau of Economic Research survey of urban mortgage lending, their absolute precision may be taken with care. The survey was made in 1945 on a sample of 170 commercial banks, 'representing about one-third of the commercial banks' total nonfarm mortgage portfolio as of mid-1945'. It included 'commercial banks… of all sizes' (ibid., p. 71). However numerous contemporary sources confirm these estimations: see for instance NAREB, Real Estate Finance (hereafter REF), Adair, 'Housing loans' and Gries and Ford, *President's conference,* pp. 6, 16, 20 (see also Section IV). This contract differed from, say, B&L contracts whose mortgages were amortized over 11 years on average. It would be useful to see how this difference in contracts impacted these institutions' chances of survival during the Depression, but B&Ls are known to have suffered from other structural problems with their share participation system which would make a comparison with commercial banks particularly difficult (see, in particular, Snowden, 'Anatomy').

[33] Reep, in *Second mortgages*, indeed referred to a 'custom' that 'has become so deeply entrenched'. From Reep's first chapter it is clear that the main type of risk considered by lenders is credit risk, not liquidity risk (see in particular 'What is an adequate security?' and 'The 50 per cent margin an approximate adequate security.') A neat table on p. 10 explains how different factors can lead to loss of value, and why 50% is a very good limit: variation in appraisal (-10%); instability of value (-5%); obsolescence and depreciation (-10%); changes in occupancy and use (-5%); foreclosure and forced sale (-5%); commission for selling (-5%), financial depression (-5%).

[34] The redemption period is the period during which borrowers may reclaim title to the property by paying down the debt. The general point is also made by Reeve, 'New proposal'.

While the average commercial bank LTV was indeed around 50 per cent, there is some interesting variation across states. Redemption laws also varied, as Table 1 makes clear.[35] And there is indeed a modest negative correlation (around .5) between the number of months allowed for redemption and LTVs. In other words, the more generous state laws were towards borrowers, the more likely banks were to reduce their mortgage loan amounts.

<Table 1 about here>

In spite of this conservatism, it is worth noting that a rise in default rates would not have left banks unscathed under all circumstances. A liquidity shock, for instance, – such as a series of bank runs – could heighten the importance of borrowers' cash flow for banks. Good mortgages could neither be sold in secondary markets nor rediscounted at the Federal Reserve. If default rates rose, banks would be protected against significant losses thanks to their low LTVs.[36] Yet long redemption periods entailed increased liquidity risk as banks would struggle to transform properties into cash.

It is well-known that most commercial banks came under severe liquidity pressure in the early 1930s. Friedman and Schwartz and others provide evidence of this phenomenon, an indication of which is given by Figure 4.[37] The fact that increased default risk would have caused further distress is illustrated by this quote from the vice-president of the First National Trust and Savings Bank in Chicago in 1932:

> As to retaining homes, I have heard a lot of talk about foreclosures and that the banks are calling loans and insisting upon repayment and that the borrowers are unable to refund elsewhere, and they are doing this because they are trying to keep their assets liquid. In our State it takes us, at a minimum, 18 months to foreclose a loan, and it will probably be closer to two years, if not two years and a half, before

[35] More detailed information including foreclosure type and court time is available in Table S.1.
[36] Brocker and Hanes find that owner-occupied home values fell from 20 to 48% during 1930-34. The only city where values fell by more was Wichita Falls, Texas (see Brocker and Hanes, '1920s American real estate boom'). Fishback and Kollmann, computing new indices of home values, find similar results: property values came to a peak somewhere between 1926 and 1930 and fell from 20 to 30% on average (see Fishback and Kollmann, 'New multicity estimates'). See also Postel-Vinay, 'What Caused Chicago Bank Failures?'.
[37] Friedman and Schwartz, *Monetary history*; Wicker, *Banking panics*. See also Richardson, 'Categories and causes'. Figure 4 can nevertheless be difficult to interpret due to the high number of bank failures in the early 1930s.

> we acquire title. We are certainly not maintaining our liquid condition by foreclosing loans. We cannot do anything with it after we get it foreclosed.[38]

<Figure 4 about here>

If second mortgages led to a rise in foreclosure risk on first mortgages made by banks, therefore, it is likely that liquidity crises would have become more severe. The next section discusses what can be learned about the second mortgage system.

IV The second mortgage system

In the depth of the Depression, President Hoover convened 25 committees to work for a number of months on the problems facing mortgage borrowers and lenders. The Committee on Finance for the Conference then drew conclusions that two years later would form the basis of the justification for the National Housing Act. One of these conclusions was that the frequent 50 per cent limit on first mortgages was based on erroneous principles: 'If security is considered, this would seem to be in line with sound public policy. On the other hand, the practice is the principle cause for most second mortgages with their exorbitant rates and frequent failures.'[39]

As a result the bill for the National Housing Act was specifically designed, among other things, 'to eliminate the necessity for costly second-mortgage financing.'[40] This necessity was best described by Reep in his 1928 book on second mortgages:

> The chief financing problem (...) is that of financing above the first mortgage. (...) In purchasing a property (...) it is assumed, of course, that at least a small down payment is made. The difference between the sum of the first mortgage plus the down payment and the total cost of the property must be financed by junior liens. If the cost of the property is $10,000, the purchase money mortgage $5,000, and the down payment $2,500, then the balance, $2,500, is the junior lien.[41]

[38] U.S. Congress, 72nd Congress, 1st Ses., Hearings on S.2959 (1932), part 2, p. 269.
[39] Gries and Ford, *President's conference*, p. ix.
[40] U.S. Congress, 73rd Congress, 2nd Ses., Hearings on S.3603 (1934), p. 1.
[41] Reep, *Second mortgages*, p. 1.

But what proportion of borrowers took on a second mortgage in addition to the first? And what was its average loan-to-value ratio? Unfortunately, the extant quantitative data on the topic is scarce, probably due to the fact that most second mortgage lenders were lightly supervised non-institutional lenders or second mortgage companies.[42] Nevertheless, a number of contemporary sources can help draw a plausible picture of the situation. The National Association of Realtors Archives in Chicago for instance contain extensive archival material on the second mortgage system.[43] Most of the material consists in valuable survey or qualitative information, as in the numerous contemporary research articles from the Association's *Real Estate Finance* journal and thousands of news items from its *National Real Estate Journal* from which many of the references cited in this section and the next are drawn.

Before the Depression, only one statistical inquiry was carried out by the Mortgage and Finance division of the Association, in 1923. It mainly consisted of survey data based on questionnaires sent to about 200 urban banking institutions which were members of the Association.[44] The survey indicates that 76 per cent of first residential mortgage borrowers took on a second mortgage. While this is only survey data, a separate survey was carried out by the above mentioned Committee on Finance in 1931-32, yielding similar results. Gries and Ford indeed noted that 'two-thirds or more of all home purchase transactions require junior financing.'[45] In the Association's survey, the average loan-to-value ratio for second mortgages was 29.6 per cent, so that the total average ratio for first and second mortgages combined was 83.3 per cent. Gries and Ford as well as other contemporary sources put the combined LTV lower, at 75 per cent.[46] NAREB documents also indicate that most loans lasted on average one to three years, so that they usually matured before the first mortgage.[47]

[42] Gries and Ford, *President's conference*.
[43] This trade association of realtors still exists but at the time was called the National Association of Real Estate Boards (NAREB). In the field of mortgage finance their aim was to capture contemporary trends, describe and explain them, and to some extent warn against them if they thought they could constitute a threat to business in the long run. They often asked outside observers (businessmen as well as academics) to contribute to their research output. The second mortgage system was one of the chief examples of 'bad practice' that many contributors criticized.
[44] It therefore excludes B&Ls. The exact source is: National Association of Real Estate Boards Archives (hereafter NAREB), 'Financing the American home'. See NAREB, REF, Reep, 'Problem', which provides further details on the study.
[45] See Gries and Ford, *President's conference*, p.21. See also, for example, NAREB, REF, Adair, 'Housing loans'.
[46] NAREB, REF, Beach, 'Financing'. See also Gries and Ford, *President's conference.*
[47] See, in particular, NAREB, REF, Dunton, 'Cost of financing', pp.172-3. See also Gries and Ford, *President's conference*, p. 20 ('Second mortgages usually run for shorter periods, one to three years being the commonest'). Gries and Ford note that sometimes the first mortgage matured before the second, but they present this fact more as an oddity than common practice.

Also contrasting with first mortgages, second liens were not expected to be renewed, and required monthly amortized payments.[48] Table 2 summarizes these findings.

<Table 2 about here>

The prevalence of very high interest rates and charges – on average 14 to 16 per cent for second mortgages on homes – can be explained in part by the underdevelopment of large institutions making second mortgages. As Bayless and Bodfish put it, 'the majority of second mortgage business is carried on by small firms and individuals, which prevents the operation of the insurance principle through the spreading of risk'.[49] Drawing on 1925 data for Chicago, Bayless and Bodfish described the second mortgage as a rather sound instrument since it only lasted one to three years, there was no intention of renewal, and it required monthly principal payments.[50] They also asserted that it 'has broadened the real estate market and has often been the financial ladder by which the urban tenant climbs to complete ownership.' However they did recognize a 'complete lack of standardization', emphasizing particularly high interest charges.

Yet the most important reason behind these high interest rates was the lack of security backing the second mortgage and the resulting 'discounting business'. As liens were junior they were by definition hazardous for the lender – so much so that charging the maximum legal rate would not be enough to cover the risks attendant to second mortgages. As charging a usurious rate would bring disrepute to the firm or individual offering the loan, they would in turn sell it to a third party, at a discount. This would render the transaction between borrower and investor legal.[51] The third party would then charge an even higher rate to the

[48] NAREB, National Real Estate Journal (hereafter NREJ), Brigham, 'Junior financing'. Regarding second liens, he noted: 'one of the commonest sharp tricks is to sell a man a house for more than it is worth with a small down payment and a one-year second mortgage which at the end of the year the seller mortgagee says that he cannot renew in spite of his assurances to the contrary at the time of sale'. See also Bayless and Bodfish, 'Costs'; NAREB, REF, Beach, 'Financing'; Gries and Ford, *President's conference*, pp. 6, 20.

[49] Bayless and Bodfish, 'Costs'. Gries and Ford mentioned the existence of 'second mortgage companies', the great majority of which failed to weather the Depression (*President's conference*, p. 29).

[50] Bayless and Bodfish, 'Costs'. According to their survey, based on a small sample of properties in Chicago, about half of homes, and around two thirds of apartments, were encumbered with a second mortgage in 1925 (ibid.).

[51] As Reep put it, 'instead of financing the borrower direct, the lender will purchase the second mortgage and land contract paper if it has been executed. This procedure is not affected by usury law because any man has the right to sell his mortgage or his contract at any rate of discount (...) provided that the mortgage or contract is not already tainted with usury in the hands of the seller'. (See Reep, *Second mortgages*, p. 19) Further detail can be found in NAREB, REF, Reep, 'Financing above the first mortgage', where the author insisted that 'second mortgages are bought at a discount and are not made directly with the owner of the property', and the following example is provided: '[t]he seller can take this second mortgage to a second mortgage company and discount it $500 and thereby realize his $5,000 cash for the property as follows: $1,500 cash from the purchaser, $2,500 in

borrower to compensate for the commission it had to pay the dealer.[52] In other words, through the discounting business the borrower ended up paying a higher rate than the already usurious rate he would pay without it. Consequently many contemporary observers, including Reep, criticized usury legislation itself and supported higher statutory maximums. Table S.2 provides information on legal rates (the default interest rate suggested by law) and statutory maximums (the actual maximum rate banks are allowed to charge by law).

To what extent was this discounting business established? According to Reep, the discounting of second mortgage paper was carried out in most U.S. cities for most second mortgages.[53] In this regard it is interesting to note that a small portion of second mortgages were in fact pooled with others and sold to banks and investors as securities. Such securities were the direct obligation of the issuing company. But as Beach made clear, this practice had yet to become more common and better known.[54]

These interest rates were often blamed for borrowers' inability to pay back their second mortgages. Consequently, most lenders specializing in second mortgages went bankrupt in the Depression. As Fahey pointed out in his 1934 article, the mortality rate of second mortgages was 'practically 100 per cent'.[55]

V Consequences for Commercial Banks

cash from the first mortgage and $1,000 cash from the discounted $1,500 second mortgage. In fact, the seller can discount the $1,500 second mortgage any amount that he wishes or even give it away without any danger of usury'.

[52] Reep, *Second mortgages*. This was also explained by Beach: 'The individual investor, fearing that he had more hazard and knowing that he had more trouble demanded a large profit. The dealer wanted a profit too. The borrower paid both - two profits - both large'. (see NAREB, REF, Beach, 'Financing'.)

[53] Reep, *Second mortgages*, p. 86.

[54] NAREB, REF, Beach, 'Financing', p. 13. Reep also provided an interesting account of what has survived today in the literature on building and loan associations (B&Ls) as the 'Philadelphia experiment'. It is often described as a relatively rare form of innovative behaviour on the part of B&Ls, in which some Philadelphia B&Ls started specializing in the second mortgage business in what seemed at first sight an attempt to reap a larger profit (see Loucks, 'Philadelphia plan' and Snowden, 'Anatomy'). Reep's account provided additional information in explaining why even first mortgage borrowers who were B&L members also needed access to the second mortgage market. He conceded that B&Ls' monthly amortization principle allowed them to make first mortgages about 15% higher 'with equal safety' (ibid., p. 90). However for him, 65% LTVs had not solved the junior lien problem as 'they have merely limited the problem to a narrower margin of security'. Indeed, many borrowers still could not make a 35% down payment and still needed to take out a second mortgage (ibid., p. 92). But Reep was quite pessimistic about the future of B&Ls in this business as he thought they would in the end face similar constraints as other second mortgage dealers (ibid., p. 100).

[55] Federal Home Loan Bank Board, *Federal Home Loan Bank Review* (1934). See also NAREB, NREJ, Cope (1929).

In this section I analyse data on commercial bank first mortgages drawing from the Department of Commerce's 1937 *Financial Survey of Urban Housing* conducted under the direction of David L. Wickens.[56] The aim of this analysis is to determine the extent to which second mortgages might have increased default risk on first mortgages made by commercial banks. This survey has many flaws. To start with, it was conducted in January 1934, long after the Depression started, and after most second mortgages made in the 1920s had been paid off or foreclosed – so that it contains no adequate second mortgage data.[57] It is retrospective – surveyors asked mortgage holders about the value of their house when they bought it; they did not look at mortgage contracts themselves. Finally, data is missing for some cities where commercial banks were minor lenders. Nevertheless, to my knowledge this survey provides the most elaborate and detailed data on first mortgages made by commercial banks prior to the Depression. For 22 'representative' U.S. cities,[58] most of which had a population of over 100,000 souls, information was gathered on 1 January 1934 on existing owner-occupied residential properties, whether mortgaged by a commercial bank, not mortgaged or undergoing foreclosure.[59]

While Section IV made clear that LTVs on such mortgages rarely exceeded 50 or 55 per cent, Table 1 also showed that there was some geographical variation in LTVs. Such variation can be exploited to determine whether particularly low LTVs led to higher foreclosure rates. To this end the most important items of the survey were, in each city: 1) the average cost of properties by year of acquisition (whether acquired through debt or bought outright); 2) the average value of properties acquired in 1926 on January 1st, 1934; 3) the average original amount of existing first mortgages; 4) the average percentage of existing first mortgages undergoing foreclosure; 5) the average amount of existing first mortgages by

[56] The data in raw form can be accessed online at http://catalog.hathitrust.org/Record/00110677.
[57] In addition, the existing data on second mortgages cannot be used for this study as it does not provide information on second mortgages taken to specifically complement first mortgages made by commercial banks. In other words the data are bundled up with other data on second mortgages taken to complement first mortgage loans made by B&Ls and other lenders, who in many cases offered higher first mortgage LTVs than banks.
[58] The cities included are: Portland, Maine; Worcester, Mass.; Providence, R.I.; Syracuse, N.Y.; Trenton, N.J.; Cleveland, Ohio; Indianapolis, Ind.; Peoria, Ill.; Minneapolis, Minn.; Des Moines, Iowa; Wichita, Kans.; Richmond, Va.; Wheeling, W. Va.; Atlanta, Ga.; Birmingham, Ala.; Oklahoma City, Okla.; Dallas, Tex.; Butte, Mont.; Casper, Wyo.; Salt Lake City, Utah; Seattle, Wash.; San Diego, Calif.
[59] Another potentially useful source is the data collected by the NBER in 1945 mentioned earlier. However, as was pointed out, and as Morton himself insists, the foreclosure data from this source are likely to be fraught with errors since many banks declined to fill out the questionnaire and many others may have been dishonest about their foreclosure experience (see Morton, *Urban mortgage lending*, pp. 133-8). In this respect Wickens's data are more reliable, being closer to the Depression and surveying individual properties instead of individual banks, which avoids the self-selection problem.

year loan made or renewed; and 6) the average contract interest rates on existing first mortgages.[60]

Unfortunately there was no ready-made LTV variable for first mortgages made by commercial banks by year loan made. Instead I had to construct such an average LTV variable by dividing (5) by (1) for each year before the Depression.[61] As the foreclosure rates concern only first mortgage loans still existing on 1 January 1934 – with no breakdown by year loan made – it was important to find out the most likely contracting dates for those existing loans. This would allow the study of relationships between foreclosure rates and LTVs of loans made roughly in the same years. Correlations included in Figure S.3 show that most existing loans were made in 1927 and 1928, which induces me to focus on those two years. This should not be an issue as the peak in residential construction was reached in 1926 and mortgage lending plateaued around 1927 (see Figure 1).

Figures 5 and 6 show correlations between LTVs on first mortgage loans made by commercial banks and foreclosure rates on those loans. In both 1927 and 1928, the correlation is strong and negative; in other words, the lower the LTV on these loans, the higher was their foreclosure rate. The existence of the second mortgage system could at first sight offer a plausible explanation for these results: it is likely that the lower the LTV on the first mortgage was, the larger was the second mortgage loan, and the greater was the debt dilution problem.

<Figures 5 and 6 about here>

While most banks would rather give smaller loans to lower-income borrowers due to the increased credit risk, in practice the reverse usually occurs due to borrower cash constraints.[62] In general, therefore, lower LTVs are given to higher-income borrowers, which

[60] The exact tables from which the numbers are drawn can be found as follows: 1) Table 3 (dividing total cost by number reporting); 2) Table 3 (also dividing total value by number reporting); 3) Table 36; 4) Table 36 ('Percent with foreclosure started'); 5) Table 48; 6) Table 37.

[61] This average is thus a ratio of means rather than a mean of ratios. While this may at first strike as odd, it should be noted that the arithmetic mean of ratios is only superior to the ratio of arithmetic means if both the numerator and denominator are normally distributed. This assumption, however, can be questioned in the case of many financial variables, which often display lognormal distributions. In such cases, the ratio of arithmetic means in fact approximates the geometric mean of the ratios, which is considered a better estimate than the arithmetic mean of the ratios (see, in particular, Lev and Sunder, 'Methodological issues'; McLeay and Triguiros, 'Proportionate growth'; and Tippett, 'Induced theory'). However in this dataset a few resulting LTVs are unexpectedly high, which may suggest that the presence of some measurement error cannot be definitely excluded.

[62] Von Furstenberg, 'Default risk'.

combined with the higher home equity effect usually entails lower default risks.[63] This explains why most observers today with no knowledge of the second mortgage system would find the negative relationship counter-intuitive.

Nevertheless the existence of the second mortgage system changes some of these assumptions. Banks willing to give smaller loans to lower-income borrowers would be able to do so. Indeed, lower-income borrowers' cash constraints would be reduced thanks to the availability of second mortgage money. It is therefore possible that the negative relationship present in Figures 5 and 6 can simply be explained by the fact that lenders lent lower amounts to riskier borrowers, rather than by any debt dilution effect.

Unfortunately it is not possible to directly observe borrower characteristics with the extant data. Yet one can make use of Wickens's statistics on owner-occupied dwellings, which report 1929 – pre-Depression – homeowner income.[64] While this variable includes all homeowners including those free of mortgage, it is notable that in 1933 mortgaged and non-mortgaged homeowners were similarly distributed across income groups, suggesting that this variable may be a good approximation of pre-Depression borrower income (see Figure S.4).[65] Figure 7 reports this statistic by city along with LTVs in 1927 and 1928. A quick perusal suggests that lower LTVs were associated, if anything, with higher income.[66]

<Figure 7 about here>

It is nevertheless worth examining falls in property values, which may also be an indication of borrower quality. Figure 8 reports the fall in property values from 1926 to 1 January 1934 along with LTVs.[67] It shows that lower LTVs were associated with larger declines in property values. This could indeed suggest that smaller loans were given to

[63] Lower home equity increases the chances that borrowers find themselves 'underwater' and thus default on their loans. For a survey of the literature, see Quercia and Stegman, 'Residential mortgage default'.
[64] See Table 20 in the survey.
[65] Figure S.4, drawn from Table 18 for each city, shows the distribution of homeowners (mortgaged and free of mortgage) across income groups in 1933. It reveals that the distribution was similar for the two groups. Assuming (reasonably) that income distributions did not change much over time, the average 1929 income data used in Figure 7 may be seen as representative of borrowers' average income then. Figure 13 in the Appendix provides further support to this reasoning, by showing a strongly positive correlation between average borrower income in 1933 and all homeowner income in 1929. Average 1933 borrower income was calculated from the data in Figure 12, using midpoints for each income interval (Wickens does not provide us with direct average borrower income data, only interval data).
[66] Note that there is no clear indication, either in contemporary or more recent sources, that commercial banks catered to higher-income individuals than other institutional lenders such as B&Ls and mortgage companies. Therefore the relationship between all homeowner income and LTVs should be relatively unbiased.
[67] This was computed using the average cost of properties acquired in 1926 and the average 1934 value of properties acquired in 1926.

lower-quality borrowers, although this association could be the result of lower LTVs leading to larger second mortgages, higher foreclosure rates, and in turn greater falls in property values (Figure 9 suggests this possibility by showing that high foreclosure rates were associated with larger falls in property values).

<Figures 8 and 9 about here>

As Figures 7 and 8 present mixed evidence of the possibility that high foreclosure rates were driven by low borrower quality, it seems necessary to introduce a regression model which would help control for these possible borrower quality effects. Although the survey sample size is very small ($n \leq 22$), one may conduct simple ordinary least squares (OLS) regressions with no more than two regressors each time, thus respecting the usual rule of thumb. It should then be possible to see whether lower LTVs had an impact on foreclosure rates, controlling for borrower quality using proxies. The data on 1929 homeowner income (*income*), as well as declines in property values (*valuefall*) are therefore included. If low LTVs mainly reflected lenders' predictions of larger falls in land values due to lower borrower quality, one would expect LTVs' explanatory power to disappear somewhat with the inclusion of *income* or *valuefall.* One can thus estimate the following base model:

$$foreclosurerate = \alpha + \beta_1 LTV_{1927} + \varepsilon \qquad (1)$$

where the dependent variable, *foreclosurerate*, is the rate of foreclosure on existing mortgages made by commercial banks, LTV_{1927} (LTV_{1928}) is the loan-to-value ratio on 1927(1928) loans, with *income* and *valuefall* separately entering the regression. Table 3 reports results for each of the six models. Despite the small sample size, Figure 14 in the Appendix suggests that the residuals in each regression are approximately normal, supporting the relative validity of p-values.

The results suggest that lower LTVs tended to lead to higher foreclosure rates regardless of pre-Depression income (models 1, 2, 4 and 5). For instance, controlling for income, a one percentage point increase in 1927 LTVs led foreclosure rates to decline by .10 percentage points. Further evidence is provided by the inclusion of *valuefall*: its inclusion in the regression does little to alter the basic results (models 3 and 6). This would tend to

suggest that second mortgages offer a plausible explanation for the relationship between low LTVs and high foreclosure rates.

<Table 3 about here>

Now, as was seen previously, the precise channels through which second mortgages could have led to higher foreclosure rates on first mortgages are of various kinds. All that can be said given the available data is that, on average, interest rates were not the obvious problem in 1927, whereas they may have been in 1928. Figure 10 helps to see this, plotting average LTVs against average interest rates on first mortgages for both years. In 1928, there is a strong negative correlation between LTVs and interest rates: the lower the LTV, the higher the interest rate. But the correlation is much weaker for 1927, which suggests an unstable relationship between the two. This could mean that foreclosures increased due to other kinds of modifications of the first mortgage loan contracts, or that first mortgage lenders suffered from 'straightforward' debt dilution due to a lack of anticipation of all the possible risks attendant to second mortgage lending.[68]

<Figure 10 about here>

One such risk possibly arose from differences in contract terms between first and second mortgages which would aggravate the situation by creating a seniority-reversal effect. Since interest rates on second mortgages were usurious, and since the latter matured in general before the former (see again Table 2), the second mortgage acquired some priority in time – what is sometimes called *de facto* priority.[69] This seniority-reversal effect was reinforced when second mortgages required monthly principal payments, unlike first mortgages which usually remained unamortized. As Schmidt remarked in 1930:

> Experience proves that it is better and safer to have one mortgage for seventy per cent than to have, say, a fifty per cent first mortgage and junior financing above that amount. The expense of the junior financing is very great, and such second

[68] 'Straightforward debt dilution' occurs when effort to pay back the first loan is reduced without full anticipation from the first lender (see Bizer and DeMarzo, 'Sequential banking'). See also Section II.
[69] Brunnermeier and Oehmke, 'Maturity rat race'.

> and third mortgages, because of heavy amortization and other causes, have been frequently the occasion of leading a first mortgage issue into difficulty.[70]

Adams likewise expressed his concern in 1928: '[i]t has been our experience that where a corporation is dealing purely in conservative first mortgage paper, it is almost invariably the case that the borrower is not being pressed by his obligation, but that he has incurred other obligations, (...) in the form of a second mortgage (...)'.[71] For Beach, while the borrower did not worry about paying the first mortgage as it was unamortized and would mature later, '[y]ou reserve a portion of your income each month for the retirement of this second mortgage'.[72]

This problem was not confined to urban mortgages. Although second mortgages were of a slightly different character in farm lands than in cities, Wickens himself insisted that:

> (...) the man who mortgages his land and later mortgages his crop or other income from the land in effect borrows twice on the same security. Not only does he pledge to another the income on which the first loan was based, but the resulting increase in his total liabilities and burden of payment reduces his capacity to meet all of his obligations.[73]

There is also evidence that in some rare cases second mortgages were made by commercial banks themselves. One study comparing five North-Eastern states shows great variation in terms of first, second and third mortgage providers. It was carried out in 1936 on Home Owners' Loan Corporation (HOLC) loans so may not be entirely representative of 1920s loans. Nevertheless, it is striking to see that in Ohio nearly 20 per cent of the amount of second mortgages were provided by bank and trust companies. Individual firms provided around 50 per cent, while the rest was mainly provided by building and loans associations and financial and mortgage companies.[74] This means that in some isolated cases commercial banks were affected by second mortgages not only indirectly through second mortgages'

[70] NAREB, REF, Schmidt, 'Safeguarding'.
[71] NAREB, REF, Adams, 'Handling the delinquent borrower'.
[72] NAREB, REF, Beach, 'Financing'. See also U.S. Congress, 73rd Congress, 2nd Ses., Hearings on S.3603 (1934).
[73] Wickens, 'Elements'.
[74] Federal Home Loan Bank Board, *Federal Home Loan Bank Review* (1936), p. 352. The four other states studied were: New York, New Jersey, Connecticut and West Virginia. The numbers are similar for West Virginia, while for Connecticut bank and trust companies held fewer second mortgages (14%). The lowest shares are for New York and New Jersey, which still held around 8% of these mortgages.

impact on first mortgage risk, but also directly through their exposure to second mortgage risk.

The scarcity of second mortgage records may have contributed to their relative disappearance from historical accounts. Nevertheless, soon after Hoover called second mortgages 'the most backward segment of our whole credit system'[75] and John Fahey denounced them as 'the outstanding sore spot in the [U.S.'s] home-financing system',[76] bills were introduced in Congress by the Roosevelt administration not only to relieve distressed homeowners but also to overhaul the real estate lending system. While the Home Owners Loan Act of 1933 already bought first mortgages from troubled lenders and restructured them by extending their maturity up to 30 years and amortizing them, it was only designed as an emergency measure.[77]

The National Housing Act of 1934, on the other hand, clearly aimed at the long-term restructuring of the mortgage financing system as a whole, and to do so primarily by introducing national mortgage insurance. The goal of mortgage insurance was not simply to increase the liquidity of real estate finance. It was in fact the main incentive structure through which the U.S. government hoped to make commercial banks, insurance companies and savings and loan institutions increasingly offer long-term (15 to 20 years), low down payment, monthly amortized and low interest (6 per cent) mortgages. Indeed, once the law was enacted, a bank could only insure its mortgages if they conformed to these criteria.[78] The U.S. government thus hoped to eliminate the second mortgage system, which it successfully managed to do for some time.

VI Conclusion

A 50 per cent down payment is not easy to make for many borrowers – and indeed, more than two-thirds of them could not make one in the 1920s. Their solution was simple but more burdensome than they probably imagined at first: taking out a second, junior mortgage from another institution or individual. This in effect allowed them to make the required 50 per cent down payment, but in reality their equity in the home was only around 25 per cent. The interest rate on the second mortgage was usurious, maturities were shorter and more binding

[75] Gries and Ford, *President's conference*, p. ix.
[76] John Fahey was Chairman of the Federal Home Loan Bank Board and a key actor behind the National Housing Act of 1934. See Federal Home Loan Bank Board, *Federal Home Loan Bank Review* (1934), p. 4. His article is called 'The evils of ultra-conservative lending'.
[77] U.S. Congress, 73rd Congress, 1st Ses., Hearings on S.1317 (1933), p.1.
[78] U.S. Congress, 73rd Congress, 2nd Ses., Hearings on S.3603 (1934).

than in the first mortgage case, which greatly impaired the borrower's ability to repay even the first mortgage.

This paper presented some qualitative and empirical evidence of the extent of the second mortgage system and of its negative impact on commercial bank foreclosure rates. While some have argued to the contrary, it is likely that increased foreclosure rates would not have left banks completely unscathed. State banks' exposure to real estate was significant, and although low LTVs would have protected them against losses, they would have been insufficient protection against liquidity crises. Bank runs occurred frequently in the Depression: high foreclosure rates and long redemption periods would have further impaired banks' liquidity, and thus contributed to banking crises' severity.

This paper's findings thus provide a timely reminder that debt dilution can increase default risk. In particular, it is noteworthy that although first mortgage contracts have changed considerably, the 2000s saw the re-emergence of interest-only loans combined with 'piggybacks' (second mortgages). Interestingly, piggyback loans emerged in the 2000s not as a result of low first mortgage LTVs, but as a way for borrowers to bring down first mortgage LTVs to 80 per cent or below in order to avoid having to pay for private mortgage insurance. Mayet et al. and LaCour-Little et al. specifically documented that by 2006-7 the share of Alt-A mortgages that were interest-only rose by 44 per cent, the share of those with piggybacks rose to 42 per cent, and that the share of subprime mortgages with piggybacks reached 28 per cent.[79] More importantly, they found that loans with piggybacks had a significantly higher probability of default -- an unsurprising fact in the light of history.

It is important to note that in this paper, increased default risk ultimately mattered from a liquidity point of view: long redemption periods combined with constraints on liabilities likely put a strain on banks, and may have contributed to the severity of the crisis. This added to the general problem that even good mortgage loans could not be liquidated easily due to long maturities, inability to be rediscounted at central banks and lack of secondary markets. Given particularly low LTVs, it is unlikely that banks would have made any significant losses on these loans. This contrasts at least partly with the recent crisis, in which high default rates combined with high LTVs actually could impair banks' capital.[80]

The securitization process was partly responsible for this increase in credit risk. Banks faced only the 'pipeline' risk of holding mortgages for a few months until they were passed

[79] Mayer et al., 'Rise in mortgage defaults'; LaCour-Little et al., 'What role'.
[80] Note however that the recent crisis also saw significant increases in liquidity risk. See Bordo and Landon-Lane, 'Banking panics'; Gorton and Metrick, 'Securitized banking'; Shin, 'Reflections on Northern Rock'.

on to another entity.[81] Their liquidity puts to conduits were only implicit, and when they did take back these entities on their balance sheets during the crisis for reputational reasons, they were inadequately prepared to take on those new risks – they became insolvent.[82] In order for banks to increase the liquidity of mortgages through securitization, therefore, they need to be liable for the credit risk associated with them. Covered bonds are more transparent and constitute claims not only on the underlying assets but on the actual cash flow of the institution that issues them.[83] This can significantly reduce moral hazard while still increasing the saleability of loans and their risk distribution to different types of investors.[84]

Bibliography

Archival documents

From the *Real Estate Finance* journal (NAREB archives, Chicago, Ill):

Adair, F., 'Housing Loans' (1923) Vol. 1. NAREB, Chicago, Ill.
Adams, M. 'Handling the Delinquent Borrower' (1928) Vol. 6.
Anderson, F. H., 'Essential and Practical Covenants of First and Second Mortgages'. (1927) Vol 5.
Beach, R. B., 'Financing Above the First Mortgage' (1926) Vol. 4.
Child, S. R., 'A Uniform Mortgage Law for All the States' (1925) Vol. 4.
Dunton, V. J., 'The Cost of Financing Through Building and Loan and Through First and Second Mortgage' (1926) Vol. 4.
Hoppe, W. J., 'Assignment of Rents as Additional Security for Second Mortgages' (1926).
Hopper, C. B., 'Trust Deeds Versus Mortgages' (1927) Vol. 5.
Johnson F. L., 'How Banks and Mortgage Companies Can Help the Realtor' (1923).
Reep, S. N., 'The Problem of Second Mortgages' (1923) Vol. 2.
Reep, S. N., 'Financing Above the First Mortgage' (1925) Vol. 3.
Schmidt, W. S. 'Safeguarding Real Estate Securities' (1930) Vol. 8.
Stalker, J. N., 'Report on Field Trip' (1925) Vol. 4.

From the National Real Estate Journal (NAREB archives, Chicago, Ill):

Brigham, H. R., 'The Junior Financing of Homes' (1928) March 5.
Cope W. A., 'Helping the Home Seeker Buy His Home' (1929) May 13.

Other (NAREB archives, Chicago, Ill):

[81] See Brunnermeier, 'Deciphering'.
[82] Reinhart, 'Year'; Schleifer and Vishny, 'Fire sales'.
[83] Calomiris, 'Subprime turmoil.'
[84] For a more detailed discussion on the subject, see Postel-Vinay, 'Sitting ducks'.

‘Financing the American Home Purchase Realtors’ Study, First Authoritative Collection on Realty Financing Published'. News item.

Digitized archival documents

Board of Governors of the Federal Reserve System, 1935-. *All-Bank Statistics*, United States, 1896-1955 , 1896 - 1955, https://fraser.stlouisfed.org/title/?id=39.

Gries, J. M. and Ford, J., *The Presidents Conference on Home Building and Home Ownership*, called by President Hoover, Home Finance and Taxation. National Capital Press, Washington, D. C. (1932) http://babel.hathitrust.org/cgi/pt?id=wu.89047199922;view=1up;seq=7

Jones, L. A., *A Treatise on the Law of Mortgages and Real Property* (1878). https://archive.org/details/mortgagesrealpro01jone

United States, Federal Home Loan Bank Administration and United States. Federal Home Loan Bank Board. *Federal Home Loan Bank Review*. 1934-1947. https://fraser.stlouisfed.org/title/?id=116

United States, *National Banking Act* (1864). https://fraser.stlouisfed.org/docs/historical/congressional/192002sen_nbact.pdf

United States, *Federal Reserve Act* (1913).

Welldon, S. A., Digest of State Banking Statutes. (Government Printing Office, Washington, 1910). https://fraser.stlouisfed.org/scribd/?title_id=621&filepath=/docs/historical/nmc/nmc_353_1910.pdf#scribd-open

Wickens, D. L., *Financial Survey of Urban Housing: Statistics on Financial Aspects of Urban Housing* (Government Printing Office, Washington, 1937). http://babel.hathitrust.org/cgi/pt?id=umn.31951001519155q;view=1up;seq=1

Congressional Hearings (available from US Congressional Hearings Digital Collection Historical Archive 1824 – 2003, LSE Library Online):

U.S. Congress (1913). Hearings before the Committee on Banking and Currency, United States Senate, Sixty-third Congress, First Session, on H.R. 7837 (S. 2639), a Bill to Provide for the Establishment of Federal Reserve Banks, for Furnishing an Elastic Currency, Affording Means of Rediscounting Commercial Paper, and to Establish a More Effective Supervision of Banking in the United States, and for Other Purposes. Government Printing Office.

U.S. Congress (1926a). Consolidation of National Banking Associations, Hearings before a Subcommittee of the Committee on Banking and Currency, United States

Senate, Sixty-ninth Congress, First Session, on S. 1782 and H. R. 2, Bills to Amend an Act Entitled 'An Act to Provide for the Consolidation of National Banking Associations,' Approved November 7, 1918; to Amend Section 5136 as Amended, Section 5137, Section 5138, Section 5190, Section 5200 as Amended, Section 5202 as Amended, Section 5211 as Amended, of the Revised Statutes of the United States; and to Amend Section 9, Section 13, Section 22, and Section 2 of the Federal Reserve Act, and for Other Purposes. Government Printing Office.

U.S. Congress (1926b). Inquiry on Membership in Federal Reserve System, Joint Hearings before the Committees on Banking and Currency, Congress of the United States, Sixty-eighth Congress, pursuant to Public Act No. 503, an Act to Provide Additional Credit Facilities for the Agricultural and Livestock Industries of the United States; to Amend the Federal Farm Loan Act; to Amend the Federal Reserve Act; and for Other Purposes. Government Printing Office.

U.S. Congress (1932). Hearings before a Subcommittee of the Committee on Banking and Currency, United States Senate, Seventy-Second Congress, First Session on S. 2959, a Bill to Create Federal Home Loan Banks, to Provide for the Supervision Thereof, and for Other Purposes. Government Printing Office.

U.S. Congress (1933). Hearings before a Subcommittee of the Committee on Banking and Currency, United States Senate, Seventy-Third Congress, First Session on S. 1317, a Bill to Provide Emergency Relief with Respect to Home Mortgage Indebtedness, to Refinance Home Mortgages, to Extend Relief to the Owners of Homes Occupied by them and who are Unable to Amortize their Debt Elsewhere, to Amend the Federal Home Loan Bank Act, to Increase the Market for Obligations of the United States and for Other Purposes. Government Printing Office.

U.S. Congress (1934). Hearings before the Committee on Banking and Currency, United States Senate, Seventy-Third Congress, Second Session on S. 3603, a Bill to Improve Nation-Wide Housing Standards, Provide Employment and Stimulate Industry; to Improve Conditions with Respect to Home Mortgage Financing, to Prevent Speculative Excesses in New Mortgage Investment, and to Eliminate the Necessity for Costly Second-Mortgage Financing, by Creating a System of Mutual Mortgage Insurance and by Making Provision for the Organization of Additional Institutions to Handle Home Financing; to Promote Thrift and Protect Savings; to Amend the Federal Home Loan Bank Act; to Amend the Federal Reserve Act; and for
Other Purposes. Government Printing Office.

References

Acharya, V. and Bisin, A., 'Counterparty Risk Externality: Centralized versus Over-The Counter Markets', mimeo (2010).

A. C. Bayless and Bodfish, M. H., 'Costs and Encumbrance Ratios in a Highly Developed Real Estate Market', *The Journal of Land and Public Utility Economics* 4 (1928): 2.

Behrens, C. F., *Commercial Bank Activities in Urban Mortgage Financing*. National Bureau of Economic Research (New York, 1952).

Bennardo, A. et al., 'Multiple-Bank Lending, Creditor Rights and Information Sharing', *Centre for Studies in Economics and Finance Working Paper* (2013): 211.

Bisin, A. and Guaitoli, D., 'Moral Hazard and Nonexclusive Contracts', *Rand Journal of Economics* 35 (2004): 2.

Bizer, D. S. and DeMarzo, P., 'Sequential Banking', *Journal of Political Economy* 100 (1992): 1.

Bolton, P. and Jeanne, O., 'Structuring and Restructuring Sovereign Debt: The Role of Seniority', *Review of Economic Studies* (2009) 76.

Brocker, M. and Hanes, C., 'The 1920s Real Estate Boom and the Downturn of the Depression' in Fishback et al. (eds), *Housing and Mortgage Markets in Historical Perspectives* (University of Chicago Press, 2014).

Brunnermeier, M., 'Deciphering the Liquidity Credit Crunch 2007-08', *NBER Working Paper* (2008) 14612.

Brunnermeier, M. K. and Oehmke, M., 'The Maturity Rat Race', *Journal of Finance* 68 (2013): 2.

Bordo, M. and J. Landon-Lane., 'The banking panics of the United States in the 1930s: some lessons for today', *Oxford Review of Economic Policy* 26 (2010): 3.

Calomiris, C., 'The Subprime Turmoil: What's Old, What's New, and What's Next.' Working paper (2008).

C. W. Calomiris and C. M. Kahn (1991). `The Role of Demandable Debt in Structuring Optimal Banking Arrangements'. The American Economic Review 81(3).

Campbell, T. and Dietrich, J., 'The Determinants of Default on Conventional Residential Mortgages', *Journal of Finance*, 38 (1983), pp. 1569-81.

Carter, S. B. et al., *Historical Statistics of the United States*. (Cambridge University Press, 2006).

Degryse, H. et al., 'On the Non-Exclusivity of Loan Contracts: An Empirical Investigation', Working Paper (2011).

Diamond, D. W. and Dybvig, P. H., 'Bank Runs, Deposit Insurance, and Liquidity', *Journal of Political Economy* 91 (1983): 3.

Eichengreen, B., *Hall of Mirrors: the Great Depression, the Great Recession, and the Uses -- and Misuses -- of History* (Oxford, 2015).

Fama, M. H. and Miller, M. H., *The Theory of Finance* (Holt, Rinehart and Winston, New

York, 1972).

Field, A. J., 'The Interwar Housing Cycle in the Light of 2001-2011: A Comparative Historical Approach.' NBER Working Paper (2013) 18796.

Fishback, P. and T. Kollman., 'New Multicity Estimates of the Changes in Home Values, 1920-1940' in Fishback et al. (eds), *Housing and Mortgage Markets in Historical Perspectives* (University of Chicago Press, 2014).

Fisher, E. M. *Urban Real Estate Markets: Characteristics and Financing* (National Bureau of Economic Research, 1951).

Friedman, M. and Schwartz, A. J., *A Monetary History of the United States, 1867-1960* (Princeton, 1963).

Ghent, A., 'The Historical Origins of America's Mortgage Laws', *Research Institute for Housing America Special Report* (2012).

Goodhart, C., 'Liquidity Risk Management', *Banque de France Financial Stability Review* (2008): 11.

Gorton, G. and A. Metrick., 'Securitized Banking and the Run on Repo', *Journal of Financial Economics* 104 (2012): 425.

Grebler, L. et al., *Capital Formation in Residential Real Estate: Trends and Prospects* (Princeton, 1956).

Holmström, B. and Tirole, J., 'Financial Intermediation, Loanable Funds, and the Real Sector', *Quarterly Journal of Economics* 62 (1997).

Jones, L. A. *A Treatise on the Law of Mortgages of Real Property, 8th ed.* (Indianapolis, 1928).

Kahn, C. M. and Mookherjee, D., 'Competition and Incentives with Nonexclusive Contracts', *RAND Journal of Economics* 29 (1998): 3.

LaCour-Little, M. et al., 'What Role Did Piggyback Lending Play in the Housing Bubble and Mortgage Collapse?', *Journal of Housing Economics* 20 (2011): 2.

Lev, B. and Sunder, S., 'Methodological Issues in the Use of Financial Ratios', *Journal of Accounting and Economics* 1 (1979): 187.

Lloyd, R. E., 'Government-Induced Market Failure: A Note on the Origins of FHA Mortgage Insurance', *Critical Review (New York)* 8 (1994): 1.

Loucks, W. N., 'The Philadelphia Plan for Home Financing', *Institute for Research in Land Economics and Public Utilities Research Monograph* (1929) 2.

Mayer, C. et al., 'The Rise in Mortgage Defaults', *Journal of Economic Perspectives* 23 (2009): 1.

Mcleay, S. and Trigueiros, D., 'Proportionate Growth and the Theoretical of Financial Ratios', *Abacus* 38 (2002): 3.

Morton, J. E., *Urban Mortgage Lending: Comparative Markets and Experience* (Princeton, 1956).

Parlour, C. and Rajan, U., 'Competition in Loan Contracts', *American Economic Review* 91 (2001): 5.

Postel-Vinay, N. *Sitting ducks: banks, mortgage lending, and the Great Depression in the Chicago area, 1923-1933.* Unpublished PhD thesis, The London School of Economics and Political Science (LSE).

Quercia, R. G. and Stegman, M. A., 'Residential Mortgage Default: A Review of the Literature', *Journal of Housing Research* 3 (1984), 3 (2).

Quigley, J. M. and Van Order, R., 'Defaults on Mortgage Obligations and Capital Requirements for U.S. Savings Institutions: A Policy Perspective', *Journal of Public Economics* 44 (1991), pp. 636-43.

Radelet, S. and Sachs, J., 'The Onset of the East Asian Financial Crisis', *NBER Working Paper* 6680 (1998).

Reep, S. N., *Second Mortgages and Land Contracts in Real Estate Financing* (New York, 1928).

Reeve, H. L., 'The New Proposal for a Uniform Real Estate Mortgage Act', *Law and Contemporary Problems* (1938): 564-591.

Reinhart, V., 'A Year of Living Dangerously: The Management of the Financial Crisis in 2008', *Journal of Economic Perspectives* 25 (2011): 1.

Richardson, G. 'Categories and causes of bank distress during the Great Depression, 1929-1933: The illiquidity versus insolvency debate revisited', *Explorations in Economic History* 44 (2007), pp. 588-607.

Shin, H. S., 'Reflections on Northern Rock: The Bank Run that Heralded the Global Financial Crisis', *Journal of Economic Perspectives* 23 (2009): 1.

Simpson, H. D., 'Real estate speculation and the depression', *American Economic Review* (1933): 163-171.

Sandor, R. and Sosin, H., 'The Determinants of Mortgage Risk Premiums: A Case Study of the Portfolio of a Savings and Loan Association', *Journal of Business* 48 (1975), pp. 27-38.

Snowden, K., 'The Anatomy of a Residential Mortgage Crisis: A Look Back to the 1930s', *NBER Working Paper* 16244 (2010).

Tippett, M., ‘An Induced Theory of Financial Ratios’, *Accounting and Business Research* 21 (1990): 81.

Vandell, K. ‘Default Risk Under Alternative Mortgage Instruments.’ *Journal of Finance* 33 (1978), pp. 1279-96.

Von Furstenberg, G. (1969). 'Default risk on FHA-Insured Home Mortgages as a Function of the Term of Financing: a Quantitative Analysis.’ *Journal of Finance* 24: 459-77.

White, E. N., *The Regulation and Reform of the American Banking System*, 1900-1929 (Princeton, 1983).

White, E. N. ‘Lessons from the Great American Real Estate Boom and Bust of the 1920s’, *NBER Working Paper* 15573 (2009).

Wicker, E., *The Banking Panics of the Great Depression* (Cambridge, 1996).

Figures and Tables (including Appendix)

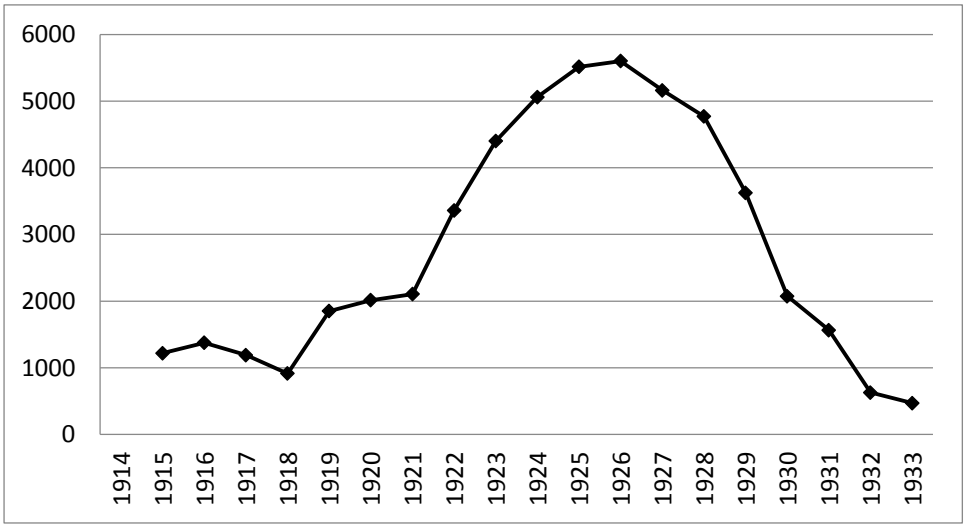

Figure 1. *U.S. nonfarm housing starts, 1914-1933.*
Source: Carter et al, *Historical statistics*, Series Dc-510.

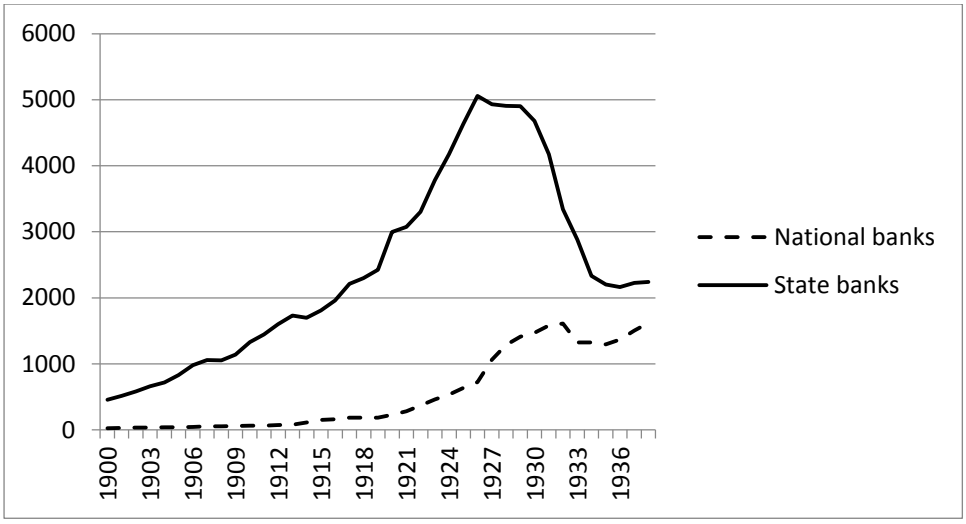

Figure 2. *Estimated real estate loans by type of bank (all categories), 1900-1938 ($ million)*
Source: Board of Governors of the Federal Reserve System, *All Bank Statistics*

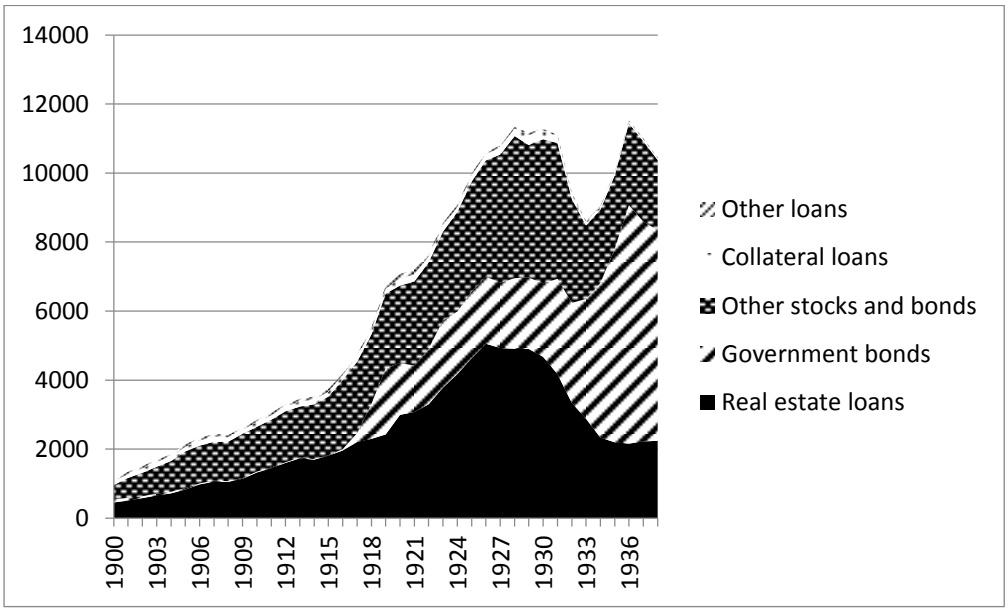

Figure 3. *Estimated main asset holdings at state banks, 1900-1938 ($ million, stacked)*
Source: Board of Governors of the Federal Reserve System, *All bank statistics.*

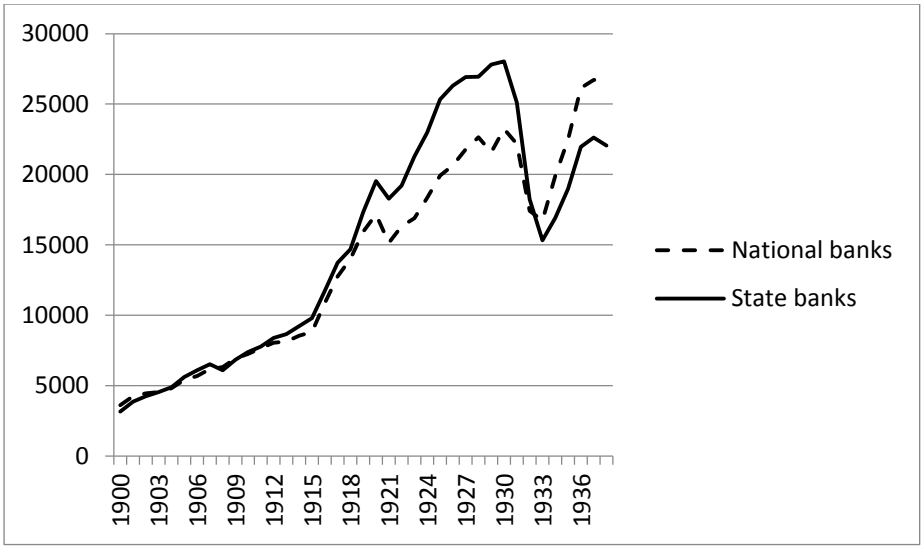

Figure 4. *Deposits at national and state commercial banks, 1900-1938 ($ million)*
Source: Board of Governors of the Federal Reserve System, *All Bank Statistics*.

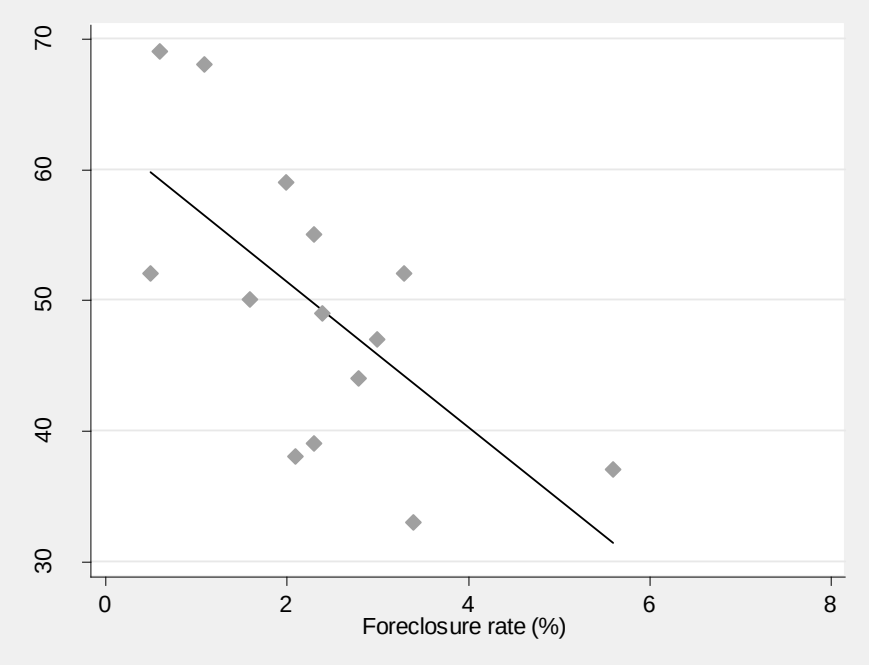

Figure 5. *LTV in 1927 and percentage of foreclosures started on loans existing on January 1st, 1934.*
Source: Wickens, *Financial survey.*

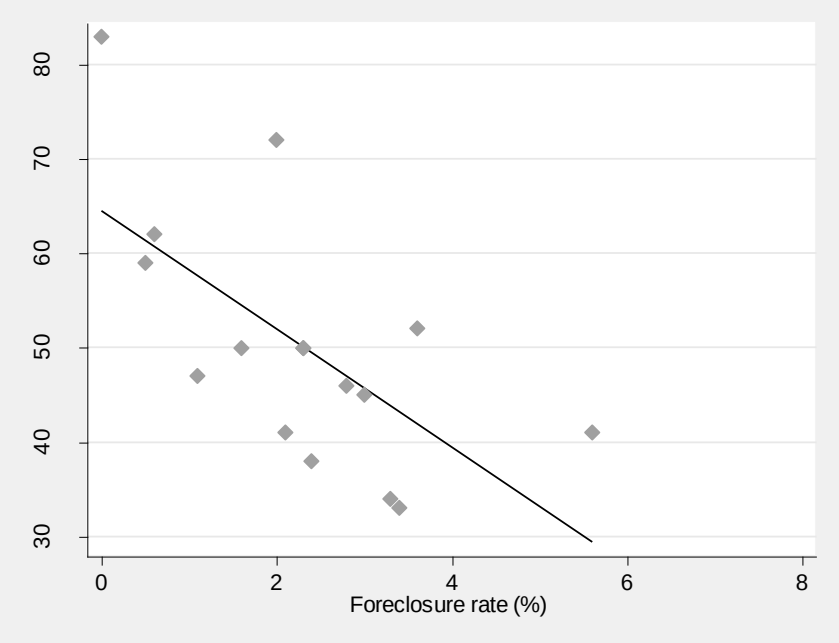

Figure 6. *LTV in 1928 and percentage of foreclosures started on loans existing on January 1st, 1934.*
Source: Wickens, *Financial survey*.

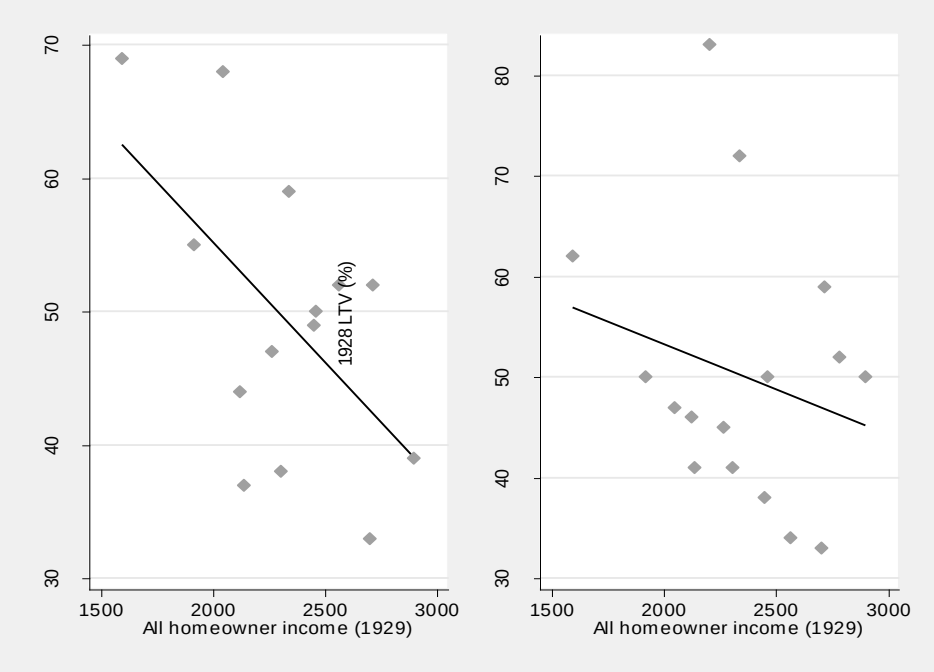

Figure 7. *LTVs in 1927 and 1928 and all homeowner income in 1929 ($).*
Source: Wickens, *Financial survey*.

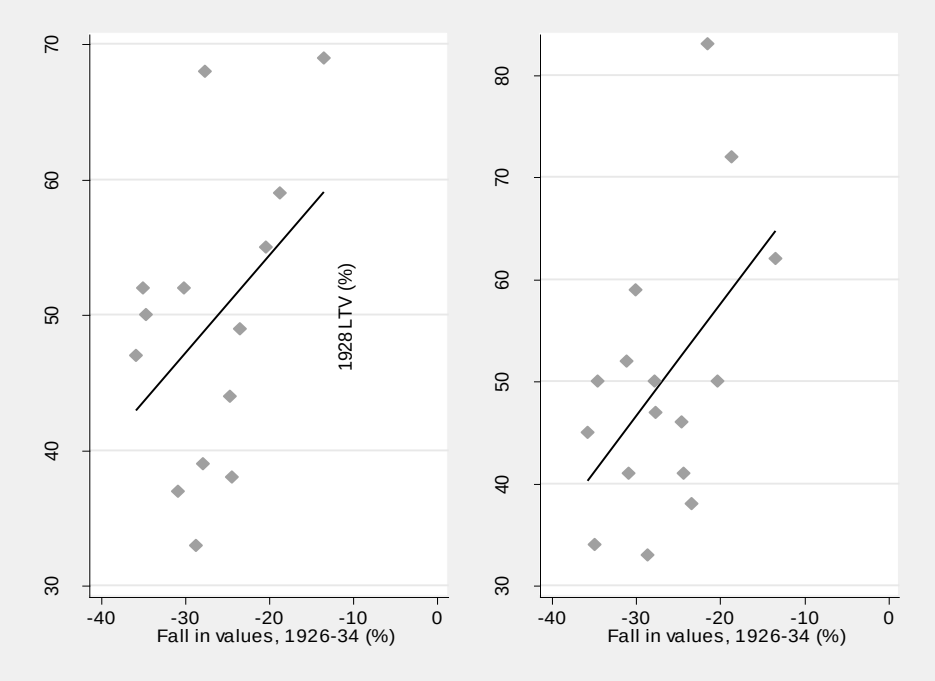

Figure 8. *LTVs in 1927 and 1928 and fall in property values, 1926-34 (%).*
Source: Wickens, *Financial survey.*

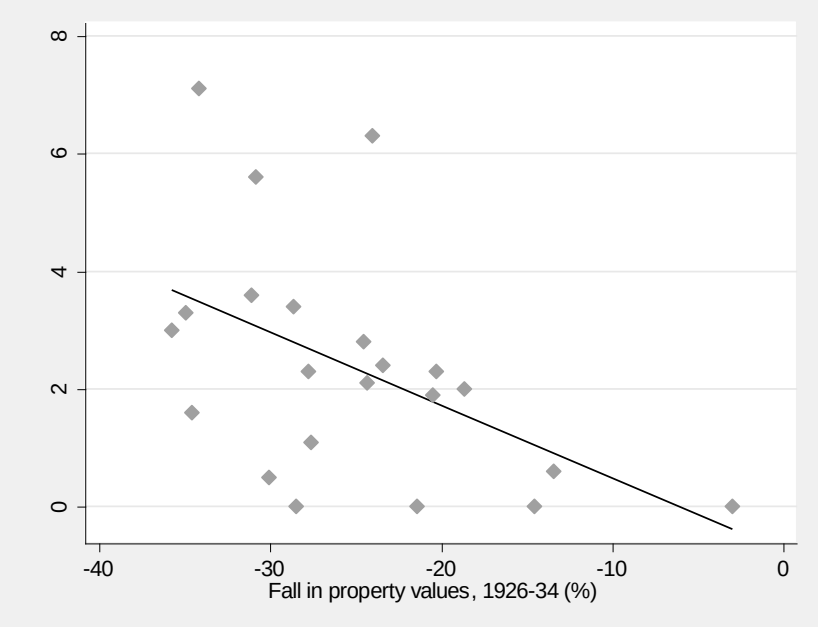

Figure 9. *Percentage of foreclosures started on loans existing on January 1st, 1934 and percentage fall in property values between 1926 and January 1st, 1934.*
Source: Wickens, *Financial survey.*

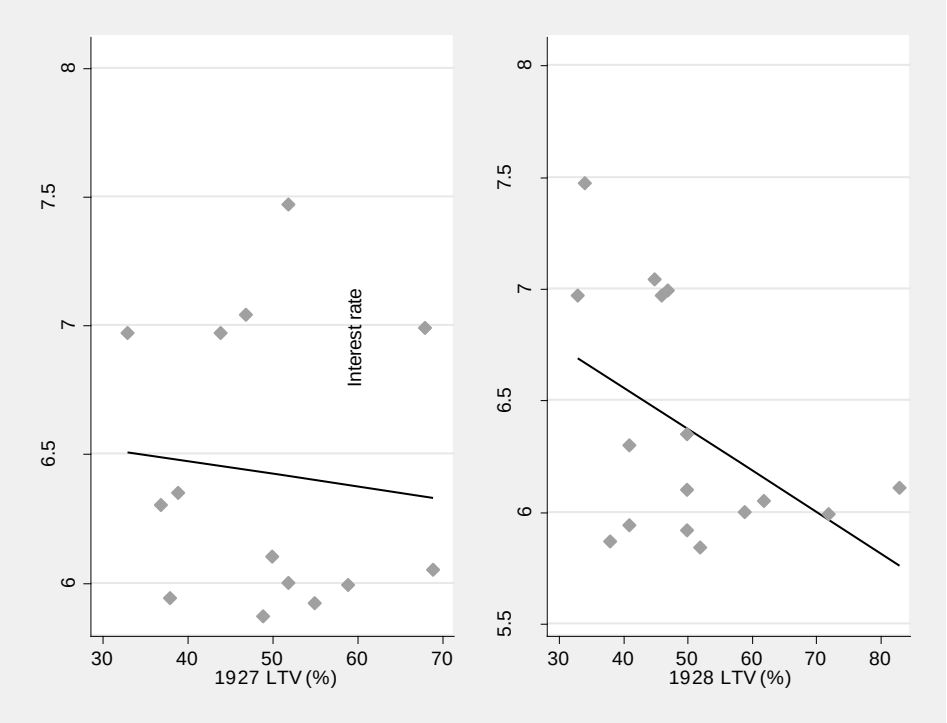

Figure 10. *LTVs in 1927 and 1928 and contract interest rates.*
Source: Wickens, *Financial survey.*

Table 1. *Redemption laws and urban LTVs by state, 1928 and 1920-1929*

State	*Redemption period, in months (1928)*	*Commercial bank urban LTV (1920-1929)*
Alabama	24	-
Alaska	6	-
Arizona	12	-
Arkansas	6	44
California	6	-
Colorado	0	47
Connecticut	0	-
Delaware	0	38
D.C.	-	-
Florida	0	55
Georgia	0	50
Idaho	12	44
Illinois	12	48
Indiana	12	-
Iowa	12	46
Kansas	18	-
Kentucky	0	-
Louisiana	12	40
Maine	0	56

Maryland	0	57
Massachusetts	12	46
Michigan	12	44
Minnesota	0	-
Mississippi	12	63
Montana	12	-
Nebraska	9	-
Nevada	6	-
New Hampshire	0	-
New Jersey	0	48
New Mexico	9	-
New York	0	55
North Carolina	0	-
North Dakota	12	-
Ohio	0	50
Oklahoma	-	40
Oregon	4	-
Pennsylvania	0	53
Rhode Island	0	53
South Carolina	0	53
South Dakota	12	-
Tennessee	24	39
Texas	0	50
Utah	6	-
Vermont	12	-
Virginia	0	48
Washington	12	47
West Virginia	0	49
Wisconsin	12	-
Wyoming	6	-

Notes: The data on redemption laws are taken from Jones, *Treatise*. The data on LTVs by state are taken from the same NBER database as in Morton, *Urban mortgage lending*, used to derive his averages, mentioned above. As pointed out earlier, these data are to be taken with great care as they come from a survey, made only in 1945, of commercial banks which by definition survived the Great Depression. As Morton himself insists, banks were less likely to report accurately on loans made twenty years earlier than on more recent loans (see Morton, *Urban mortgage lending*, p. 133-8). I thank Andra Ghent for making these data available to me in a processed format. The raw data are available online on the NBER website: http://www.nber.org/nberhistory/historicalarchives/archives.html.

Table 2. *First and second mortgage loan characteristics*

Loan characteristics	*First mortgage*	*Second mortgage*	*Combined*
Contract maturity	3-5 years[a,c,d]	'Shorter'[c,f] ,1-3 years[b,c]	-
Loan-to-value ratio (%)	40[b] to 54[e,d]	20[b,d] to 29[e]	75[c] to 83[e]
Annual interest rate (%)	5 to 7[a,c]	14 to 16 or above[b,c]	-
Renewal expectations	Yes[a,g]	No[f]	-
Monthly principal payments	No[a,c]	Yes[c,f]	-

Notes: When discussing first mortgage lending, many of these sources do not refer specifically to commercial banks *per se*. Rather, they refer to companies which, unlike B&Ls, offered only straight mortgages. We know from Morton that commercial banks were in this category (see Morton, *Urban mortgage lending*, p. 3-7, 178). This category also included so-called 'mortgage companies,' which specialized in mortgage lending.
Sources:
[a] Morton, *Urban mortgage lending*, pp. 3-7, 178.

[b] NAREB, REF, Dunton, 'Cost of financing,' p. 172-3,177.
[c] Gries and Ford, *President's conference*, p.6, 16, 17, 20.
[d] NAREB, REF, Adair, 'Housing loans,' p. 54.
[e] NAREB, 'Financing the American home.'
[f] NAREB, REF, Beach, 'Financing above the first mortgage,' p. 2.
[g] Reep, *Second mortgages*, p. xx.

Table 3. OLS model of foreclosure rates, 1927-1934 (dependent variable: *foreclosurerate*)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
LTV_{1927}	-.078***	-.104**	-.072**			
	(.02)	(.04)	(.03)			
LTV_{1928}				-.067***	-.066***	-.059***
				(.02)	(.02)	(.02)
income		-.001			.000	
		(.001)			(.00)	
valuefall			-.023			-.036
			(.02)			(.04)
constant	6.219	11.722	5.296	5.670	4.917	4.292
	(1.34)	(5.37)	(2.01)	(.90)	(2.83)	(1.54)
n	14	14	14	16	16	16
R^2	.43	.53	.45	.42	.43	.44
Prob > F	.006	.019	.017	.001	.001	.006

Notes: *** significant at $\alpha = 0.01$, ** significant at $\alpha = 0.05$, * significant at $\alpha = 0.10$. The dependent variable is *foreclosurerate*: the rate of foreclosure on first mortgages made by commercial banks (%). *LTV* is first mortgage LTV made by commercial banks in 1927 and 1928 (%); *income* is the 1929 income of all surveyed homeowners in owner-occupied dwellings ($). *valuefall* is the percentage fall in owner-occupied home values from 1926 to January 1st, 1934 (%). Robust standard errors in parentheses.
Source: Wickens, *Financial survey*.

Appendix

Table 4. *Redemption laws and foreclosure practice by state, 1925*

State	*Suit in court*	*Redemption period*	*Total approximate time to get title*
Alabama	No	2 years	psd + 2 years
Alaska	-	-	-
Arizona	Yes	6 months	court time + 6 months
Arkansas	Yes	1 year w	court time
California	Yes	1 year	court time + 1 year 10 months
Colorado	No	9 months	court time
Connecticut	Yes	-	court time
Delaware	Yes	-	court time
D.C.	-	-	-
Florida	Yes	-	court time
Georgia	Yes	-	court time
Idaho	Yes	1 year	court time + 1 year
Illinois	Yes	15 months	court time + 15 months
Indiana	Yes	1 year	court time + 1 year
Iowa	Yes	1 year	court time + 1 year
Kansas	Yes	18 months	court time + 18 months

Kentucky	Yes	1 year 2/3av	court time
Louisiana	No	-	50 days
Maine	No	-	1 year
Maryland	No	-	psd + confirmation of sale by court
Massachusetts	No	-	21 days
Michigan	No	1 year	15 months
Minnesota	No	1 year	13.5 months
Mississippi	No	No	21 days
Missouri	No	-	20 days
Montana	Yes	1 year	court time + 1 year
Nebraska	Yes	9 months	court time + 9 months
Nevada	Yes	6 months	court time + 6 months
New Hampshire	No	1 year	1 year
New Jersey	Yes	-	court time
New Mexico	Yes	3 months	court time + 1 year
New York	Yes	-	court time
North Carolina	No	-	psd + 10 days
North Dakota	No	1 year	14.5 months
Ohio	Yes	-	court time
Oklahoma	Yes	6 months	court time + 6 months
Oregon	Yes	1 year	court time + 1 year
Pennsylvania	Yes	1 year w	court time
Rhode Island	No	-	psd
South Carolina	Yes	-	court time
South Dakota	No	1 year	13.5 months
Tennessee	No	2 years w	psd
Texas	No	-	20 days
Utah	Yes	6 months	court time + 6 months
Vermont	Yes	1 yea	court time + 1 year
Virginia	No	-	psd
Washington	Yes	1 year	court time + 1 year
West Virginia	No	-	20 days
Wisconsin	Yes	1 year	court time + 1 year
Wyoming	No	9 months	10.5 months

Notes: ``psd" - power of sale days; ``w" - period may be waived in the mortgage; ``2/3av" - redemption allowed only if property does not sell for 2/3 appraised value.
Source: Child, 'Uniform mortgage law.'

Table 5. *Legal interest rates on mortgages and statutory maximums by state, 1928*

State	*Legal rate (%)*	*Statutory maximum (%)*
Alabama	8	8
Alaska	6	10
Arizona	6	10
Arkansas	6	10
California	7	12

Colorado	8	No limit
Connecticut	6	12
Delaware	6	6
D.C.	6	10
Florida	8	10
Georgia	7	8
Idaho	7	10
Illinois	5	7
Indiana	6	8
Iowa	6	8
Kansas	6	10
Kentucky	6	6
Louisiana	5	8
Maine	6	No limit
Maryland	6	6
Massachusetts	6	No limit
Michigan	5	7
Minnesota	6	8
Mississippi	6	8
Missouri	6	8
Montana	8	12
Nebraska	7	10
Nevada	7	No limit
New Hampshire	6	No limit
New Jersey	6	6
New Mexico	6	12
New York	6	6
North Carolina	6	6
North Dakota	6	10
Ohio	6	8
Oklahoma	6	10
Oregon	6	10
Pennsylvania	6	6
Rhode Island	6	30
South Carolina	7	8
South Dakota	7	12
Tennessee	6	6
Texas	6	10
Utah	8	12
Vermont	6	6
Virginia	6	6
Washington	6	12
West Virginia	6	6
Wisconsin	6	10
Wyoming	8	12

Sources: Reep, *Second mortgages*, pp. 215-7.

Figure 11 shows that the strongest correlations between the average original amount of existing first mortgage and the average amount of existing loans contracted or renewed in some particular years can be found in 1927 and 1928. This suggests that a focus on LTVS for loans made in those years is recommended, given that the data on foreclosure rates are not broken-up by year loan made but are average foreclosure rates for existing loans.

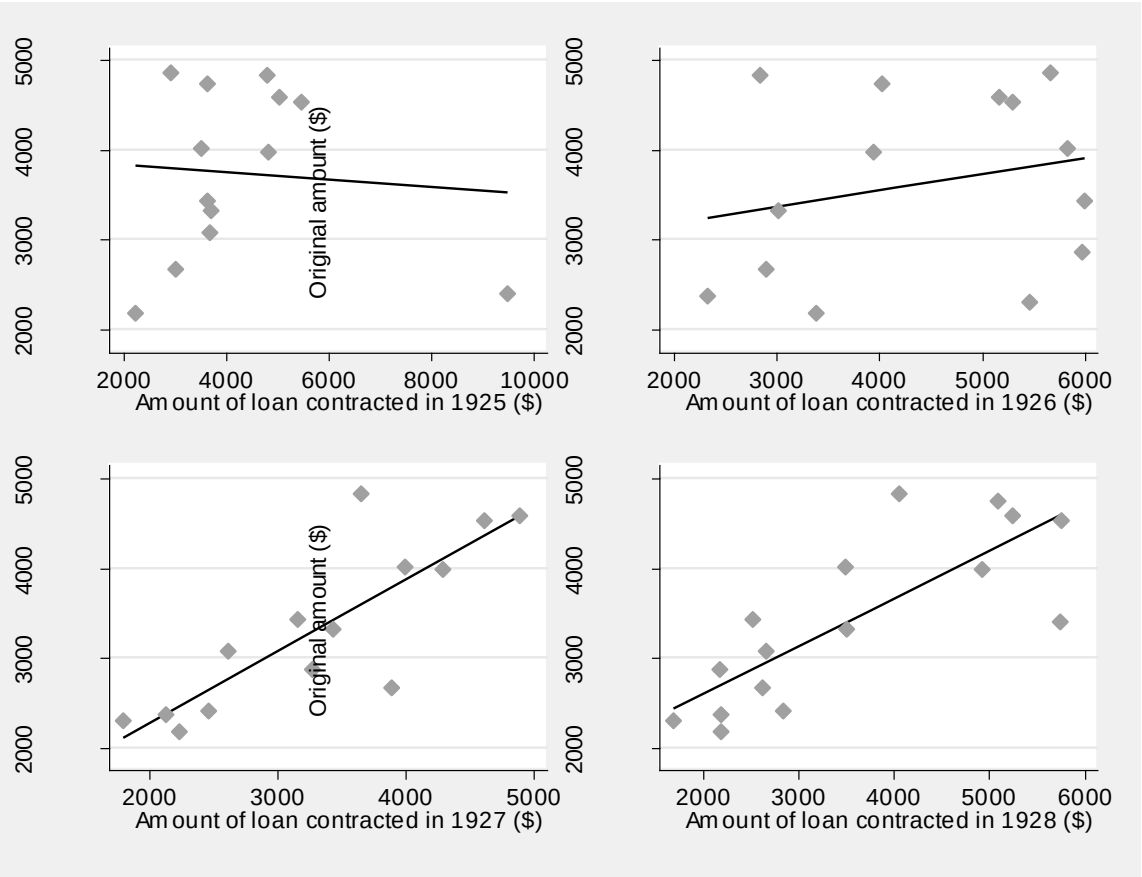

Figure 11. *Original amount of existing loan and amount of existing loan contracted or renewed in 1925, 1926, 1927 and 1928 ($).*
Source: Wickens, *Survey of urban housing*.

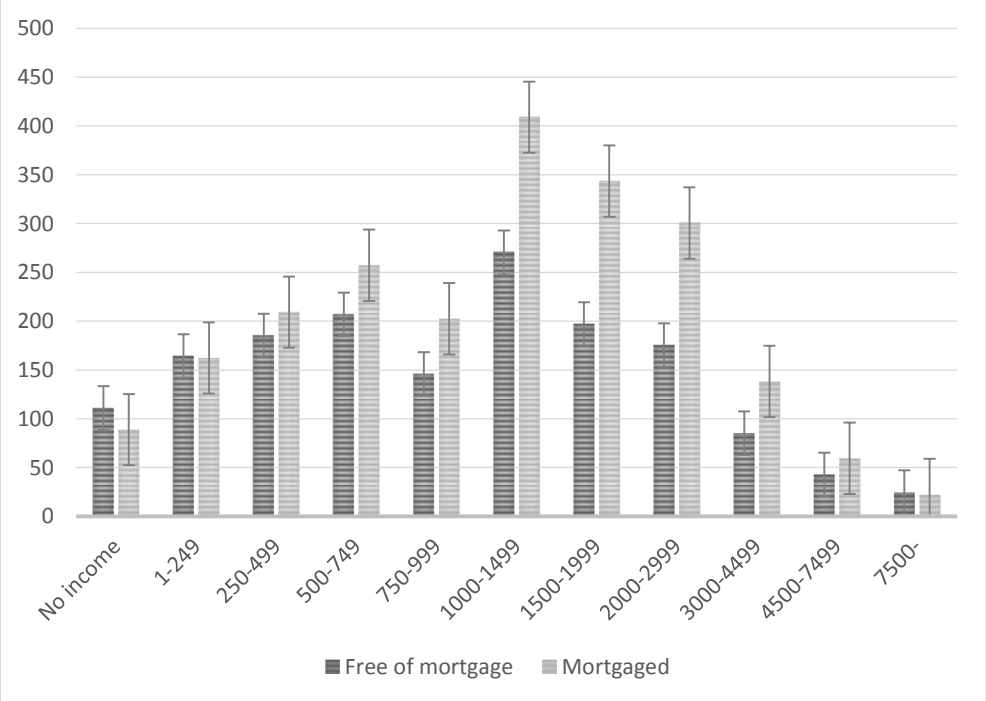

Figure 12. *1933 income ($) of homeowners in owner-occupied dwellings, free of mortgage and mortgaged, with error bars.*
Source: Wickens, *Survey of urban housing*.

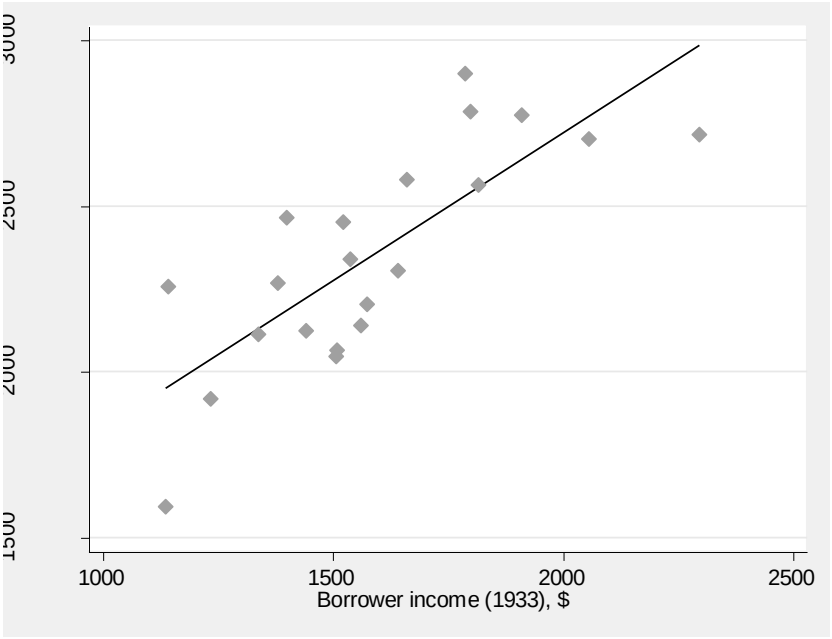

Figure 13. All homeowner income in 1929 and borrower income in 1933 ($).
Source: Wickens, *Survey of urban housing*.

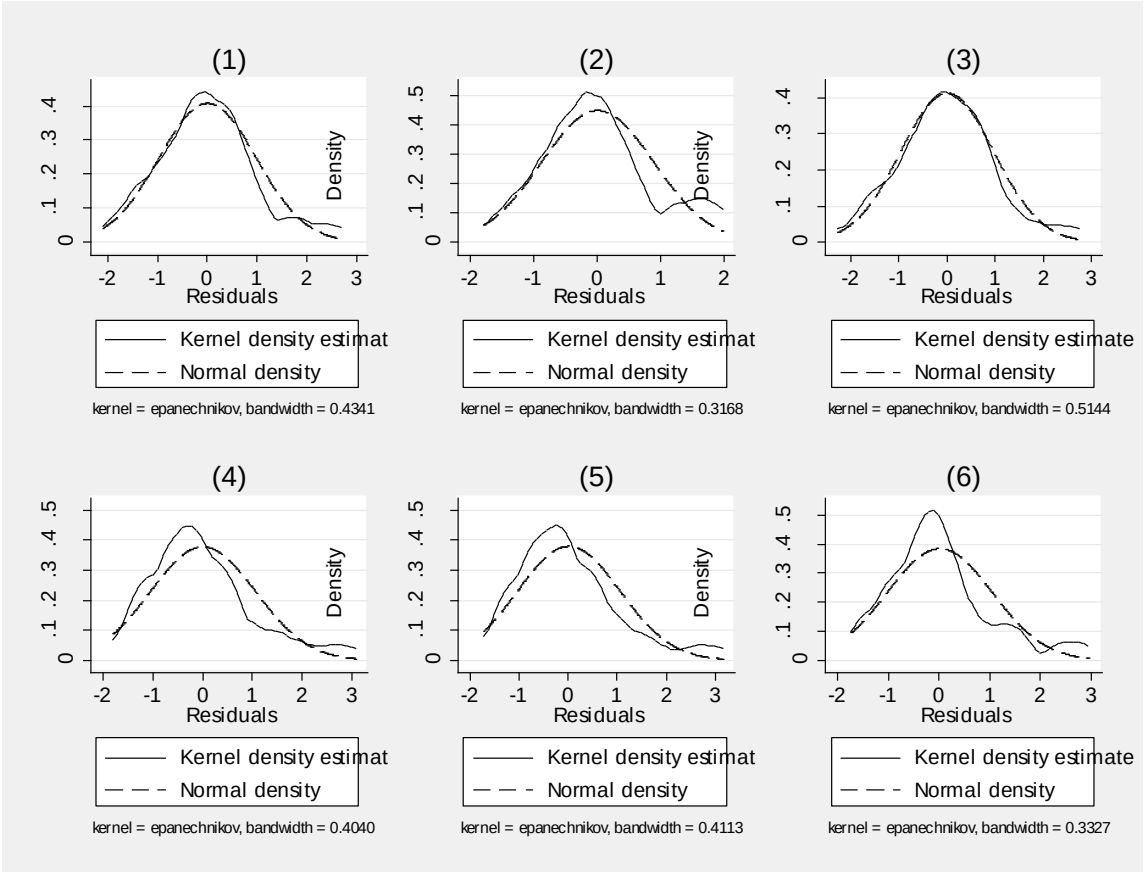

Figure 14. *Kernel density plot of residuals for regressions (1) to (6).*
Source: Wickens, *Survey of urban housing*.

Online Appendix

Table S.1. *Redemption laws and foreclosure practice by state, 1925*

State	*Suit in court*	*Redemption period*	*Total approximate time to get title*
Alabama	No	2 years	psd + 2 years
Alaska	-	-	-
Arizona	Yes	6 months	court time + 6 months
Arkansas	Yes	1 year w	court time
California	Yes	1 year	court time + 1 year 10 months
Colorado	No	9 months	court time
Connecticut	Yes	0	court time
Delaware	Yes	0	court time
D.C.	-	-	-
Florida	Yes	0	court time
Georgia	Yes	0	court time
Idaho	Yes	1 year	court time + 1 year
Illinois	Yes	15 months	court time + 15 months
Indiana	Yes	1 year	court time + 1 year
Iowa	Yes	1 year	court time + 1 year
Kansas	Yes	18 months	court time + 18

			months
Kentucky	Yes	1 year 2/3av	court time
Louisiana	No	0	50 days
Maine	No	0	1 year
Maryland	No	0	psd + confirmation of sale by court
Massachusetts	No	0	21 days
Michigan	No	1 year	15 months
Minnesota	No	1 year	13.5 months
Mississippi	No	No	21 days
Missouri	No	0	20 days
Montana	Yes	1 year	court time + 1 year
Nebraska	Yes	9 months	court time + 9 months
Nevada	Yes	6 months	court time + 6 months
New Hampshire	No	1 year	1 year
New Jersey	Yes	0	court time
New Mexico	Yes	3 months	court time + 1 year
New York	Yes	0	court time
North Carolina	No	0	psd + 10 days
North Dakota	No	1 year	14.5 months
Ohio	Yes	0	court time
Oklahoma	Yes	6 months	court time + 6 months
Oregon	Yes	1 year	court time + 1 year
Pennsylvania	Yes	1 year w	court time
Rhode Island	No	0	psd
South Carolina	Yes	0	court time
South Dakota	No	1 year	13.5 months
Tennessee	No	2 years w	psd
Texas	No	0	20 days
Utah	Yes	6 months	court time + 6 months
Vermont	Yes	1 year	court time + 1 year
Virginia	No	0	psd
Washington	Yes	1 year	court time + 1 year
West Virginia	No	0	20 days
Wisconsin	Yes	1 year	court time + 1 year
Wyoming	No	9 months	10.5 months

Notes: ``psd" - power of sale days; ``w" - period may be waived in the mortgage; ``2/3av" - redemption allowed only if property does not sell for 2/3 appraised value.
Source: Child, 'Uniform mortgage law.'

Table S.2. *Legal interest rates on mortgages and statutory maximums by state, 1928*

State	*Legal rate (%)*	*Statutory maximum (%)*
Alabama	8	8
Alaska	6	10
Arizona	6	10
Arkansas	6	10

California	7	12
Colorado	8	No limit
Connecticut	6	12
Delaware	6	6
D.C.	6	10
Florida	8	10
Georgia	7	8
Idaho	7	10
Illinois	5	7
Indiana	6	8
Iowa	6	8
Kansas	6	10
Kentucky	6	6
Louisiana	5	8
Maine	6	No limit
Maryland	6	6
Massachusetts	6	No limit
Michigan	5	7
Minnesota	6	8
Mississippi	6	8
Missouri	6	8
Montana	8	12
Nebraska	7	10
Nevada	7	No limit
New Hampshire	6	No limit
New Jersey	6	6
New Mexico	6	12
New York	6	6
North Carolina	6	6
North Dakota	6	10
Ohio	6	8
Oklahoma	6	10
Oregon	6	10
Pennsylvania	6	6
Rhode Island	6	30
South Carolina	7	8
South Dakota	7	12
Tennessee	6	6
Texas	6	10
Utah	8	12
Vermont	6	6
Virginia	6	6
Washington	6	12
West Virginia	6	6
Wisconsin	6	10
Wyoming	8	12

Source: Reep, *Second mortgages*, pp. 215-7.

Figure S.1 shows that the strongest correlations between the average original amount of existing first mortgage and the average amount of existing loans contracted or renewed in some particular years can be found in 1927 and 1928. This suggests that a focus on LTVS for loans made in those years is recommended, given that the data on foreclosure rates are not broken-up by year loan made but are average foreclosure rates for existing loans.

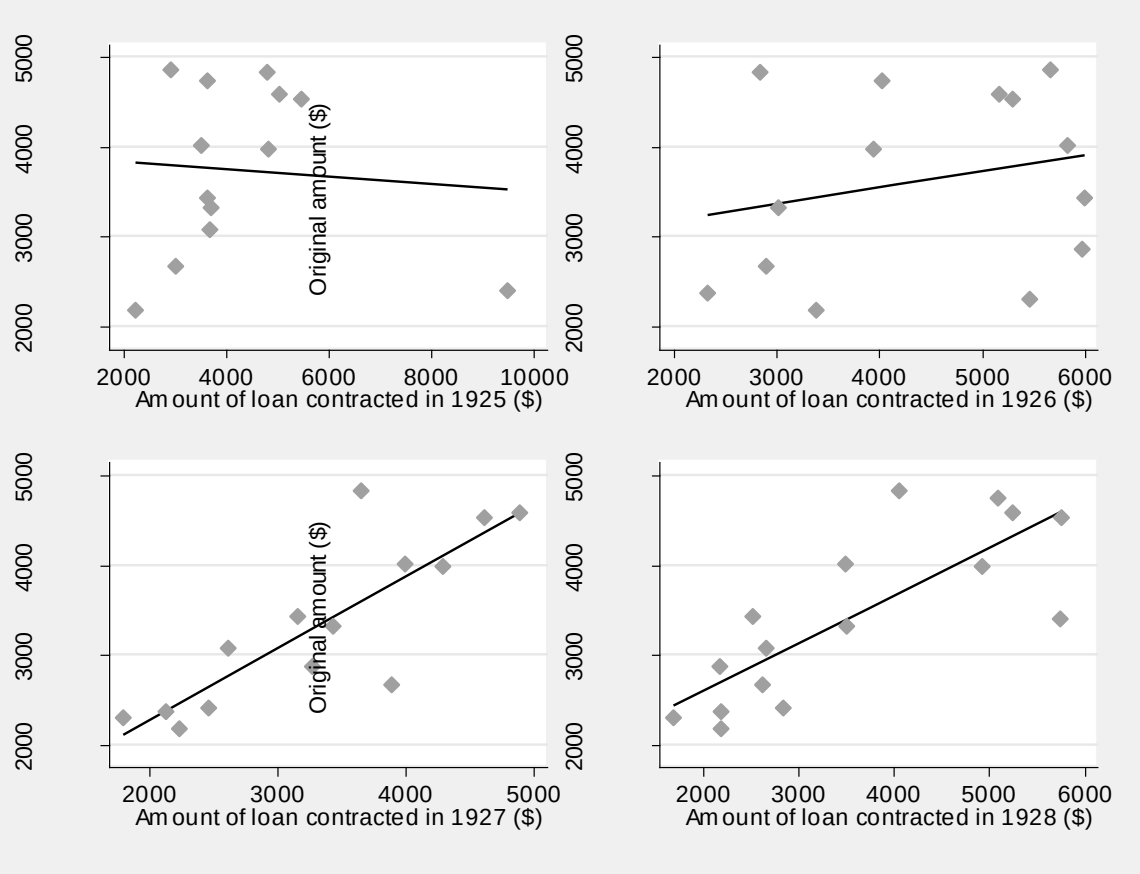

Figure S.1. *Original amount of existing loan and amount of existing loan contracted or renewed in 1925, 1926, 1927 and 1928 ($).*
Source: Wickens, *Survey of urban housing*. For more detail, see text.

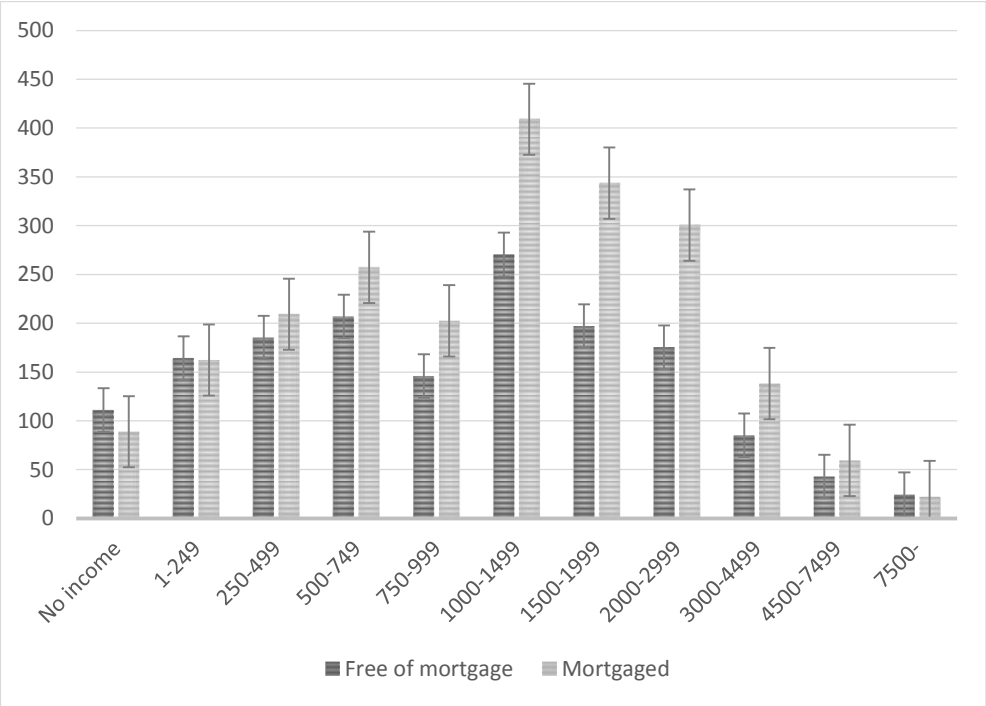

Figure S.2. *1933 income ($) of homeowners in owner-occupied dwellings, free of mortgage and mortgaged, with error bars.*

Source: Wickens, *Survey of urban housing*. For more detail, see text.

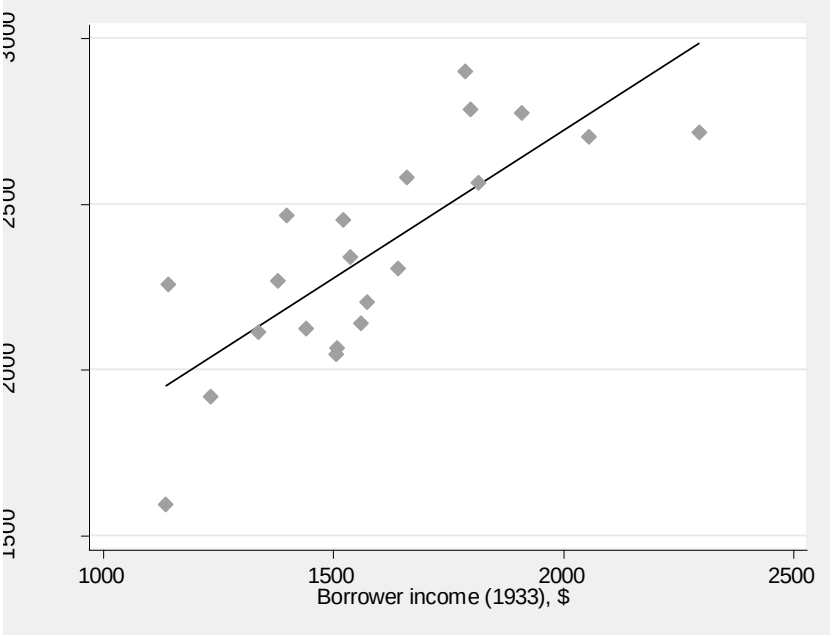

Figure S.3. *All homeowner income in 1929 and borrower income in 1933 ($).*
Source: Wickens, *Survey of urban housing*. For more detail, see text.

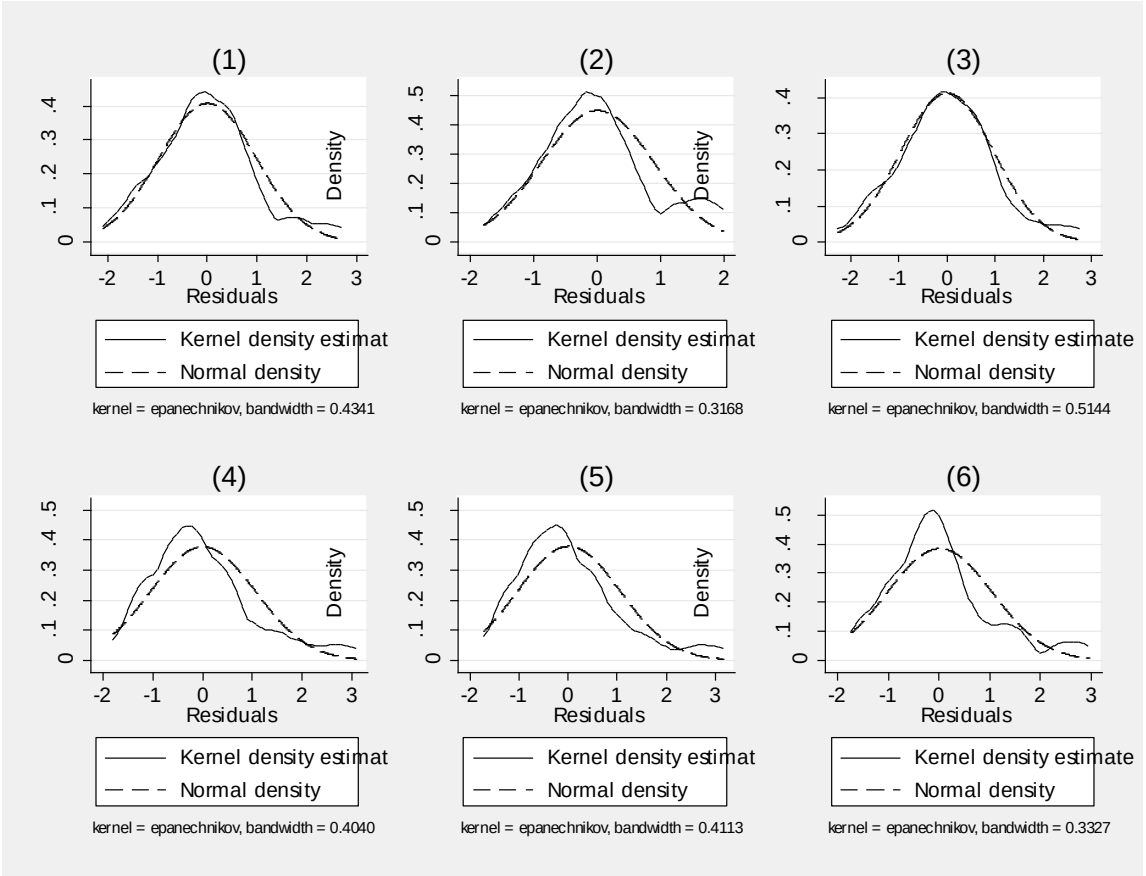

Figure S.4. *Kernel density plot of residuals for regressions (1) to (6).*

Source: Wickens, *Survey of urban housing*. For more detail, see text.