

Macroeconomics and Finance in Emerging Market Economies

ISSN: 1752-0843 (Print) 1752-0851 (Online) Journal homepage: <http://www.tandfonline.com/loi/reme20>

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To cite this article: Kaushik Basu (2011) Non-recourse mortgages and credit market breakdowns: a framework for policy analysis, *Macroeconomics and Finance in Emerging Market Economies*, 4:1, 1-8

To link to this article: <http://dx.doi.org/10.1080/17520843.2010.529634>



Published online: 22 Mar 2011.



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Non-recourse mortgages and credit market breakdowns: a framework for policy analysis

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(Received 8 June 2010; final version received 15 June 2010)

This article illustrates that the legal structure of mortgage credit, in particular its status in terms of recourse in foreclosure, can lead not only to the familiar problem of adverse selection but multiple equilibria in the credit market with the possibility of a small exogenous shock leading to a major breakdown in the credit market with the supply of credit drying up. As such, it tries to shed light on the recent sub-prime crisis; and suggests lessons for emerging economies drafting regulation for modern financial markets so as to prevent meltdowns.

Keywords: mortgage; non-recourse loans; foreclosure rules; limited liability; financial crisis

1. Introduction

While the full story of the financial crash of 2007–9 will take many years to tell and many debates to weather, we do have a fair amount of consensus on two of its features. First, it began with the housing mortgage market and sub-prime lending. Second, it resulted in a sudden, sharp decline in the amount of credit being given out. The channels of credit suddenly got blocked, like a clogged plumbing system, to use an analogy that *The Economist* magazine used to describe the onset of this crisis.

This is, however, not the first time that the sub-prime market has been among the major suspects behind a financial breakdown. This article presents a simple theoretical analysis of the connection between the nature of the mortgage market and the fragility of financial markets. The article pays particular attention to one feature of home loans – the fact that they are frequently, in effect, ‘non-recourse’. What this means is that, in the event of a default, the lender can foreclose on the home but cannot seize other assets of the borrower such as cars or bank balances. A ‘recourse loan’, on the other hand, is one in which, in the event of a default, the lender can go after other assets of the borrower so as to recover the full value of the loan (subject to, of course, the protection provided to all individuals under the nation’s normal bankruptcy laws).

Unlike in some countries where a home loan is secured by a mortgage on the home *plus* an assurance of payment from other assets should the default exceed the value of the home at the time of default, in several states in the United States home

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loans are non-recourse. In general, the laws governing foreclosure vary considerably across states (see Pence 2006). Further, in many states where judicial recourse to asset seizure is possible, it can be prohibitively costly for the lender to go for assets that were not explicitly demarcated as collateral. Hence, if the price of a house drops to below the amount of loan that was taken to buy one – in popular parlance, we have a case of ‘underwater’ mortgage – it could make sense for the buyer to simply walk away from the home and default on the loan. This was indeed a common phenomenon in the financial crisis of 2007–9.

Even until recently (end November 2009), an alarming 23% of US homeowners owed more on their mortgages than the value of the loan that they had taken, as cited in *The Wall Street Journal* of 24 November 2009. The same issue of *The Wall Street Journal* cites a report from the *First American* that for 5.3 million US households the value of their homes have dropped so much that their mortgages are at least 20% higher than their home values. This naturally creates incentives for people to walk away from their homes without paying off their mortgage and allowing for foreclosures. This would create a glut on the housing market, depressing the housing market, which is consistent with the stories that are coming out regarding the slowdown in the housing sector and the downward pressure on prices as are being widely reported in the US press (see, for instance, the article by Streitfeld and Hernandez (2009) in the *New York Times*).

This article argues that the two phenomena – the widespread prevalence of non-recourse loans and the occurrence of financial crises in which credit dries up – are not unconnected. One can in fact *lead* to the other. While a connection between these two phenomena has been suspected by economic journalists and policy commentators, for instance, by Swaminathan Aiyar in the *Times of India* (see Aiyar 2009), the precise nature of the connection remains ill-understood. The aim of this article is to make amends for this lacuna. The basic idea is simple. Non-recourse loans give rise to the problem of asymmetric information, since now it is important for the lending banks to gauge the risk of a default (since they may not be able to recover the full value of the loan) and this risk is likely to be better known to the borrower. As is now standard knowledge, at least from the time of Akerlof’s (1970) classic paper, this can result in the market breaking down and the free market outcome being inefficient. Stiglitz and Weiss (1981) demonstrate this in the case of credit markets (see Basu 1989, for a discussion in the context of share tenancy). What the model in the paper shows is that there may be cases where such a market will not breakdown but exhibit multiple equilibria, with a very limited zone of stability. As we know from the substantial literature on multiple equilibria, this can help us understand how economies can get trapped in low-performing traps (Hoff and Stiglitz 2001). In this case, a shock can result in a rapid movement to the ‘bad’ equilibrium with the flow of credit coming to a ‘sudden stop’, to use a term popularized by Guillermo Calvo in the context of foreign credit flows and macroeconomic meltdowns (see, for instance, Calvo and Talvi 2005).

Constructing the model has the advantage of giving us a framework in which to discuss policy initiatives, including stimulus packages of the kind being designed in several nations, and, prominently, by the new US administration. In a sense the model goes beyond the case of recourse and non-recourse mortgages to the larger issue of borrower rights in the case of credit defaults, in general. The article develops a method for analysing the equilibrium effect of differing levels of bankruptcy protection provided to the borrower in the event of a foreclosure. As such, it can be

of value to emerging economies, such as India, that are working to develop a modern regulatory system for financial markets.

2. Intuitive sketch

I shall develop the model of non-recourse loans in general terms, that is, without pegging it down specifically to the case of home mortgages. So my model will apply to the case of home mortgages, but also to other forms of credit. I shall first describe the broad argument informally, and then construct an example to show that the informal story can be given rigorous shape.

Since the focus of the article is on the supply of credit, it is useful to be conventional concerning demand and to simply assume that the demand curve is downward sloping. That is, as the interest rate rises, the aggregate demand for credit declines. One such demand curve is illustrated in Figure 1.

If loans are non-recourse, and there is asymmetric information about the possibility of default, then the supply curve of credit can take an unusual form. In particular, it can look like the supply curve shown in Figure 1. What is unusual about this supply curve is that, beyond a point, it bends backward. The broad intuition behind this is as follows. As the interest rate rises, fewer individuals demand credit, and it is entirely possible and, in fact, likely that the fewer individuals are not a random draw from among those who were earlier demanding credit but a group that consists of borrowers who are more likely to default. Given limited liability, this smaller group is a less attractive set of borrowers from the point of view of the

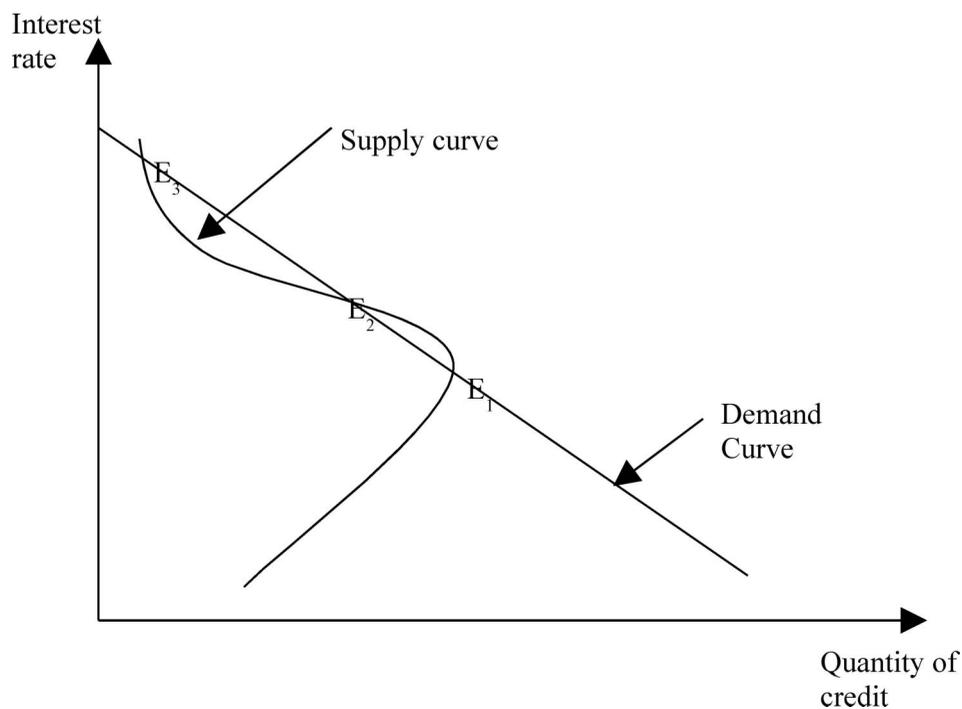


Figure 1. Credit market with multiple equilibria.

lender. Hence, there can be zones where even though the interest rate rises, the lender's expected earning from each dollar loaned declines. If this happens, then, as the interest rate rises, few lenders will be willing to lend. This can explain the backward-bending part of the supply curve.

When this happens it is possible to get multiple equilibria. In Figure 1 this happens at E_1 , E_2 and E_3 . It may be checked that, of these, E_1 and E_3 are stable, whereas E_2 is unstable. I shall here be focusing on the stable equilibria.

Suppose now the economy is at E_1 . So interest rate is low and there is a lot of lending going on. Now, suppose, for reasons that could be exogenous to this market, one or two lending banks or firms go bankrupt and cease to exist. This will cause the entire supply curve to move left. It is now entirely possible that equilibria E_1 and E_2 vanish and the only equilibrium is E_3 . So interest rates rise and, more importantly, the volume of lending suddenly collapses. It should be clarified that how sharp this interest rate rise will be depends on the elasticity of demand for credit. In principle, it is possible for the credit meltdown to occur with negligible rise in the interest rate if demand is sufficiently elastic.

If the bankrupt banks are nursed back into health or new banks take their place so aggregate supply shifts right and the supply curve shown in Figure 1 is restored, the old equilibrium may cease to be achieved. It will exist but the economy once settled in the vicinity of E_3 may refuse to move back to E_1 . We have the same policy quandary that I have described in another paper that is explicitly based on the financial crisis of 2007–9 and relies on a mechanism totally different from foreclosure laws (Basu 2009).

I have up to now not demonstrated how this 'unusual' supply curve can actually occur and its connection to the foreclosure laws. In the remainder of this article I shall construct an actual example which will give rise to the kind of situation described in Figure 1.

In particular, the intuitive claim made above – that the supply curve can bend backwards – is now formally demonstrated in the case of a credit market with asymmetric information and non-recourse limited liability for the borrower. And it will be evident from the context how a change in the law can alter the outcome of the credit market.

3. Model

Suppose there are n potential borrowers. Each borrower is of a type $t \in [0,1]$. Each borrower can invest one dollar in a project with mean return x . There are two states of the world – good and bad – each of which occurs with probability $\frac{1}{2}$. A type t borrower gets a return of $x + t$ in the good state and $x - t$ in the bad state. Hence, a borrower of higher t has a riskier project to invest in. The outputs in the two states for each borrower of type t are illustrated in Figure 2.

Later I shall be talking about exogenous shocks which can *shift* the entire demand and supply curves. So clearly there are other states of the world, at least as far as the macroeconomic world is concerned. But it will be assumed for simplicity that this does not intrude on the borrower's decision-making in any other way. A more general way of approaching this is to begin with n states of the world where n is greater than 2 and to assume that in some of those states the borrower gets a good output whereas in the remainder he or she gets the low output. The analysis that follows will be unaltered by this.

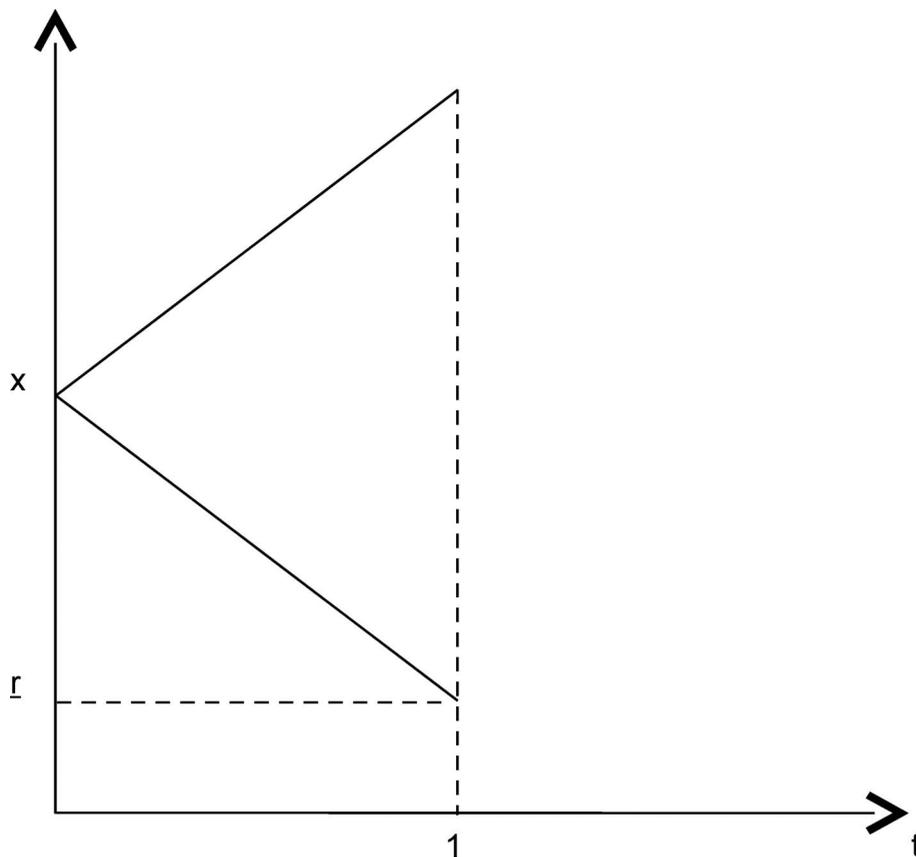


Figure 2. Borrower types and returns.

Let us now assume that $x > 1$. This implies that even for borrower of type $t = 1$, in a bad state the return, $x - 1$, is positive. Define

$$\underline{r} = x - 1.$$

Let me now explain the limited liability clause. Suppose a borrower takes a loan of \$1 at an interest rate r and invests the dollar in his project and gets an output of q . If $q \geq 1 + r$, he pays $1 + r$ to the lender. But if $q < 1 + r$, he has the right to partially default and pays the lender q . With this clause in mind, it is worthwhile for a borrower of type t to take a loan, bearing an interest of r , if and only if

$$u(t, r) \equiv \frac{1}{2} \max \{x + t - (1 + r), 0\} + \frac{1}{2} \max \{x - t - (1 + r), 0\} > 0.$$

If $r < \underline{r}$, clearly, for all $t \in [0, 1]$,

$$u(t, r) = \frac{1}{2}(x + t - (1 + r)) + \frac{1}{2}(x - t - (1 + r)) = x - (1 + r) > 0, \text{ by the definition of } r.$$

Hence, if $r < \underline{r}$, all n borrowers take loans and, it is easy to verify, there is no default.

Next note that if a lender lends \$1 to a person at an interest rate of r and the borrower uses this to get an output of q (given the limited liability clause) the lender's income is $\min\{(1+r), q\}$.

Suppose there are lots of potential lenders each of whom can raise \$1 at an interest rate or equivalent cost of $i(\geq 0)$. The i 's vary across the lenders. So if a lender gets a dollar at interest i and gives it to a borrower at interest rate r and the borrower manages to produce q with it, then the lender's profit, π is:

$$\pi \equiv \min\{(1+r), q\} - (1+i).$$

And in this same situation the borrower's income is:

$$y \equiv \max\{q - (1+r), 0\}.$$

Note $\pi + y = q - (1+i)$.

Hence as the market interest rate rises to \underline{r} , each lender's earnings rise and so the supply of credit rises.

It is easy to verify that, as long as $1+r \leq x$, all borrowers demand credit. As interest rises beyond x , more and more borrowers drop out of the credit market. Hence, the demand curve for credit is as shown in Figure 3. Note that the vertical axis of this figure denotes $1+r$.

We have already shown that as r rises up to \underline{r} , supply of credit rises. It is easy to verify that if $1+r > x$, it is not worthwhile for any lender to lend any money since all i 's are greater than or equal to 0. Hence, supply must first rise, then fall. One particular case of this is illustrated in Figure 3. This credit market has three equilibria, at E_1 , E_2 , and E_3 . And we have now caught up with the intuitive story that was told in section 2. A small exogenous shock can have a huge effect and can cause a breakdown in credit activity.

Suppose the economy is at E_1 . There is some small exogenous change, for instance, one that causes one lending firm to go out of business. This will cause the supply curve to shift left. It is entirely possible that now the only equilibrium is at E_3 . If this happens, then this small exogenous change will translate into total stoppage in lending activity. This, in turn, can have a large impact on the real economy, may be causing a recession as happened in 2008.

4. Comment on policy

The policy implications are interesting. The above model demonstrates the need for two *kinds* of policy that have to be used in conjunction. To do just one and not the other would not solve the problem. Suppose a shock of the kind described above takes the economy to E_3 . To restore the equilibrium back to E_1 it is not enough to restore the supply curve back to its original position. This is necessary but not sufficient. Once the original supply conditions are restored, the old equilibrium, E_1 is once again *available* but there have to be additional interventions to deflect the economy from E_3 to E_1 . This has to be, in part, an exercise in psychology and confidence building but can also be achieved through a large temporary stimulus. This has been attempted by virtually all major nations during the 2007–9 global

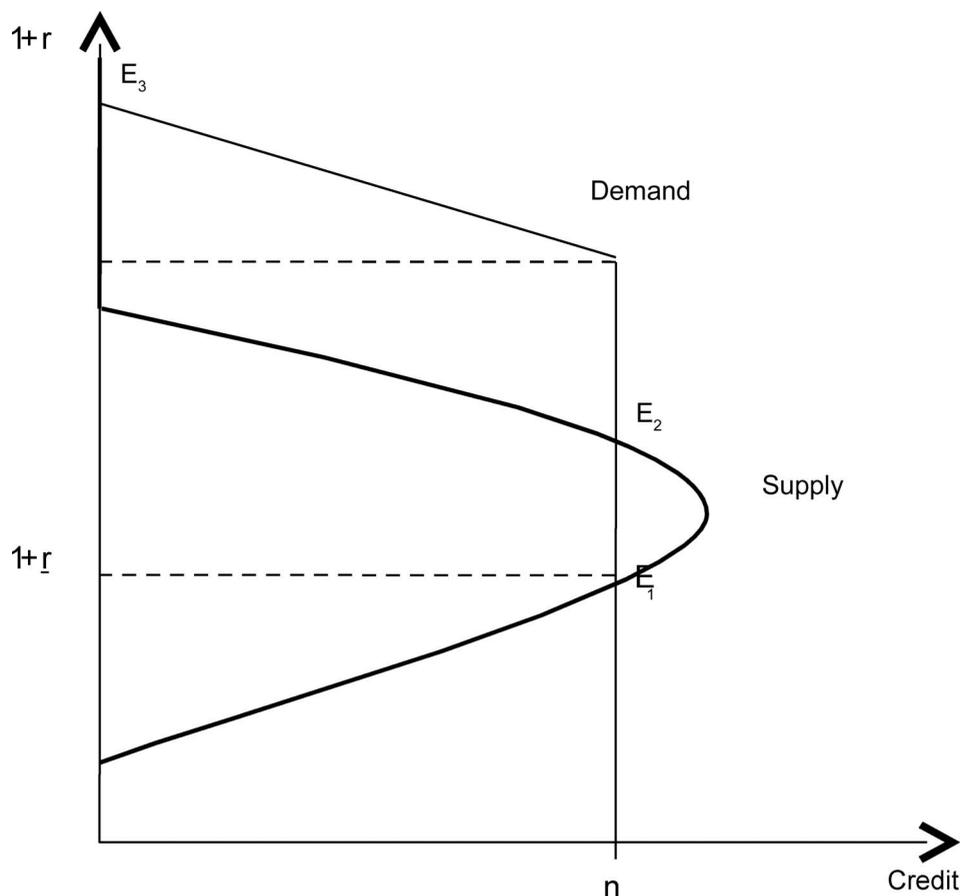


Figure 3. Credit market equilibria.

financial crisis, though questions remain about the magnitude of the effort, given the task at hand. In India, during October 2008 and April 2009, the repo rate was reduced by 425 basis points, bringing it down to 4.75%, and the reverse repo was reduced by 275 basis points, bringing it to 3.25%. There were also some reductions in the cash reserve ratio (CRR) and statutory liquidity ratio (SLR) (Reserve Bank of India 2010). What the model demonstrates however is that simply restoring the structural features of the economy to what they were before the crisis may not be enough.

While the article demonstrates the problems that arise from the limited liability clause in legal contracts, it must not be read as an argument for reducing bankruptcy protection for borrowers. In this age of financial scams, it is possible for lenders and other sophisticated agents to design contracts, which, even when entered into voluntarily by individuals, trap them into predicaments that they may come to regret (see Basu 2010). We do need laws to protect individuals from getting into such situations and this may require preventing them by limiting the amount of collateral that they can offer when they take loans. Yet there is a need to understand how such legal provisions may contribute to the breakdown of the credit market and the need

for complementary policies. The aim of this article was to highlight this point by constructing a simple theoretical model.

Acknowledgements

This paper was presented at a conference in the London School of Economics and the author is grateful to the participants for valuable comments and would like to thank, in particular, Philip Bond, Greg Fisher and Massimo Morelli for suggestions and criticisms – some that I heeded and some not. The paper also benefited greatly from the comments of Brain Dillon, Supriyo De, Freeha Fatima and Ashima Goyal. The views expressed in this paper are those of the author and do not necessarily reflect the views of the Ministry of Finance or the Government of India.

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