

A Comment on Mortgage Procyclicality

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A Comment on Mortgage Procyclicality

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Abstract: This paper comments on mortgage procyclicality. A framework for credit constraints along the lines of Kiyotaki and Moore (1997) illustrates the potential regime shift in the credit risk assessments of mortgagees. Depending on the relationship between house price growth and the alternative rate of return the weight given to collateral and debt-servicing ability may vary according to the house price cycle as mortgagees engage in *search-for-yield*. Regime shifts might come about when house price appreciation is expected and risk assessments ignore debt-servicing ability, fuelled by competition for mortgage market shares and expansionary monetary policy. In the case of regime shifts increased house price growth might stimulate owner-occupation and LTV-ratios and induce mortgage procyclicality.

Keywords: Mortgage, procyclicality, house prices.

JEL-Classifications: E 44, G 21.

1. Introduction

Stylised facts show how economic booms are associated with excessive lending, while downturns often are accompanied by credit crunches. This procyclicality can be related to a number of arguments, ranging from over-optimism (Herring and Wachter, 2002), reductions in supervisory toughness (Berger, Kyle and Scalise, 2001) or market discipline (Sironi, 2003), herding (Rajan, 1994), loan seasoning (Avery and Gordy, 1995) or the institutional memory hypothesis (Berger and Udell, 2004).

This comment develops a simple model of mortgage procyclicality which can serve as a unified framework for the arguments above. The risk evaluations of mortgagees encompass assessments of both collateral and the debt-servicing ability of the mortgage seeker (Sommervoll et al, 2010). This paper shows why the importance of collateral (debt-servicing ability) might increase (decrease) as house prices grow, and argues for a potential regime shift in the relation between mortgage and housing markets.

A model of housing demand that highlights the user cost of housing, the down-payment constraint and mortgagees' relative rate of return is developed. The housing market adaption of credit constrained households is analyzed when the risk assessments of mortgagees are influenced by housing market conditions. Market influence is - directly or indirectly - common to the arguments above. As housing markets are characterized by adaptive expectations (Getzlaff, 1994), regime shifts can come about when house price growth stimulates expectations about future price growth and creates incentives for *search-for-yield* among mortgagees. Implicitly, the comment highlights the importance of including *both* debt-servicing ability and collateral values in the credit risk assessment of mortgagees in order to reduce procyclicality.

The model provides a rationale for why increased house price growth is accompanied by higher loan-to-value (LTV) ratios, as the regime shift allows new socio-economic groups to enter housing markets along the lines of Chambers et al (2009). Increased LTV-ratios make housing markets more exposed to shocks (Benito, 2006), and impact on how

housing markets respond to monetary policy. Changes in the monetary policy response make the financial accelerator in housing markets context specific (Calza, 2009).¹

This comment is structured as follows. The second part sets out a model of housing demand by credit constrained households, focusing on the user cost of capital, liquidity constraints and down-payment conditions. The third part derives four regimes for mortgage structures and the housing market adaption of credit constrained households based on mortgagees incentives for *search-for-yield*. The last part concludes.

2. Credit constrained households

For mortgage financed housing it is often necessary for a household to pledge collateral in the house that is to be purchased. For a number of reasons mortgagees also apply down-payment constraints (Engelhardt, 1996). Finally, risk score models involve a weighing of agent specific factors mainly related to debt-servicing ability. In basic, mortgage financed housing is conditional on both past, present and forecasted house prices, as well as the size of down payments and socio-economic characteristics of the mortgage seeker (Sommervoll et al, 2010).

When incorporating debt-servicing ability, collateral and down-payments a household's housing demand can be derived as follows: First of all, a collateral effect is introduced along the lines of Kiyotaki and Moore (1997):

$$b_t = q_{t+1} k_t (1+r)^{-1} \quad \text{when} \quad q_t < q_{t+1}, \quad (1)$$

where q_{t+1} is the house price in period $t+1$, r is a fixed interest rate, b_t household debt and k_t housing capital, both in period t . The endogenous credit constraint in (1) assumes that lenders are myopic and only care about next period return. The collateral constraint allows a household a maximum level of debt equal to the present value of the (expected) market value of collateral, as some sluggishness is assumed in the default process. To simplify, house price growth is assumed exogenous.

¹ See Bernanke et al (1996) for financial accelerators, and Aoki et al (2004) for an application to housing markets.

Second, a liquidity constraint can highlight debt-servicing ability, for instance as

$$w_t N_t + b_t = p_t C_t + b_{t-1}(1+r^B) + q_t I_t \quad (2)$$

Aggregate expenditures is split between consumption $p_t C_t$, interest payments and repayments of existing debt $b_{t-1}(1+r^B)$, and housing investments $q_t I_t$. The mortgage interest rate, which also is fixed, is given by r^B . Available funds are given by labor income $w_t N_t$ and mortgage debt. As no depreciation is assumed, investments I_t equal the period's increase in housing capital stock $I_t = k_t - k_{t-1}$. Savings is defined as income less consumption $S_t = w_t N_t - p_t C_t$.

Inserting the collateral effect, and the expressions for investments and savings into (2), simplifies the liquidity constraint to

$$S_t + q_{t+1} k_t (1+r)^{-1} = b_{t-1}(1+r^B) + q_t (k_t - k_{t-1}). \quad (3)$$

Rearranging, and solving for housing demand, gives

$$k_t = \left[\frac{1}{q_t - \frac{q_{t+1}}{1+r}} \right] [S_t - b_{t-1}(1+r^B) + k_{t-1} q_t] \quad (4)$$

where $\left(q_t - \frac{q_{t+1}}{1+r} \right)$ equals the user cost of capital and $[S_t - b_{t-1}(1+r^B) + k_{t-1} q_t]$ net worth (NW) of a household. The latter is defined as current savings plus the market value of existing housing less interest and repayments on existing debt. Whereas net worth represents a household's potential down-payment, the reciprocal of the user cost measures the necessary down-payment pr. unit of mortgage financed housing. In this simplified expression of the user cost the necessary down-payment only depends on the expected capital gain (loss) of owner-occupied housing, which also is the key component of the endogenous credit constraint.² Hence, housing demand depends on a market based down-payment constraint and a household's financial position.

² In a more thorough analysis, as for instance by Haurin and Gill (2002), the user cost contains six elements: interest rate, the rate of depreciation, repair, insurance costs, property taxes and the capital gain.

3. Mortgage policy and search-for-yield

In order to analyse how a credit constrained household adapts to housing markets the lending policy of a mortgagee must be introduced. A mortgage policy taking collateral and debt-servicing ability into account and which is in conformity with our model reads:³

$$b_t^* = \min\left(\alpha_2 q_{t+1} k_t (1+r)^{-1}, \alpha_1 [w_t N_t - p_t C_t - b_{t-1} (1+r)]\right) \quad (5)$$

where b_t^* is the maximum level of debt a household is allowed given the risk assessments of the mortgagee. Debt is constrained by:

- The accepted LTV-ratio α_2 , defined in terms of the present value of collateral.
- The accepted debt-to-income ratio α_1 , (measuring debt-servicing ability). Debt-to-income is given for a situation where households refinance all debt each period and income adjusted for necessary consumption expenditures.

Further, we assume that the mortgagee has two alternative investment possibilities; in the mortgage market or in an alternative asset where the return equals the interest rate. The relative rate of return impacts on both mortgagees' aggregate housing market exposure and the accompanying mortgage structures it allows.

The exogenous interest rate equals the alternative rate of return. Together with a mortgage spread, the interest rate also determines the mortgage rate and is crucial for mortgagees' nominal return.⁴ House price growth - and the accompanying collateral effect - is first of all gross mortgage return in case of default. Second, through its interdependence with mortgage markets house price growth also impacts on mortgagees' incentives for *search-for-yield*. In addition to fuelling current lending house price growth also boosts bank capital by increasing the value of the collateral pledged by existing borrowers (Koetter and Poghosyan, 2009). The reduction in portfolio risk accompanying house price growth might impact on both funding costs and capital adequacy ratios, and

³ See for instance again Chambers et al (2009) for developments in mortgage structures and their implications.

⁴ A mortgage spread can as in Gallagher and Milne (1997) either be defined a retail mortgage spread, measured as the difference between mortgage interest and the interest rate, or as a wholesale mortgage spread defined as the mortgage rate minus the cost of wholesale funds.

serve as a basis for future lending. Stated differently, the interplay between house price growth and increased mortgages volumes may allow mortgagees to compensate for a reduction in mortgage spread following a fall in interest rate by increased lending and growth in the mortgage *net-interest rate* or the *mortgage margin* to meet a nominal return target (Rajan, 2005). This process is in the following referred to as *search-for-yield*.

We relate the incentive for *search-for-yield* among mortgagees to the difference between the alternative return and house price growth:

$$(1 + r) \text{ vs } \left(\frac{q_{t+1}}{q_t} \right) \quad (6)$$

In Heuson et al (2001) house price growth – measuring mortgage return in case of default exclusively – is assumed to be lower than the mortgage alternative return. Sommervoll et al (2010) on the other hand, allows for equality between the two.

In the following we do not impose any restrictions on the relation between the two, and allow the mortgage return to exceed its alternative. It is the latter scenario which provides incentives for *search-for-yield* among mortgagees.

Mortgagees may allow favorable developments in market risk (collateral) to compensate for unfavorable developments in socio-economic risks (debt-servicing ability) in overall risk assessments if house price appreciation is expected and the mortgage return exceeds its alternative, i.e. $(1 + r) < \frac{q_{t+1}}{q_t}$. A mortgagee is now willing to suppress α_1 as a mortgage constraint, in order to increase its market exposure which again will allow for changes in mortgage structures.

Expression (6) shows that in addition to developments in both mortgage markets and in the real side of the economy boosting house prices, a reduction in interest rate can also stimulate the risk taking of banks. This latter effect is, along the lines of Brunnermeier (2001) and Borio and Zhu (2008), arguing for increased risk taking both through changes

in behavior and through new ways of measuring risk respectively, in a low interest rate environment.

4. Market based risk assessments, mortgage lending and house price growth regimes

Expression (4) allows us to distinguish between four regimes for housing demand, separated by the rate of house price growth and the user cost of housing. The regimes are summarised in Table (-1-). Regime IV is impossible when the interest rate is positive, and is therefore ignored.⁵

Table 1: House prices and the user cost of housing

	<i>Growing house prices</i>	<i>Falling house prices</i>
<i>Positive user cost</i>	I	II
<i>Negative user cost</i>	III	IV

Regime (I) is referred to as a situation with *weak house price growth* and is characterised by a combination of house price growth $q_t < q_{t+1}$ and a positive user cost of housing

$$\left(q_t - \frac{q_{t+1}}{1+r} \right) > 0. \text{ Combined, these two makes the regime characterised by: } (1+r) > \frac{q_{t+1}}{q_t}.$$

Likewise, in regime (II) house prices are falling $q_t > q_{t+1}$ and the user cost is

$$\text{positive } \left(q_t - \frac{q_{t+1}}{1+r} \right) > 0. \text{ Again, the combined constraint equals: } (1+r) > \frac{q_{t+1}}{q_t}.$$

In both these regimes is the mortgage return lower than its alternative. As the *search-for-yield* condition is not fulfilled conventional credit risk assessments dominate lending.

Expression (7) shows that when the user cost is positive, a household is allowed to enter housing markets, i.e. ($k_t > 0$), when

$$S_t + k_{t-1}q_t > [b_{t-1}(1+r^B)] \tag{7}$$

⁵ Regime (IV): Falling house prices $q_t > q_{t+1}$ and a negative user cost $q_t + \frac{q_{t+1}}{1+r} < 0$ gives $1+r < \frac{q_{t+1}}{q_t}$, which is impossible when the interest rate is positive.

As savings plus the value of existing housing capital exceeds interest payments and loan repayment, the household is in a net-asset position.

In these regimes the expected appreciation of collateral values and mortgage return in case of default is lower than its alternative. Mortgagees are hence not involved in *search-for-yield* behaviour. Due to asymmetric information mortgagees pledge down-payments by mortgagors and are not willing to accept 100 percent LTV-ratios. Hence, only households who are able to fulfil the necessary down-payment constraint are allowed to become owners.

Regime (III) on the other hand refers to as a situation with *strong house price growth*. It is characterised by house price growth $q_t < q_{t+1}$ and a negative user cost of housing $\left(q_t - \frac{q_{t+1}}{1+r}\right) < 0$. The combined constraint equals: $(1+r) < \frac{q_{t+1}}{q_t}$. As the mortgage return exceeds its alternative, the incentives for *search-for-yield* are present.

Reversing expression (7) shows that when the user cost is negative a household is allowed to enter housing markets, i.e. a sufficient condition for $(k_t > 0)$, even when it is in a net-debt position. *Search-for-yield* makes mortgagees willing to supply mortgages even if households not are able to fulfil any down-payment constraints. Hence, as new groups of households are allowed to move into owner-occupation strong house price growth is accompanied by 100 percent LTV-ratios.

5. Summary and discussion

This paper comments on mortgage procyclicality and illustrates the context specific nature of financial accelerators in housing markets. Stated differently, the conditions for when the two offsetting financial sector components dominates mortgage policy, are derived. A model that highlights the alternative return to mortgages, the user cost of housing, and adaptive expectations is applied to analyse credit constrained households housing demand. As the down-payment constraint is determined by the capital gains of owner-occupation, the model implicitly argues the importance of debt-servicing ability in

the credit risk assessments of mortgagees in order to reduce mortgage procyclicality. The mortgage structures accompanying the down-payment constraint is related to the relative rate of return and the incentives for *search-for-yield* behaviour among mortgagees.

Separated by the user cost and house price growth four regimes are derived for credit constrained household's housing market adaption when mortgagees risk assessments are influenced by market conditions. *Search-for-yield* may allow the positive collateral effect of rising house prices to dominate the accompanying negative debt-to-income effect, and bring new socio-economic groups into owner-occupation when house price growth is *strong*. As households in net-debt positions are allowed to become owners, the conventional down-payment constraint disappears and mortgagees accept 100 percent LTV-ratios. This increases housing market risk in accordance with the *deviation hypothesis*, see again Koetter and Poghosyan (2009).

The potential for regime shifts in the relation between housing and mortgage markets shows how *significant* changes in monetary or credit policy might have fundamental implications for housing markets. As an example figure (1) summarises the main differences between regime (I) and regime (III).

When house price growth is strong, the behaviour of mortgagees is driven by *search-for-yield*. The down-payment constraint that usually accompany asymmetric information in credit markets disappear. As mortgagees accept 100 percent LTV-ratios, households in net-debt positions are allowed to enter owner-occupation. Through moral hazard and adverse selection house price growth might increase mortgage portfolio risk. When house prices grow at a slower rate, a household must be in a net-asset position and be able to fulfil the down-payment constraint in order to become owner. Now, the *collateral effect* dominates the financial accelerator.

Figure 1: House price growth and mortgage regimes

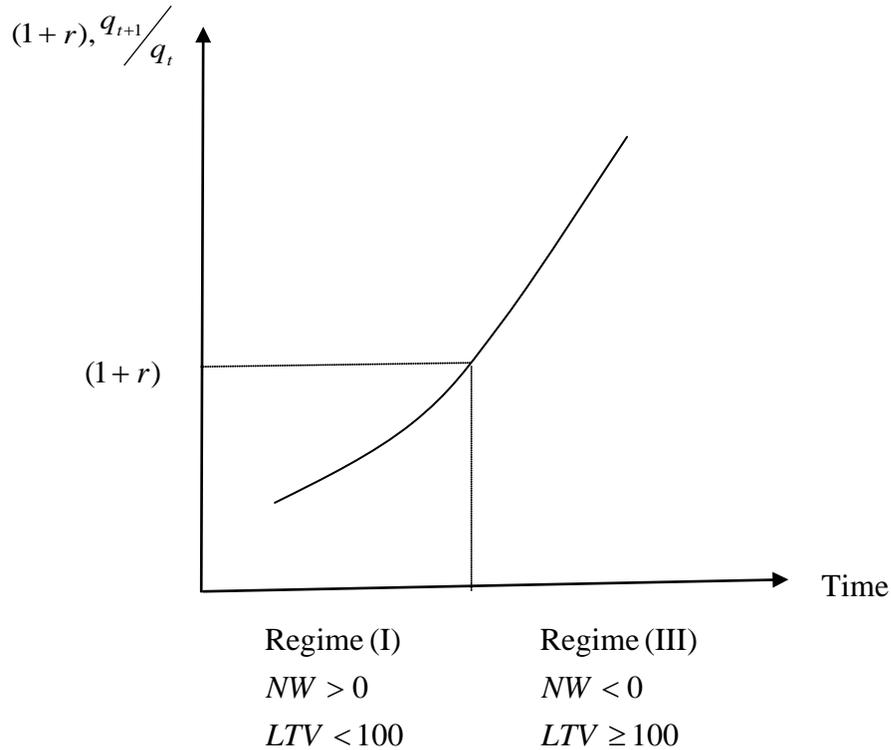


Figure 1 illustrates how both monetary policy and mortgage market developments might serve as potential sources of regime shifts. A substantial reduction in the interest rate might for instance change the relation between housing and mortgage markets from a situation where mortgagees demand down-payments and focus on the debt-servicing ability of households, into one where *search-for-yield* suppress the socio-economic characteristics of a mortgage seeker in favour of expected collateral gains in its mortgage portfolio and future lending, in search of a nominal return target. Increased competition for mortgage market shares might have the same effect.

The regime shifts can be derived on the basis of herding, over-optimism, weak institutional memory, reductions in market discipline or supervisory toughness. Implicitly, the paper argues for the importance of incorporating debt-servicing ability in mortgage policy in order to avoid procyclicality. This can either be ensured through internal mortgage guidelines, market discipline or supervisory measures.

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