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Modelling and Forecasting with County Court Data: Regional Mortgage Possession Claims and Orders in England and Wales

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NON-TECHNICAL SUMMARY

1. This paper presents new quarterly panel data models for county court claims and orders for mortgage possession for seven regions of England plus Wales. Different types of data on mortgage possessions are compared.
2. The innovations include the treatment of difficult to observe variations in loan quality and shifts in forbearance policy by lenders, by common indicators based on dummy variables.
3. The main drivers of mortgage possessions rates are three economic variables, as well as forbearance policy and credit factors, including previous credit quality, access to refinancing opportunities and income support policy. The three drivers are the debt service ratio, the proportion of mortgages in negative equity (based on an average debt to equity ratio in each region) and the unemployment rate. The specification imposes common long-run coefficients on the impact of these three variables, but allows rich heterogeneity in the dynamics.
4. These regional findings corroborate those in Aron and Muellbauer's (2010) analysis of aggregate UK possessions and arrears data.
5. As in 1990s mortgage crisis, the recent upturn in the possessions rate was preceded by lower lending quality and rising debt and house price levels, and accompanied by growing negative equity and unemployment. However, there is a stark difference. The 1990s crisis was triggered by a large rise in interest rates, and policy constraints prevented the reduction of rates. The recent rise in the possessions rate preceded the most dramatic interest rate reductions in British economic history.
6. The lower interest rates and other policy interventions caused the UK possessions rate to peak at the end of 2008 at around half the peak experienced in the 1990s crisis.
7. Regional data on court orders for mortgage possession show that the Southern part of England was hit far harder in the 1990s than recently. Thus, Wales and the Northern half of England experienced lower court orders for possessions rates than the Southern half in the 1990s. At the recent 2008 peak, however, court orders rates matched the North's peak in the 1990s and not far below the peaks in Yorkshire and Humberside, Wales and the West Midlands.
8. This is largely explained by lower levels of debt relative to income in the Northern half of the country, by the later and smaller fall in Northern house prices in the 1990s in contrast to the larger and longer fall in 2008-9, while, in the 1990s, unemployment shocks were more adverse in southerly regions and in 2008-10 in northerly regions.
9. There is also evidence of further heterogeneity across regions possibly related to differences in the incidence of 'buy-to-let' lending.
10. A range of economic forecast scenarios for forecasts to 2015 reveals the sensitivity of mortgage possessions orders to different economic conditions, highlighting potential risks faced by UK mortgage lenders.
11. Simulations suggest that softer house prices in 2011 combined with some withdrawal of income support would be likely to lead to a small upturn in possessions orders in most regions. However, the most serious potential cause of rising possession rates would be some return of mortgage interest rates to more 'normal levels'. Much then hinges on when this is likely to occur.

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I. Introduction

After the house price and credit boom of the 1980s, the years 1990-95 saw a record number of households, around 345,000, and containing perhaps one million individuals, suffering the misfortune of mortgage possession. The house price and credit boom, ending in mid-2007, once again increased the proportion of households with overstretched budgets and over-extended debts relative to their assets. At its peak in 2008, however, the UK possessions rate reached only half that of the 1990s possessions peak. A deeper possessions crisis was avoided mainly through dramatic monetary policy interventions, bringing base rates rapidly down to half a percent, and to some extent the quantitative easing that lowered spreads between base rate and mortgage rates. Forbearance policy and increased income support for those with payment difficulties also assisted.

The possessions outlook was particularly uncertain in 2008-9, and reflected in successive downward revisions of forecasts of possessions cases in 2009 by the Council of Mortgage Lenders (CML) between November 2008 and the final publication of the 2009 data. In August 2010, CML again revised down its June forecasts for possessions for the whole of 2010 to 39,000 from an original estimate of 53,000. The lack of clarity about the scale of the UK's mortgage following the global financial crisis, was due to the uncertain impacts of a tighter credit market in the UK, with lower interest rates, lower house prices, unemployment and income, and the uncertain effects of changing lending quality and policy interventions.

Fluctuations in aggregate UK possessions rates are shown in Figure 1. Recent policy changes increasing lender forbearance have reduced the possessions rate, though the rate of mortgages in arrears rose. Figure 1 also illustrates that voluntary possessions were at low levels until around 2007 and then rose sharply, while the possessions rate on buy-to-let was higher in 2009-10 than the rate for all loans.

An analysis of the CML's national data on possessions and arrears by Aron and Muellbauer (2010) has thrown light on the complex mix of factors driving defaults and payment difficulties. Under most scenarios considered, they found the decline in the possessions rate in 2009 and 2010 from its peak at the end of 2008 should prove temporary. In particular, the return of mortgage interest rates to more normal levels is likely to renew the upward drift in the possessions rate. Much then depends on when this occurs.

This paper complements the national analysis in Aron and Muellbauer (2010) by analysing the regional historical variations in court possession actions and orders, using data from the County Courts for England and Wales. The court data are the only currently available data offering clues about regional divergences in possessions rates. The court data differ in several respects from the CML's possessions data (see Section 2), though the trends share common factors. Court possessions claims (actions) and orders data for England and

Wales in aggregate from the Ministry of Justice (MoJ) are shown in Figure 2, as a fraction of the number of UK mortgages outstanding. The pattern is similar to the CML's possessions rate. The claims (actions) rate leads the orders rate, the orders rate is lower on average than the claims rate, and there is widening of the gap between the two in 2003-08. The fall in the ratio of suspended court orders to total court orders between 2003 and 2007 may be connected with the then increasing share of securitized and 'sub-prime'[1] mortgages in the UK. The lenders originating these loans may have practiced tougher policies or, having made more risky lending decisions, may have anticipated problems and reacted to them more quickly.

The paper employs panel models which can distinguish the region-specific labour and housing market shocks (e.g. rises in unemployment and falls in house prices and real incomes) from national trends in lending quality and policy interventions on mortgage possessions. Despite the different data sources and definitions, the regional analysis of the court claims and orders data offers a potential check on the aggregate findings of Aron and Muellbauer (2010), including the role they give lending quality and policy shifts.

The most systematic previous study of the court data is by Cameron and Muellbauer (1997), examining annual panel data from 1987 to 1996. For the court claims (actions) rate, the key long-run economic drivers were the debt service ratio and the debt to equity ratio. There were short-run effects from the change in the claimant count unemployment rate, the rates of change of nominal house prices and the previous year's rate of business deregistration from VAT. Important time effects, common to all regions, were interpreted as shifts in lending quality and forbearance policy. The court orders rate was modeled, explained by the court claims (actions) rate, the above economic variables and time effects. In the long run, the ratio of orders to claims depended only on the debt to equity ratio and common time effects, though the short-run dynamics also depended on the change in the unemployment rate and in house prices. Cooper and Meen (2001) have also modelled the annual regional data on court orders to 1999, but without regional debt to equity ratios, and using only limited dummies for shifts in behaviour common to regions. However, they also found a large influence of debt service ratios on court orders.

The key innovations of this paper are firstly, the use of quarterly data from 1987 to 2010Q3 that more than doubles the annual number of observations, and includes a second economic cycle that is very different from the 1987 to 1995 cycle. This should make the identification of common shifts in lending quality and forbearance policy more robust. The quarterly frequency permits a more careful examination of the dynamics in the relationships,

[1] "Sub-prime" is a US term and there is no comparable definition of "sub-prime" in the UK. The FSA only report on mortgages which are "credit-impaired" which is not comparable to the US FICO-based definition of "sub-prime". Such firms do a range of business, not only credit-impaired business. Features of US "sub-prime" lending, such as lack of income verification, were also practiced by "mainstream" UK lenders. A better tern would thus be: "non bank/ building society lenders".

and increases the information content. Secondly, our regional estimates of the proportion of mortgages in negative equity are used instead of regional estimates of debt to equity ratios: based on theory (see section 3), negative equity should be more closely associated with possessions. Thirdly, regional data on the Labour Force Survey measure of the unemployment rate replace the claimant count rate used by Cameron and Muellbauer (1997). Together with the increase in the number of observations and data frequency, this makes it possible to distinguish unemployment level effects from the effects of changes in the unemployment rate.

The outline of the paper is as follows. The definitions and characteristics of the court data are discussed in Section 2. The theoretical framework and an empirical specification deriving from this approach are outlined in Section 3. In Section 4, the empirical results are presented, first analysing the aggregate data for England and Wales, and then the regional panel data. The complex data construction entailed is detailed in a data appendix. The paper concludes with regional prospects for the rates of court orders for mortgage possession, by simulating the above model under several scenarios to 2015.

2. A Perspective on County Court Possessions Data

2.1 The County Court Data and CML's Possessions Data

In most cases, mortgage possession involves court proceedings. Ford *et al.* (1995) report that even in cases where households voluntarily handed the keys of their property to their mortgage lender, evidence of court proceedings was often a requirement to be eligible for rehousing in the social rented sector. Thus, data on court proceedings are of general interest for understanding the phenomenon of mortgage possession.

Quarterly data on County Court claims (actions) and orders for mortgage possession have been published by the MoJ since 1987 (Table 1). The Financial Services Authority (FSA) and CML report only aggregate UK data. The characteristics of these data from the three providers are contrasted in Ministry of Justice (2009). The MoJ data are the only source of regularly available regional data to map possessions and cover all court possession actions in England and Wales, regardless of the nature of the loan (i.e. whether it is first charge or second charge lending, or other types of credit including commercial loans).[2] Scotland and Northern Ireland, accounting for perhaps ten percent of mortgages outstanding, are excluded from the MoJ figures. The data cover both mortgage actions, and social and private landlord

[2] This means that separate claims and orders may be issued concerning the same property. Note that prior to the recent redefinition by the MoJ (see Table 1), there could be instances of multiple orders on the same claim.

actions.[3] Scotland and Northern Ireland, accounting for perhaps 10 percent of mortgages outstanding, are excluded from the MoJ figures. Buy-to-let loans are included. The CML data also include buy-to-let loans, but they cover only first charge loans and only for those financial firms that are members of the CML (from 2006, the CML expanded their coverage the "non-bank, building society" lenders). The FSA data from 2007 cover first charge and second charge lending, but only for FSA-regulated financial firms, and include buy-to-let loans. The FSA data are somewhat higher than CML figures since 2007, but the CML figures are the only source for historical comparisons. All three providers report court-ordered possessions, but unlike the CML and the FSA, the MoJ excludes voluntary possessions such as abandonments and cases where the lender has obtained possession without recourse to the courts. Finally, riskier mortgages which are part of the MoJ count may be under-represented in the CML data since some lenders of 'sub-prime' mortgages were not CML members, though CML have scaled their figures to attempt to be representative of all first charge mortgages.

Two types of data are reported by the MoJ: the "claims issued" by the county courts (initiating the county court process to obtain a possession order) and the "orders made" by the judges in the courts. The orders made include both the "outright orders" that entitle the claimant to apply for a warrant to evict the debtor, and "suspended orders" where the claimant is granted possession, but the operation of the order is suspended and cannot be enforced if the debtor complies with the terms of suspension, which usually require the defendant to pay the current mortgage instalments plus some of the accrued arrears. Not all possession claims lead to orders made while debtors may be able to avoid repossession even after a possession order is awarded against them. Many claims are a warning shot to the borrower to begin discussions with the lender. This is also true for court orders, and even for outright orders. There are time lags entailed in the court procedures, so that court claims issued and orders made may occur in earlier periods than the actual possessions, should these occur. The MoJ figures are thus an over-estimate of the actual number of homes possessed via a court procedure (Ministry of Justice, 2009). A recent view from the FSA is that the main reason for the gap between CML and FSA- possession statistics is due to the different treatment of buy-

[3] The figures used in the econometric exercises in this study, however, are for orders issued for mortgaged properties only (this includes all types of mortgage lenders), and they do not include any figures regarding private or social landlord possession cases. Bridging finance companies, included in the orders data, are also excluded in our study, as typically this is unsecured lending. The 2009 edition of Judicial and Court Statistics (published in September, 2010 by the MoJ) gives the number of repossessions of property by bailiffs with a breakdown by the type of claim (mortgage, private landlord and so forth). Quarterly breakdowns are available by regions from 2000, on request from the MoJ.

to-let Receiver-of-Rent cases.[4] The FSA's data also differ from the CML's data through coverage only of loans made by regulated firms and coverage of second charge loans, but the CML data also exclude buy-to-let mortgages for which a receiver of rent (RoR) has been appointed[5], whereas the FSA includes these cases. Where there are both first and subsequent charges on a property (often where the subsequent charges are held with other lenders), some possessions may be reported more than once by the FSA.

There are thus some major differences between data sources on possessions. Figure 3 shows ratios of the numbers of MOJ court claims, court orders and of outright court orders to the CML's count of possessions. At an extreme point in 2004, there were about nine times as many MoJ court claims as CML possessions cases, about five times as many court orders and around twice as many outright orders. This is despite the exclusion of Northern Ireland and Scotland, and of voluntary possessions cases included in the CML figures.[6] The scale of the differences between numbers of court actions and numbers of possessions emphasises that most actions for possession do not result in possession.

Ongoing research by the FSA suggests that lagged possession orders track CML possession statistics adjusted for voluntary possessions relatively closely up to around 2001/2, before possession orders increase as possessions continue to fall. There was a period of rapid appreciation of house prices after 2001. Many borrowers in difficulties sold (the growth in sale and rent back which was marketed as an alternative to possession was probably an important influence). During 2002-2007, those in payment default, but with equity, could trade out of the position or borrow more to forestall possession. Distressed borrowers easily obtained re-mortgages (often with a new lender) and second charge credit without the requirement of income verification. This enabled the avoidance of possession for extended periods, even when a possession order had been granted. Lenders reacted by moving to court proceedings given expectations of losses from the deteriorating borrower quality. The at-risk borrowers migrated down the spectrum towards lenders with shallower capital cushions to allow sustained forbearance (and quickening the time taken to obtain a

[4] These cases can arise for buy-to-let mortgages, where the court order specifies the appointment of a receiver, so that the lender receives rent payments via the receiver rather than directly from the landlord.

[5] We are grateful to John Longbottom of the FSA for drawing our attention to these details. Analysis by the FSA of the possessions data produced since 2007 as part of their regulatory requirements supports this view. Moreover, analysis by the FSA suggests that the majority of possessions that occur in the unregulated market arises from buy-to-let loans (including RoR cases) rather than second charge loans. This view is supported by separate data on second charge possessions produced by the Finance and Leasing Association.

[6] Indeed, in 1995, around one third of the CML's possessions cases were classified as voluntary, though between 2003 and 2007, the proportion was under 15 percent. The factors influencing the decision to voluntarily give up a property have been explored qualitatively using micro-data by Ford (2009) and Ford *et al.* (2010).

possession order once in arrears).[7] The FSA has examined around 2,000 credit histories from house purchase through to possession. Frequently, the borrower had a history of re-mortgaging and obtaining additional credit, until about 6 – 9 months prior to possession. This pattern of behavior mirrors that identified by LaCour-Little *et al.* (2009) in California. The MoJ data cover all loans while the CML data up to 2006 may have slightly under-adjusted for loans made by non-bank, non-building society lenders.

The above considerations help explain the widening gap between orders and possessions after 2001. The subsequent lack of refinancing opportunities, given the tightening of lending conditions and the decline in resale options, together with "Mortgages and Home Finance: Conduct of Business sourcebook" (MCOB) guidance, may have tended to bring possessions and orders more back into line.

Indeed, the time profile of the ratio of court orders to the CML's possessions data is distinctive. The ratio is high in 'good times' and falls in 'bad times'. To put it another way, in 'good times' court orders fall but possessions fall by even more; the reverse tends to be true in 'bad times'. In Figure 4 it is plotted against our estimate of the proportion of UK mortgages in negative equity, the UK debt service ratio and the unemployment rate, all in logs. When unemployment, negative equity and the debt service ratio are low, the count of the CML's possessions is low relative to the court orders made. To put it simply: since possession is an extreme outcome which is harder to avoid when fundamentals are bad, one should expect a lower rate of claims and orders to possession at such times. However, this also depends on the lenders' expectations of future prices, for the lender may wish to sell even at a loss if further falls in prices are anticipated. It also depends on the degree of recourse available to the lenders: often they cannot claim on indemnities until a loss is booked, nor claim against any professionals' insurances to sue for malpractice. Moreover, covenants attached to securitisation funding may lead to penalties for lenders in breach of these terms (e.g. a common covenant relates to the proportion of loans in arrears at a given point in time).

2.2 Changing policy on possessions and changes in lending quality

Policy shifts

Governments can influence possessions rates in several different ways. They can try to alter the forbearance policies of mortgage lenders and court procedures. They can alter the income

[7] We are grateful to John Longbottom of the FSA for this point. Work in the US by Mian and Sufi (2010) suggests an initially strong negative relationship between house price growth and defaults as borrowers can forestall defaults by borrowing more. "Lower credit quality households living in high house price appreciation areas experience a relative decline in default rates from 2002 to 2006 as they borrow heavily against their home equity, but experience very high default rates from 2006 to 2008."

and other support offered to mortgage borrowers in difficulty. Finally, they can influence economic drivers such average income, the unemployment rate, interest rates and house prices. Aron and Muellbauer (2010) distinguished forbearance policy from income support policies by the differential effect each has on possessions and mortgage arrears. Increased forbearance lowers possessions but increases arrears; increased income support for those with payment difficulties, lowers both possessions and arrears. Increased forbearance has a direct effect on arrears, since every mortgage already in arrears which does not move into possession then swells the arrears count. There may be an incentive effect: if lenders are more lenient on possessions, households may prove less rigorous in reducing debt.

There are parallels in forbearance policies in 1991 and 2008. Heightened public concern about mortgage possessions resulted in the implicit contract agreed between the Government and mortgage lenders in late 1991 before the 1992 General Election, to reduce possessions. The government paid income support for mortgage interest direct to the lenders, stimulated the housing market by raising the Stamp Duty ceiling for a year and gave ear-marked grants to housing associations to purchase properties. In return, lenders agreed to greater leniency on possessions. Practices by the County Courts also altered in the 1990s, with longer repayment periods for households in payment arrears being permitted, see Ford (1994) and Ford *et al.* (1995, ch. 5). The government substantially reduced the generosity of Support for Mortgage Interest (SMI) from 1995, see Dale (1995) and Stephens (1996). In 2008 the government of the time exerted pressure toward leniency on lenders (some of whom the government newly-owned in part). The SMI became more generous, a Mortgage Pre-action Protocol was introduced from November 2008, and a Mortgage Rescue Scheme and Homeowners' Mortgage Support (Stephens (2009) summarises these measures). An important ingredient was setting the standard mortgage rate at which SMI was paid at 6.08 percent until October 2010, far above the average rate on outstanding mortgages of around 3.6 percent. Indirect policy support included another Stamp Duty holiday, and mortgage loan targets for wholly or partly-owned banks (Northern Rock, and Royal Bank of Scotland and Lloyds TSB).

The Courts are unlikely, as in the early 1990s, to have been entirely immune from these recent shifts in public and official concern, though the discretion that can be exercised by the courts is limited by the 1970 (amended 1973) Administration of Justice Act. It is possible that the apparent softening of forbearance policies by the courts from 2008 may also have been influenced by the loss of public reputation by the banks in the financial crisis, though perhaps more important was a change in lender behaviour, when some lenders, such as Northern Rock, came into outright or partial public ownership.

To understand the variations that have occurred in rates of mortgage possession, such shifts in behaviour should be taken into account along with the influence of variations in economic conditions, such as the debt to equity ratio or the proportion in negative equity, and

debt service ratios, unemployment shocks, and house price developments. Indeed, econometric studies of aggregate mortgage possession data such as Breedon and Joyce (1992), Brookes *et al.* (1994), and Allen and Milne (1994), estimated on data up to 1990 or 1991, break down badly on later data.

Changes in lending quality

Lending quality has varied over time. Centralised mortgage lenders increased their market share in the late 1980s, often to less credit-worthy customers, and contributed to high possessions and arrears in the 1990s. Ford *et al.* (1995) quote possessions rates for centralised mortgage lenders averaging three times those of high street banks. In 2005-7 the shares of self-certification mortgages and of mortgages issued by non-banks and building society subsidiaries rose sharply (Turner, 2009), and such mortgages have shown higher default rates.[8]

Loan quality is difficult to measure directly. Since 1968, micro data have been collected from mortgage lenders on loan-to-value and loan-to-income ratios, often used as indicators of lending quality or credit availability or both. However, these indicators are not pure measures of lending quality as they also depend on interest rates, house prices, incomes and other variables (see Fernandez-Corugedo and Muellbauer, 2006). Moreover, the data are not comparable over time, nor do they fully capture the quality of the screening carried out by lenders. Aron and Muellbauer (2010) therefore used a latent variable based on dummies, common to a three-equation system of possessions and arrears equations, to capture changes in loan quality and in forbearance policy. The strategy of the empirical work below is to use the loan quality and forbearance policy indicators estimated in Aron and Muellbauer (2010), and to check their robustness in the context of the court claims and orders data (see Section 3.2).

3. The Double Trigger Model for Defaults and an Empirical Specification

There is general agreement that mortgage defaults or possessions result from some mix of excessive debt relative to home equity and cash flow problems. This is consistent with the 'double trigger' approach, a more general view of mortgage possession than the option pricing approach popular in some of the US literature, see Kau *et al.* (1992) and Deng *et al.* (2000), and applied to UK data by Ncube and Satchell (1994). In the option pricing model,

[8] See the FSA'a CP10/16: Mortgage Market Review: Responsible lending (July 2010), p.20, chapter 6 and Appendix A1 p.5-12.

default is *chosen* by the household once housing equity falls below the mortgage debt level by a given percentage, which depends mainly on house price uncertainty. Even in the US, where mortgages in many states are non-recourse loans (i.e. where the lender's rights are restricted to the equity in the home, excluding recourse to the borrower's income or other assets), doubt has been cast on this 'ruthless default' literature (Vandell, 1995). Recent empirical literature adopts a more general approach that encompasses cash flow problems, for example, Gerrardi *et al.* (2008) and Foote *et al.* (2008).

In what follows we present the double trigger framework and derive the associated empirical specification for modelling and forecasting regional possessions.

3.1 Theoretical Framework

The double trigger approach rests on the idea that defaults occur not just because home equity is low relative to debt, but also because households have cash-flow problems. An early exposition of the theory behind the double trigger model is by Elmer and Seelig (1998), and it underlies much recent micro-econometric work on US mortgage defaults (Bajari *et al.* (2009); Gerardi *et al.* (2008)). These authors argue that, abstracting from variations in interest rates, default for a household, due to a weak net equity position, occurs when the debt to equity ratio exceeds a particular threshold c_{it}, where the threshold depends positively on the expected growth rate of house prices, given transactions delays, and also on house price volatility (Bajari *et al.* (2009), their equation (4), p.10).[9]

Bajari *et al.* argue that when interest rates can change, the threshold depends additionally on an interest rate term (their equation (10), p. 13). Default due to a weak net equity position can occur even if the household does not have cash flow problems. This is particularly relevant in the US where, in states such as California, borrowers have a 'walk away' option so that their liability is confined to the value of the home.

However, default can also occur because of cash flow problems induced by credit constraints. Bajari *et al.* argue that this will occur when the debt service ratio exceeds a threshold, but depends also on the credit worthiness of the household, its employment status and its expected income growth (their equation (13), p.15). This can be expressed by a trigger function, a relationship between a household's unemployment rate, its credit score and its expected income growth being positive.[10]

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[9] Expressed technically as *condition (1)*, $\log(\text{mortgagedebt}_{it} / \text{equity}_{it}) > c_{it}$, for household i at time t, and a threshold c_{it}.

[10] Technically, this can be expressed by *condition (2)*, a trigger function: $f(\text{debt service ratio}_{it}, ur_{it}, cs_{it}, \Delta y_{it}^{e}) > 0$, where *ur* is the household's unemployment rate, *cs* its credit score and Δy^{e} represents its expected income growth.

Bajari *et al.* embed the first debt-equity threshold condition in a utility model, so that if the utility associated with this type of default is positive, the household will default.[11] The debt service trigger condition is treated as an aspect of the budget constraint, outside the control of the household. Default then occurs if either or both conditions are fulfilled.[12]

There is a problem with this formulation. It makes little sense for a household with positive net housing equity to default, even when there are cash flow problems. With positive equity, such households may have refinancing possibilities or could sell the home rather than lose it through possession. It seems more plausible that default should occur either when there is weak debt to equity position or when *both* conditions are met, that is, the debt service relationship is positive *and* the debt to equity ratio exceeds a particular threshold c_{0t}.[13] Thus, a weak debt to equity position is the common factor in all defaults.

It is plausible that the factors driving defaults might be a little different for buy-to-let borrowers who may be more concerned about expected capital gains or losses, the stability of rental cash flows and with their tax position. The composition of the mortgage stock by type of borrower could then affect the behaviour of aggregate mortgage defaults.[14]

In the UK, unlike the US, it is probable that relatively few possessions cases arise only through the debt to equity ratio exceeding c_{0t} (*condition (1)*) since the consequences of possession are more painful. Mortgage borrowers can be pursued for up to six years for negative equity remaining after the lender has sold off a home in possession and the threat of such action is likely to deter borrowers from choosing possession as an easy option. This contrasts with non-recourse mortgage loans and 'walk away' options in some states of the US, and a general scepticism elsewhere among US lenders regarding the benefits relative to the costs of trying to recover such losses.

Given individual heterogeneity and knowledge of (or assumptions on) the distributions of the observable data (such as the debt to equity ratio) and of the unobservable data (such as tastes) at the micro level, one could obtain the aggregate proportion of defaults as a function of the means of the observables and of the parameters of the distributions. Without knowledge of the distributions of observable and unobservable data, the functional form of the relationship between the aggregate proportion of defaults and the means of the observable data is unknown, but in general will be non-linear. Specifically, there is an

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[11] The utility function incorporates an unobserved random variable, for example representing household tastes or an unobserved household characteristic, so that the probability of default can be derived from the probability distribution of this random variable combined with the observable elements of the threshold condition.

[12] This is modelled as a bivariate probit, given some unobserved stochastic components reflecting tastes and household characteristics.

[13] Technically, this is expressed as *condition (3),*

$f(\text{debtservice ratio}_{it}, ur_{it}, cs_{it}, \Delta y_{it}^{e}) > 0$ *and* $\log\left(\text{mortgage debt}_{it} / \text{equity}_{it}\right) > c_{0t}$

[14] We are grateful to John Longbottom, FSA for this observation and also for noting that since about 2003 an increasing proportion of conventional mortgage may be disguised buy-to-let mortgages.

important common element in all default outcomes involving a threshold for log (mortgage debt/equity). Although c_{0t} is expected to be a little below zero (e.g. from transactions costs), while option pricing theory implies c_{it} would be a little above zero, the proportions of households satisfying each condition should be highly correlated with the proportion in negative equity (the proportion for whom log (mortgage debt/equity) exceeds zero).

On specific assumptions, it is possible to derive a simple relationship between the proportion of households with negative equity, and mean debt and mean equity. Suppose, for example, that debt and equity have log-normal distributions, so that the log (mortgage debt/equity) is also normally distributed. The proportion of mortgages with negative equity, i.e. log (mortgage debt/equity) greater than zero, is then given by the normal distribution function $F(\mu, \sigma; 0)$, with the mean of log (mortgage debt/equity) denoted by μ and its standard deviation by σ. As the mean of the distribution shifts to the right, the area under the tail increases proportionately *more* than does the mean. This is illustrated in Figure 8 which shows the proportion of mortgages with negative equity as the area under the right tail of the distribution of log (mortgage debt/equity). The figure makes it clear that, say, a five percent rise in average debt to equity, shifting the distribution to the right, would result in a much more than five percent increase in the area under the tail.

For the log-normal distribution, there is a relationship between the mean of log debt, which we do not observe, and the log of mean debt, which we do observe; and, correspondingly for the mean of log equity.[15] The logistic function is a good approximation to the normal, with a simple distribution function which depends on two parameters.[16] Given data on the ratio of mean debt to mean equity, and estimates based on micro data of the proportion of households with negative equity, these parameters can be calibrated to match the estimated proportion of negative equity based on micro data. This equation should yield a good time-series approximation to the most important non-linearity in the relationship between the aggregate or regional rate of possessions and the means of its fundamental drivers. A further advantage is that if later estimates of negative equity based on micro data become available, the relationship could be recalibrated for improved accuracy.

The probability associated with the simultaneous occurrence of a bad debt to equity position and a 'bad trigger' can be written as the product of the probability of 'bad debt to equity' and the probability of a 'bad trigger' given 'bad debt to equity'. Modelling the log of the probability, i.e. the log possessions rate, results in an additive model. If the two events were independent, the log possessions rate would be given by a function of (debt/equity) plus a

[15] It is well-known that if X is log normally distributed, then $\log EX = E \log X + 0.5 \mathrm{Var} \log X = \mu + 0.5\sigma^2$.

[16] In technical terms, this can be expressed by *expression (4)*, implying:

$$\text{proportion of negative equity} = 1 / (1 + \exp(-\lambda\ (\log(\text{mean debt/mean equity}) - \lambda_0)))$$

where λ_0 is half the difference in the variances of log debt and log equity.

function of the means of the variables appearing in the trigger function, e.g. the debt service ratio and unemployment. This suggests a log-linear formulation in which the log possessions rate is driven by the log of the unemployment rate, the log of the debt service ratio and the log of the imputed proportion with negative equity. In addition, without data on the aggregate credit score, an aggregate loan quality indicator is needed.

To summarise, the theory suggests the probability of possession in the UK is the result of the simultaneous occurrence of two factors: a vulnerable debt to equity position and a trigger factor including elements such as cash-flow problems with debt service payments and unfavourable expectations for an improvement. A rational borrower would not default on a mortgage just because of cash-flow problems if the equity cushion relative to debt was sufficient to allow trading down or out. Similarly, someone able to meet mortgage payments is unlikely to seek possession: UK borrowers who default face a high probability of being pursued for their unpaid debt in the future and of being denied access to credit for at least some years. The fraction of households with a vulnerable debt to equity position can be summarized by the estimated proportion in negative equity. Finally, there are good reasons for thinking that the relationship between the proportion of possessions cases, and the proportion in negative equity, the unemployment rate and the debt-service ratio is approximately log-linear.

3.2 An Empirical Model for Regional Mortgage Possessions

The theory set out above suggests that at the regional as well as at the national level, the log proportion of mortgages going into possession should be approximately determined by three economic variables, and by forbearance policy and loan quality. The three economic variables are the log proportion of mortgages in negative equity, the log debt-service ratio and the log unemployment rate. In practice, possession can be initiated by mortgage borrowers or by lenders. Given information asymmetries between them and different objectives, the possession probability will not have exactly the same relationship with economic fundamentals for borrower or lender-initiated possessions. Indeed, Aron and Muellbauer (2010) found that for aggregate UK data, voluntary possessions were more sensitive to lending quality and the debt service ratio than was the case for the total rate of possessions. However, one would still expect the same set of economic fundamentals to be operative in both cases. As Ford *et al.* (1995) observe, for households in possession to obtain access to local authority housing, possession has typically to be the result of court proceedings.[17]

[17] In an attempt to reduce inconsistencies in the application of rules across local authorities, the Department of Communities and Local Government issued supplementary guidance for local

We do not observe possessions as such at the regional level but have data on court claims (actions), court orders and suspended court orders which we can express as rates by dividing by the estimated number of mortgages in each region. One would expect the relative role of the different drivers to be different for claims than for court orders. It seems likely, for example, that claims would be more driven by cash flow problems than by negative equity. Many claims will be triggered by mortgage payment problems; but only in the more serious and intractable cases will the claim be followed by a court order.

Thus, we hypothesize that in the i^{th} region the log proportion of court claims or orders, in the long run, can be expressed by the following equation:

$$\begin{aligned} &log(court\ claims\ or\ orders\ rate)_{it} = \ regional\ fixed\ effect_i + a_1\ log(debt\ service\ ratio)_{it} \\ &+ a_2\ log\ (proportion\ of\ negative\ equity)_{it} + a_3\ log(\ unemployment\ rate)_{it} \\ &+ a_5\ (lending\ quality\ index)_t + a_6\ (forbearance\ policy\ index)_t \end{aligned} \quad (1)$$

This equation says court claims or orders can be explained by the variables on the right hand side. The three fundamental economic drivers are the debt service ratio (the product of the mortgage interest rate and the level of debt divided by disposable income); an estimate of the incidence of negative equity (based on the ratio of average mortgage debt to average home prices); and the unemployment rate. The estimates of negative equity in each region are based on the existence of a stable non-linear relationship, see section 3.1, between the mean of the distribution of the log debt/equity ratio and the proportion of mortgages in the tail where debt exceeds equity, calibrated to estimates of regional negative equity for 1992 and 2009. The equation for every region includes a factor specific to that region as a 'fixed effect', to capture long-run regional differences in age and occupational structure, in tax rates, in the ownership of financial assets and inequality.

A priori, it is possible that regional fixed effects might be sufficient to capture the idiosyncratic long-run features of each region, given rich enough region-specific economic controls and regionally heterogeneous short term dynamics. However, it is important to check the pooling restriction on the slope parameters of the long-run model. Thus, panel estimates with fixed effects are compared for panels of different sizes, for example with a north-south division of regions.

The dynamic adjustment of the court claims rate to the long-run solution is not instantaneous so that an 'equilibrium correction' form, incorporating the above long-run relationship captures these dynamics. Included in the 'equilibrium correction' model is the

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authorities in 2009 on assessing whether households losing their home due to mortgage difficulties are intentionally or unintentionally homeless, http://www.communities.gov.uk/publications/housing/intentionalhomelessnessguide.

lagged adjustment of the log court claims (actions) rate to the long-run fundamentals, the short-run dynamics in the log proportion of negative equity, log house prices, the log debt service ratio and the log unemployment rate, and the loan quality index and the forbearance policy function.[18] The speed of adjustment to equilibrium and other short-run dynamics all vary by region. The equations include a few dummy variables for outliers.

The fitted values of the forbearance policy and lending quality indices from Aron and Muellbauer (2010) are employed in the model (Figure 9). Both the indices are simple functions of dummy variables. For example, for forbearance policy, a step dummy equal to one from 1992Q1 and zero before captures the end of 1991 policy shift. A smoothed step dummy which moves gradually from zero in 1996Q4 to one in 1998Q4, captures the return to normal, imposing the restriction that the 1991 shift is eventually cancelled out. The recent shift in 2008 was captured with a step dummy beginning in 2008Q4. Since the 2008 Mortgage Pre-action Protocol would have introduced delay on possessions procedures, and implies a partial reversal after a few quarters of the initial impact of the policy shift, lags of this dummy were introduced in Aron and Muellbauer's estimated policy function to capture these possibilities. The data suggest that court orders fell more sharply than CML possessions from the beginning of 2009, Figure 4, than can be easily explained by this policy function and the economic variables and so a step dummy beginning in 2009Q1 was introduced. The evidence is that by 2010Q3 most of this additional effect had faded.

The 'loan quality' indicator does not measure the initial quality of loans but the *later* impact of quality change on possessions. Lending standards tend to have gradual effects on aggregate mortgage defaults: heterogeneity of individual borrowers and of lender behaviour tends to result in a smoothing of the response of aggregate default rates to evolving quality of lending. It could also result in heterogeneity across regions to the extent that lenders such as Northern Rock, whose lending quality deteriorated, may have had larger market shares in some regions than others. The 'loan quality' index represents two factors in addition to loan quality. The first is increased access to refinancing opportunities which can mask an underlying deterioration in loan quality, as was probably the case in the 2005 to mid-2007 period. This accounts for a small but otherwise counter-intuitive fall, i.e. improvement, in the index in this period (Figure 9). The second is income support policy for borrowers with payment difficulties, which improved from the end of 2008, resulting in a fall in the index. Examples are the policy shifts announced in late 2008, offering more generous income support for the unemployed

[18] This is illustrated for the log court claims rate as follows:

$$\Delta \log pclaims_t = a_4(a_0 + \sum_{l=1}^{3} a_l X_{l,t} + a_5 LQ_{t-1} + a_6 PS_{t-1} - \log pclaims_{t-1}) + \sum_{l=1}^{n}\sum_{j=0}^{k} b_{l,j}\Delta X_{l,t-j}$$
$$+ \sum_{j=1}^{k} c_j \Delta \log pclaims_{t-j} + g_1 \Delta LQ_t + g_2 \Delta PS_t + \varepsilon_t$$

with mortgages and those already on Pension Credit and Income Support, and the Mortgage Rescue Scheme.

Lending quality and forbearance policy shifts are assumed to be primarily national features common to all regions. This is clearly an approximation. Between 2007 and 2009, close to half of mortgages were of the 'self-certification' type, where careful income checks were not carried out. There are no data on the regional incidence of such loans which might have offered clues on regional variations in lending quality. Qualitative information suggests substantial variations in the regional incidence of buy-to-let lending after 2000. Press reports suggest loans on speculative apartment developments, e.g. in cities such as Leeds and Manchester, have soured as rental demand could not sustain cash flows. Fewer such problems have been reported for London.

While maintain the assumption that forbearance policy had a homogeneous effect across regions, there are thus reasons to believe that the different regional incidence of buy-to-let lending may have caused some regional heterogeneity in lending quality in recent years.[19] A time dummy differing by regions is therefore added to this specification from 2003. We also test the restriction that forbearance policy was fully normalised by the end of 1998 by introducing a smoothed 1997 dummy. The above long-run form of the equation is thus augmented by the following term: $a97(sdmm97_t) + a03_i(sdmma03_t) + a09(sd2009q1_t)$, see definitions in Table 2. In the panel context, *a03* is allowed to vary by region, but *a97* and *a09* are assumed identical across regions.

4. Estimation Results of Regional Mortgage Possessions Models

The analysis begins with data for all of England and Wales in Section 4.1. Regional divergences in court data and in the key economic drivers are discussed in Section 4.2. Regional panel data models are estimated for court claims and orders in Sections 4.3 and 4.4.

4.1 Modelling England and Wales aggregate court data: a first approach

Aggregate court data for England and Wales are modelled using aggregate UK explanatory variables. This is a reasonable approximation to modelling with aggregate data for England and Wales since Scotland and Northern Ireland account for only around 10 percent of mortgages and of population. Beginning with aggregate court claims for England and Wales,

[19] As far as we are aware, there are no data on buy-to-let lending by region (e.g. they are not produced by the CML), so the heterogeneity of buy-to-let lending cannot be verified. Research at the FSA, communicated by John Longbottom suggests that properties potentially suitable for renting have experienced disproportionately high possessions rates leading to postcodes with high concentrations of possession orders.

compared to the long-run solution for the proportion of possessions as measured by CML in Aron and Muellbauer (2010), the long-run effect of loan quality is similar, but the forbearance policy effect is larger, and both indices are strongly significant (Table 3, columns 1-2). This is consistent with the finding of Aron and Muellbauer that forbearance policy has no effect on the voluntary possessions included in the CML possessions count, but which are largely excluded from the court data. This suggests that court data should show larger forbearance effects. The smoothed dummies for 1997 and 2003 have only marginal effects, but the step dummy for 2009 is significant, suggesting that the (relative) impact of (recent) increased forbearance policy on court claims is proportionately somewhat greater than on CML possessions.

The long-run effects of the debt service ratio and the proportion in negative equity, each entering as four-quarter moving averages, are both estimated to be somewhat lower than for the CML possessions rate, but the unemployment effect is estimated to be somewhat larger, though still not very precisely determined[20]. In the dynamics, there are strong effects from the previous year's increase in the log debt service ratio and in the log unemployment rate. The dynamics also include the deviation from a past moving average of the proportion in negative equity, taken to be the 8-quarter moving average of eight quarters previously. Similar terms are later found to be relevant for the *regional* court claims and orders data. One possible interpretation of such a variable is as an adjustment for measurement bias in the estimate of negative equity. If the measurement bias is persistent, it will be present in the lagged moving average so that taking the deviation from a lagged moving average removes much of the bias.

A check on the stability of these parameter estimates is obtained by running the equation to the end of 2002, so excluding the recent cycle. The results are displayed in columns 3 and 4 of Table 3. All the parameter estimates are well within one standard error of the estimates to 2010Q1 so that stability is satisfactory.

The equation for the log court orders rate has a very similar structure and again finds strong loan quality and forbearance policy effects with evidence of a stronger negative effect on court orders from 2009 than found for CML data (Table 3, columns 5-6). The long-run coefficients for the log proportion in negative equity and for the log unemployment rate are larger than for court claims, but the log debt service ratio has a similar effect. The long-run effect of log negative equity at around 0.2, with a t-ratio over 6, is still somewhat lower than

[20] A more precise measurement might be achieved using unemployment among those over 25. Only 23 percent of mortgaged households are under 35 years of age, according to DCLG; moreover, the recent rise in unemployment has been mainly among the young. Duration of unemployment effects, using unemployment over 3 or 6 months, might also help pin down this effect. However, lack of historical data at the regional level on the age and duration composition of unemployment makes it infeasible to check these hypotheses.

for the CML data modelled by Aron and Muellbauer (2010). The dynamics show a similar effect for the deviation of the proportion in negative equity from a lagged moving average, and even more pronounced effects from the rise in the debt service ratio and the unemployment rate in the previous two years than found in the court claims equation. A check on parameter stability estimating on data to the end of 2002 shows very satisfactory results, with each long-run parameter within one standard error of its full-sample estimate.

It is also possible to model the court order rate conditional on court claims. The hypothesis of a one-for-one long run effect of claims on orders can be rejected: the coefficient is only just over one half (results available on request). Since court claims respond to the same fundamentals, though with not quite the same relative influences, the coefficients on loan quality, forbearance policy and the three economic drivers would all be expected to be lower than in the court orders equation not including a court claims effect. This is the case and indeed, the forbearance policy effect now vanishes. This is consistent with the fact that its coefficient was over twice as large in the claims equation as in the orders equation that excluded a court claims effect. However, the negative equity effect remains large, which is consistent with its relatively weak showing in the court claims equation but its strong effect in the court orders equation excluding a court claims effect.

4.2 Regional Contrasts

To compare court across regions it is necessary to scale by the number of outstanding mortgages in each region.[21] Figure 5 shows four panels of data for each of the eight regions. The court orders rate for Greater London mostly exceeded the average and rose earlier than in other regions in 2002-07, then falling more sharply. Some regional differentials can be explained by differences in the movement of house prices. The later onset of rising house prices in Northern regions and Wales accounts for the persistence of considerable negative equity beyond 2000, and the persistently above-average rates of court orders until 2004. The earlier rise for Greater London in the estimated incidence of negative equity after 2001 helps explain the earlier rise there in the court orders rate.

The figure also shows unemployment rates compared to the national average. Regional differentials in unemployment rates narrowed in the 1990s, and then widened after 2000. While the unemployment rate in London declined less than in other regions in 2000-07, the increases since 2007 in Northern rates proved substantially higher than in the three Southern regions. A related picture is presented by earnings data. The Southern regions, especially Greater London, lead the rises and falls in boom and recessionary periods.

[21] The data appendix explains how national figures on the number of mortgages were apportioned to the regions on the basis of regional CML data from the Survey of Mortgage Lenders on numbers of new mortgages, and linking to pre-1992 figures based on survey methods.

Unemployment has been persistently above average in the North, and Greater London. The rise in London after 1989 was more pronounced than in most regions and the unemployment rate remained persistently higher. This helps account for the above average rates of court orders in London and the North, and the below average rate in the South West. However, differences in the debt service ratio are also important.

Regional divergences in court claims (actions) rates follow a broadly similar pattern to those for court orders. Figure 6 illustrates by showing rates of court claims for Greater London and the North compared to the average for England and Wales. The sharply higher rate of court claims for London in 1989-1993 is apparent as it was for court orders, as is the persistence of relatively high rates for the North up to about 2003, while those for London again led the rise from 2002 onwards.

Figure 7 illustrates regional variations in the ratio of suspended court orders to total orders, showing the ratio for Greater London and the North and for all regions. The volatility of the series at the regional level is notable, as is the rise in the ratio in London from 2008, in contrast to the North and the average of all regions. Perhaps a lower incidence of problems in the buy-to-let market and an earlier recovery of house prices help explain the different behaviour of London.

4.3 Modelling the Regional Rate of Court Claims (Actions)

The regional panel specification for eight regions imposes homogeneity across regions on the five key long-run effects: loan quality, forbearance policy, the log debt service ratio, the log of the estimated proportion in negative equity and the log of the unemployment rate. In other respects, including the speed of adjustment and the effects of short-term dynamics and of outliers, regional heterogeneity is permitted. In addition, some additional short-term dynamics are permitted in lagged rates of change of house prices. These are the four-quarter log changes in the own region and in London's house price index lagged one quarter and five quarters. These are included as proxies for expected house price changes in the region, which should have a bearing on court proceedings for possession. When lenders and indeed borrowers are optimistic about house price changes, there are better prospects for recovery from negative equity. Even when borrowers have such serious cash flow problems that eventual possession looks likely, lenders may wish to hold off temporarily with the expectation of obtaining a better price later. The well-known 'ripple effect' by which house price rises originating in London radiate out to other regions, with lags depending on the distance from London, suggest that price rises in London have useful predictive power and probably have been factored into house price expectations in each region. It is also possible that measurement

errors in the estimated proportion in negative equity in each region can be compensated for by including these heterogeneous lagged house price changes.

Table 4 shows the estimated long-run coefficients together with speeds of adjustment and the coefficients on the deviation of negative equity from the moving average of two years previously. For the eight-region panel, the long-run coefficient for loan quality on court claims is 0.82, less than one standard error away from the coefficient of 1 for the CML possessions data from Aron and Muellbauer (2010). The coefficient for forbearance policy is estimated at 2.09, significantly higher than the coefficient of 1 for the CML data. This suggests that shifts in lenders' forbearance have a more dramatic effect on court claims than on final possessions. As we shall see later, this is further supported by the coefficient on forbearance policy found also for the court orders data. The estimated equation includes a smoothed dummy for 1997 to capture a possible mis-specification in the forbearance policy index estimated on CML data. Its coefficient is -0.27 (t=-3.0). This implies a downward adjustment of -0.13 in the coefficient of 0.173 on the 1997 smoothed dummy incorporated in the forbearance policy index estimated on CML data[22]. The implication is that the return to pre-1992 levels of forbearance may have been less complete than assumed by Aron and Muellbauer (2010). The other possible adjustment concerns the policy shift from the end of 2008. The coefficient on a step dummy which is one from 2009Q1 and zero before, is -0.22 (t=-3.4). This is equivalent to a downward shift of -0.11 in the forbearance policy function. This could be an indication that on CML data up to 2009Q3, the beneficial effects of increased forbearance policy have been slightly underestimated or merely a difference in the effects on court data.

The equation also incorporates the heterogeneous effects of a smoothed 2003 step dummy. As noted earlier this could reflect deterioration in lending quality differing across regions, perhaps connected with Buy-to-let lending, but could partly incorporate a tightening of forbearance policy. These effects are generally significant, with coefficients ranging from 0.08 (t=1.1) in the South West, via 0.19 (t=2.7) in London, to 0.54 (t=7.0) in the North. Interestingly, the average effect for all regions implied by these estimates is far larger than the 0.08 implied by the aggregate data for England and Wales discussed in section 4.1. The aggregate data also failed to detect the probable shift in 1997 in the forbearance policy index and over-estimated the 2009 shift, compared to the regional panel data.

Turning to the long-run effects of the economic variables, a coefficient of 0.90 (t=9.6) on the log debt service ratio is lower than the corresponding estimate of 1.86 for CML data, while the coefficient on the proportion in negative equity is far lower at 0.07 (t=4.2) compared to 0.72 for CML data. However, the coefficient of 0.13 (t=1.9) on the log

[22] The calculation divides -0.27 by the estimated coefficient on the policy function of 2.09.

unemployment rate is not far from the imprecise estimate of 0.2 on CML data, but lower than the estimate for aggregate court data for England and Wales seen in Table 3. As Table 4 indicates, the coefficients on the deviations of the proportion in negative equity from the moving average of two years previously are mostly significant and show considerable variation across regions. They are most significant in London and the South West. The smaller level effect of negative equity compared to CML data makes good sense since court actions are more likely to be triggered initially by cash flow problems showing in arrears than by negative equity.

The possibility that the three southern regions might exhibit distinctive behaviour is examined by running a three-region panel for them. Results are shown in the second pair of columns in Table 4. As far as loan quality and the forbearance policy effects are concerned, the coefficients are a little lower than in the eight-region panel, but within one standard error of those estimates. The 1997 shift is no longer significant but the 2009 shift is estimated to be of a similar size. For the economic variables, the only notable difference from the eight-region panel is the larger coefficient of 0.31 (t=3.4) on the log unemployment rate, which is around two standard errors away from the point estimate for the larger panel. This is a hint that perhaps the effects of unemployment may be larger for the southern regions than for the rest of the country. It is possible that the proportion of long-term unemployed is higher outside the southern regions, so that the unemployment rate is a less sensitive cyclical indicator there.

The stability of the findings is checked by running the estimates for the eight region panel to the end of 2002: see the last two columns of Table 4. Only the estimated coefficient on the forbearance policy index is (just) over one standard error away from the full-sample estimates, while the other estimates are closer.

4.4 Modelling Regional Court Orders

The panel estimates for the log of the court order rate have the same overall structure as those for court claims discussed in the previous section, and are presented in Table 5. Again, homogeneity across regions in the key long-run coefficients is imposed. The coefficients for loan quality and forbearance policy are estimated to be close to the values of unity for the CML possessions data, which was not true for court claims. This is gratifying since court orders are conceptually closer to possessions than court claims. The estimated effect of the smoothed dummy for 1997 in adjusting the forbearance policy index is -0.14, close to the -0.13 estimated for court claims. However, the 2009 policy shift is estimated to be even larger at -0.37 than the -0.22 estimated for court claims. This is a further indication that the CML estimates to 2009Q3 may have underestimated the size of the forbearance policy shift or

of the beneficial effects of the improvement in income support for those in payment difficulties[23]. However, as discussed in section 5, updating the model to 2010 quarter 3 reduces this estimated effect.

The heterogeneous effects of the smoothed dummy for 2003 are again very significant, with an average effect far larger than the 0.15 implied by aggregate data for England and Wales, and entirely absent in the estimates for CML data. The coefficients range from 0.14 (t=2.4) for London, via 0.25 (t=4.4) for the South West, to 0.46 (t=6.7) for the North.

The long-run coefficients on the economic variables are higher than for court claims data. For the log of the debt service ratio, the coefficient is 1.0 (t=11.1) not far from the aggregate England and Wales estimate of 1.1, but lower than the estimate for CML data of 1.86. For the log proportion in negative equity, the estimate is 0.19 (t=10.8), almost identical to the estimate for aggregate data for England and Wales, but far lower than the estimate for CML data of 0.72. However, the estimated coefficient for the unemployment rate of 0.26 (t=4.4), though less than the aggregate England and Wales estimate of 0.42, is higher and more accurately estimated than the coefficient of 0.2 for the CML data. However, it is less than one standard error away from the latter estimate. The estimated coefficients on the deviation of the log proportion in negative equity from the moving average of two years previously vary regionally and are generally positive, and significant for half the regions.

As discussed earlier, substantial fractions of court orders do not lead to actual possession. Hence one would expect court orders to be somewhat less sensitive to economic fundamentals than actual possessions. Also, CML possessions data include voluntary possessions some of which are excluded from the court orders data, and which are more sensitive to the debt service ratio and negative equity than possessions cases enforced through the courts. This helps explain why court orders are less sensitive than CML possessions data to the debt service ratio and to negative equity.

To check for the possibility that the southern regions might be distinctive, a three region panel was also run. The resulting estimates shown in Table 5 are well within one standard error of the eight-region panel estimates. The coefficient on negative equity is marginally higher at 0.22 (t=7.6) compared to 0.19 for the eight region panel. The unemployment rate coefficient is also marginally higher at 0.29 (t=3.3) vs. 0.26 for the eight region panel. The coefficient on the smoothed 1997 dummy is now not significant, though

[23] However, one contributing factor could be due to a difference in the negative equity estimates in the present paper from Aron and Muellbauer (2010). The latter paper adjusts negative equity estimates by subtracting possessions cases for the previous two years from the negative equity estimate based on the average debt to equity ratio. This would imply a sharper drop in 2009-10 in the estimated proportion in negative equity and so attribute more of the reduction in recent possessions to this factor. This adjustment has not been carried out in the present paper since we do not have accurate estimates of regional possessions rates.

only around one standard error away from the eight region estimate. The estimated 2009 shift in forbearance policy or income support policy is -0.30 (t=-4.4), compared to -0.37 for the eight region panel.

The stability of the findings is again checked by running the estimates to the end of 2002. Most parameter estimates are well within one standard error away from the full-sample estimates. However, the coefficient on loan quality is estimated at 1.60 with a standard error of 0.20 which differs from the full sample estimate of 1.15 with a standard error of 0.21. The effect of the smoothed dummy for 1997 is more negative at -0.27 (standard error 0.069) compared to -0.15 (standard error 0.064) for the full sample. The two findings are related: imposing the more plausible full sample coefficient of -0.15 on the smoothed dummy for 1997 brings down the loan quality coefficient to 1.36, far closer to the full sample estimate of 1.15.

A discussion of the impact of the long-run effects of the driving variables on the log court orders rate is postponed to the forecasting section, Section 5, using a figure that explains the contribution of different factors under the base scenario forecasts of the economic and policy environment, both for the estimation and forecasting periods.

5. Forecast Results from Regional Court Orders Models

To forecast orders for mortgage possession in the eight regions, we first update the data to the third quarter of 2010 and re-estimate the model. The parameter estimates for the full system are close to those for data up to 2010Q1. The main exception is the estimated 2009 shift in forbearance policy or income support policy: it drops from -0.37 to around -0.25. The comparison of fitted and actual values for 2010Q3 is suggestive: while the model implies a continued decline in the court order rate, in all regions the court order rate actually rose in the third quarter. This appears not to be the result of mis-specified short term dynamics since a very general lag structure has been used for the econometric specification. It raises the possibility that an underlying deterioration might have begun in some combination of forbearance policy and of loan 'quality', which, as noted above is actually a mix of three factors: riskiness of lending in previous years, income support policy for mortgage borrowers with payment difficulty and access to refinancing opportunities. It is also possible that mortgage lenders have begun to take a more pessimistic view of prospects for the housing market and of the economy.

The rise in the numbers of court orders in all regions in 2010Q3, combined with a rise in the proportion of main-stream bank and building societies originating such orders, raises intriguing questions about the causes and implications for the future. It appears to coincide with a more negative view by lenders of prospects for house prices, household finances and

policy support. A moderate reversal of some mix of forbearance and lending quality beginning in 2010Q3 is plausible. It was announced in the June 2010 Budget that from October 2010 the standard rate of interest used to calculate payments of borrowers eligible for Support for Mortgage Interest (SMI), frozen at 6.08 percent since late 2008, would be based on the average mortgage rate published by the Bank of England, initially 3.63 percent. After that, changes to the standard rate will be triggered when the standard rate and the Bank of England published average mortgage rate differ by at least 0.5 percent. Since these payments are made directly to mortgage lenders, this reduces the subsidy to mortgage lenders with customers in receipt of SMI. Further, around half of claimants or about 110,000, according to the Department for Work and Pensions, are liable for additional payments since their contracted interest rates exceed 3.63 percent. It seems likely that a disproportionate number of these were paying higher rates being regarded as riskier prospects by their mortgage lender, so their default risk is therefore higher. The change reduces the incentive for lenders to practice forbearance and increases payment stress on some borrowers. Rates of possessions may be somewhat higher than they would have been as a result of this policy change or 'normalisation'.[24]

It is possible that the rise in court orders for mortgage possession seen in 2010Q3 anticipates some of these consequences. If this interpretation is correct, a more permanent shift in court order rates is likely to be seen. In the model, a step dummy, beginning in 2009Q1 with a negative coefficient, reflects the additional effect on court order rates compared to CML possessions figures of greater forbearance and income support practiced since January 2009. Estimating to 2010Q3, its coefficient is -0.32 (compared to -0.37 reported in Table 5) if we also include a step dummy beginning in 2010Q3, whose coefficient is estimated at 0.28, which annihilates most of the effect of the 2009Q1 step dummy from 2010Q3 onwards. It seems implausible that there should be such a large shift in a single quarter and moreover, in *anticipation* of a policy shift which only impacts from 2010Q4. It is assumed therefore in all the forecast scenarios that two thirds of a long-term shift towards a higher court order rate comes into effect in 2010Q3 and one third in 2010Q4.[25] Considerable uncertainty surrounds the likely consequences for court orders of the normalisation of the standard mortgage rate for SMI and of the impact of the two-year limit on access to SMI. It is likely that at least two more quarters of data will be needed before this uncertainty is substantially reduced.

Four forecast scenarios are considered. The underlying assumptions are given in Table 6, and forecast data are recorded in an Annex for the base scenario, for two regions, the

[24] The previous government had announced the intent, but not the timing, of such a normalisation.
[25] By imposing a coefficient of 0.2 on the 2010Q3 step dummy and a coefficient of 0.1 on the lag of this step dummy.

greater South (the South East excluding London, plus the East) and the greater North (North East plus North West). In the first of these scenarios, we take *Oxford Economics* central forecasts for the UK mortgage interest rate, the total mortgage stock and the number of mortgages, combined with their regional forecasts for house prices, unemployment rates on the LFS definition and average earnings. The second and third consider more positive and more negative variants applied uniformly across regions. The fourth 'mixed' scenario is one in which the three more southerly regions do better than the five more northerly regions but the base scenario forecasts are assumed for the interest rate and the growth of the mortgage stock.

Figure 10 illustrates the base scenario forecast by combining forecast and actual data from 2000 to the end of 2015 for the mortgage rate, the average mortgage, house prices, average earnings and unemployment rates for the greater South and the Greater North. The figure shows that mortgage rates are expected to remain low for an extended period before rising moderately to 4.2 percent at the end of 2012, 4.9 percent at the end of 2013, 5.9 percent at end 2014 and 6.1 percent in 2015. The Southern unemployment rate is expected to peak at 6.7 percent in 2011Q3 before declining gradually to 5.1 percent at the end of 2015. However, in the North, it peaks at 9.3 percent in 2011Q3 before declining to 7.7 percent. House prices in all regions are expected to decline slightly in early 2011, before gradually rising, by about 20 percent by end-2015 in the South and 15 percent in the North. Regional mortgage stocks are assumed to increase at the UK rate.

Given these assumptions, plus the assumptions about loan 'quality' and forbearance policy used in Aron and Muellbauer (2010),[26] and the removal by 2010Q4 of most of the fall in court orders attributed to the additional quality and forbearance factor introduced in 2009Q1, regional outcomes for the court order rate under the base scenario are as shown in the eight panels of Figure 11 (Tabulated in Table 7). The 'headline' news is that under these assumptions the fall in court order rates is largely over in the three more southerly regions but may have a little further to run in 2011 and 2012 in most of the other regions as house prices rise. After 2012, the higher rates of increase of earnings and house prices, and the lower forecasts of unemployment rates in the more southerly regions, imply a smaller rise in court orders in southerly than in northerly regions, when mortgage interest rates start increasing after 2012.

A graphical decomposition of the estimated long-run effects of the different economic variables and policy variables both for the estimation and the forecast period is shown in Figure 12 for the South region and the North region. The figure shows the fitted long-run

[26] See Figure 8 in Aron and Muellbauer (2010) for a visual display. This builds in a slight improvement in loan quality beyond 2010 as more cautious lending since mid 2007 begins to affect the mortgage stock.

contribution of the log debt service ratio, the combined effect of log negative equity and its deviation from the lagged eight-quarter moving average, the log unemployment rate and finally, the combined effects of the loan quality and forbearance indices including the 1997, 2003 and 2009Q1 dummies and 2010Q3 dummies. The figure suggests that over the forecast horizon, the projected rise in interest rates from late 2012 onwards will be the main driver of the eventual forecast rise in the court orders rate. The role of the unemployment rate and of negative equity under this central set of assumptions is relatively subdued. However, the assumed deterioration in the mix of policy in the last two quarters of 2010 is important in explaining the approximate stabilization of the orders rate in the South and the temporary halt in the decline of the orders rate in the North.

Figure 12 accounts for the rather different regional experiences in the 1990s recession, as compared to the recent recession. The North experienced a smaller and later rise in the court orders rate than the South in the 1990s. This was largely due to the initial lack of negative equity but also because of lower levels of debt relative to income. After 2005, the rise in the court orders rate in the North was to a similar peak as in the early 1990s, while the rise in the South was to a level far below the 1990s peak. This can be attributed mainly to greater deterioration in loan quality and a greater rise in negative equity in the North. Variations in the unemployment rate played a significant role but were clearly not a dominating influence.

To illustrate alternative assumptions, consider two variants around the base economic scenario. Table 6 sets out the different scenario assumptions for shifts in the level of the mortgage interest rate and the unemployment rates, and for shifts in growth rates of house prices, earnings, and the mortgage stock. In the positive variant, mortgage rates stay low for longer and then rise less strongly, unemployment falls sooner, house prices and earnings rise a little more strongly, and the mortgage stock expands a little more. The negative variant assumes that interest rates rise sooner and remain high and otherwise makes the opposite assumptions to those in the positive scenario. Implicit in this is that higher interest rates are a major cause of slow growth. This is quite different from a situation where the MPC is able to respond to low growth by keeping interest rates low. Rather, inflation concerns or a rise in gilt yields due to a dislocation of bond markets is assumed to have forced mortgage rates higher in this scenario. The positive and negative variants simply assume that all regions are affected uniformly by these alternative assumptions.

As shown in Figure 11, the positive scenario, in which unemployment rates are 0.5 percentage points below the base scenario from mid-2013 and in which by end 2013, the mortgage rate is 1.8 percentage points below the base scenario, and in which annual house price growth is 3 percent higher and earnings growth 2 percent higher from 2011Q2, shows substantially lower levels of future court orders in all regions. In contrast, in the negative

scenario, unemployment rates are 1 percentage point higher than in the base projection, from mid-2012, the mortgage interest rate is 1.8 percentage points higher, house price growth is 3 percent lower and earnings growth 2 percent lower. Unsurprisingly, court order rates rise sharply from late 2012 under these assumptions.

Finally, a regionally divergent variation is examined, labeled the 'mixed scenario'. A greater rise in unemployment rates in Northerly regions than in the three Southerly regions is assumed and correspondingly weaker housing and labour markets so that, on average, the UK forecast is achieved. Thus, the same path for the mortgage interest rate is assumed as in the base forecast. However, for the three Southerly regions the unemployment rate and earnings take on the same path as in the positive scenario above, while for the five more Northerly regions the unemployment rate and earnings take on the path assumed for the negative scenario. The deviation of house price growth from the base scenario is assumed to be intermediate between positive and base scenarios for the Southerly regions, and intermediate between negative and base scenarios for the other five regions. This is because house prices are also driven by the UK mortgage interest rate and this is the same as in the base scenario. Figure 11 shows the forecasts for the three Southerly regions are intermediate between those in the base and in the positive scenarios already considered, while those for the five Northerly regions are intermediate between the base and the negative scenario above. In both cases, the outcomes are a little closer to the base scenario than to the positive and negative scenarios already considered.

6. Conclusions

The analysis of regional data on court claims and court orders to investigate empirically the influence of variations in the macroeconomic and the regional economic environment on these indicators of mortgage default broadly confirms the conclusions of Aron and Muellbauer (2010) for national CML data. The debt service ratio is the most important determinant of court claims and orders, followed by negative equity, and with the unemployment effect relatively somewhat smaller. However, the estimates of the unemployment effect for court orders are significant and more accurately estimated than for aggregate CML data. This is one of the beneficial outcomes of analysing regional panel data with distinctive regional variations in the unemployment rate. Modelling regional court orders and UK possessions and arrears jointly may, in future, bring forecasting gains for all three types of data.

The loan quality and policy indicators developed in Aron and Muellbauer (2010) work well, though some modifications were introduced to reflect the different dynamics of the court data. Three modifications were found significant. The first is a shift in the forbearance

policy index in 1997, offsetting part of the increased toughness implied by the estimates based on CML data. The second is a shift in 2009, suggesting a bigger impact of increased forbearance and/or of more generous income support for borrowers with payment problems than implied by estimates for CML data up to 2009Q3. However, on court orders data up to 2010Q3, it seems that most of this shift has now been eliminated. The notable rise in the court order rate in all regions in 2010Q3 may be linked to a more pessimistic outlook by mortgage lenders for the housing market, the economy and for policy support. One example of the latter is the normalisation of the statutory interest rate for income support for borrowers with payment difficulties, announced in June 2010, to take effect from October 1, 2010. As discussed in the previous section, this reduces somewhat the forbearance incentives of lenders and financial pressure on borrowers.

The third modification is to introduce a regionally varying factor beginning in 2003 to reflect the regionally heterogeneous shift in loan quality and possibly forbearance policy probably connected with the differing pattern of buy-to-let lending in the different regions. The inclusion of Receiver-of-Rent cases for buy-to-let loans and second mortgages in the court data but excluded in the CML data may also play a small role. It is curious, however, that this last factor and the 1997 shift are harder to detect on aggregate court claims and orders data for England and Wales, while proving to be significant for regional panel data.

The forbearance policy index has a significantly larger effect on court claims compared to court orders. This suggests that the Mortgage Pre-Action Protocol has probably stopped a proportion of claims that would previously have been resolved later, between the court claim and the hearing, by borrowers paying off arrears or negotiating a new payment schedule with the lender by encouraging such contact before the court claim stage. The smaller effects from fundamentals, particularly negative equity, on claims compared with orders, was predictable, and strongly confirmed by the empirical results. The direction of differences in effects of economic fundamentals on court orders, as opposed to actual possessions as measured by CML data, was also predictable. Smaller coefficients were expected for court orders than for CML data, since many orders do not result in actual possessions, and one would expect those that do to be more sensitive to economic fundamentals. Furthermore, CML data include voluntary possessions which are more sensitive to the long-run economic fundamentals. Thus, the estimated long-run effect of the log debt service ratio on court orders was estimated to be only just over half of the effect for CML data. The effect of the log proportion in negative equity on the log court order rate was estimated to be only around 30 percent of the estimate for CML data. However, the models also included the deviation of the log proportion in negative equity from the moving average of two years previously, which is also a fairly persistent variable. The significance of this measure may reflect some measurement biases in

the negative equity indicator. For some regions at least, the sum of the coefficients on the two negative equity variables is around half of the estimate based on CML data.

It has been suggested that the court figures are 'leading indicators' of subsequent possessions. However, this may be misleading especially when forbearance is common. [27] There is a flow effect from new orders, but also a "stock" effect from past suspended orders. If payments due under a suspended possession order are not maintained, the lender can ask the court bailiff to evict the borrower without another hearing and without warning the borrower of their intentions. The stock effect can be important if the re-default rate is high. US data from the Office of the Comptroller of the Currency suggest that the default rate from loans whose terms are changed for those in default is relatively high at 60-70 percent. Though British conditions are likely to be different, possessions could rise quickly without a sharp rise in new orders should economic conditions lead to borrowers being in breach of the conditions set out in their suspended order or in any agreement reached after an outright order has been obtained. Indeed, given the explanatory variables included in Aron and Muellbauer's model for UK arrears and possessions, lagged values of the court orders rate for England and Wales prove to be statistically insignificant.

The outlook for court orders for mortgage possessions at the regional level was analysed in the context of four different economic scenarios. The base scenario was based on forecasts of interest rates, regional unemployment, house prices, earnings and other variables from *Oxford Economics*. This suggests a slight further fall in court orders outside the southerly regions, but a slight rise in these three regions. Given the importance of the mortgage interest rate, the upward drift in the forecast rate from end-2012, tends to drive up forecast court order rates in all regions from then to 2015. However, with somewhat more optimistic forecasts of unemployment, wage growth and house price growth in the three southerly regions, the upward drift of forecast court orders is lower than in the Wales and the more northerly regions. A positive variant with lower interest rates, lower unemployment rates and higher wage and house price growth shows court order rates continuing to decline everywhere. A negative variant with the opposite (and not very likely) economic scenario shows court order rates exceeding the 2008 peaks. In the final scenario, the base projection for interest rates is combined with a more negative economic outlook in the five northerly regions offset by a more positive economic outlook in the three southerly regions. Because of the eventual upward drift of mortgage interest rates assumed in this forecast, court orders eventually rise even under the positive assumptions for the southerly regions.

The common assumption in all four economic scenarios is that a long-term shift towards a higher court order rate comes into effect in 2010Q3, and in 2010Q4. This

[27] We are grateful to John Longbottom for discussion of this point.

assumption could be wrong both on the exact timing and on the magnitude of the long-run effect. However, this is only one of the uncertainties regarding the outlook for court orders for mortgage possession. Uncertainties about the economic outlook and prospects for mortgage finance and hence refinancing possibilities for those with payment difficulties are probably even more important.

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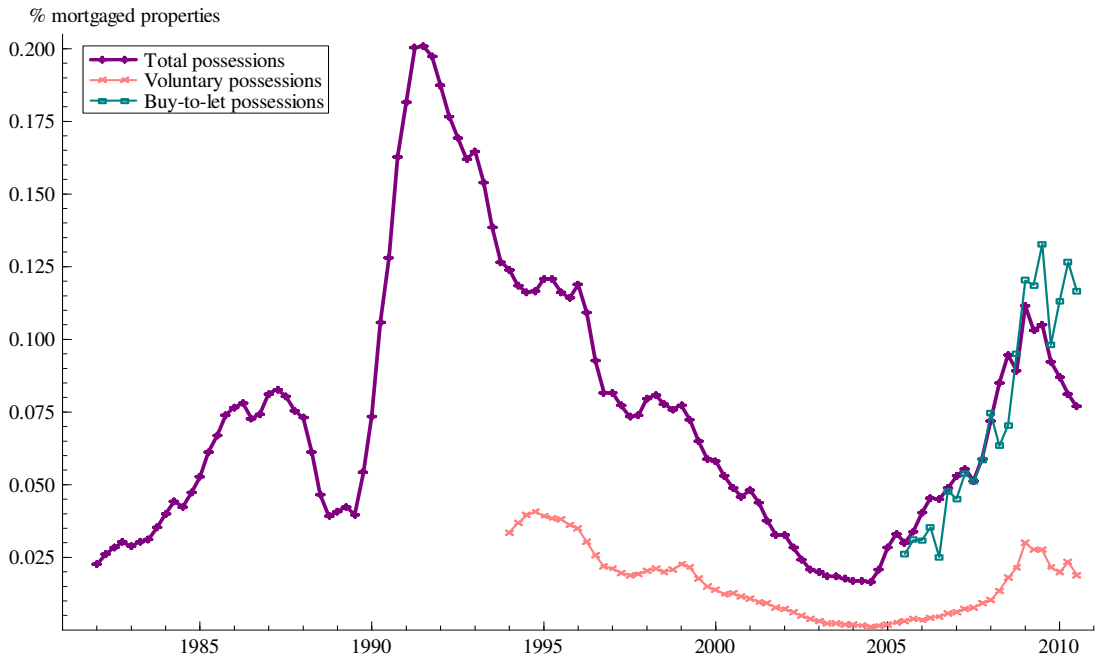
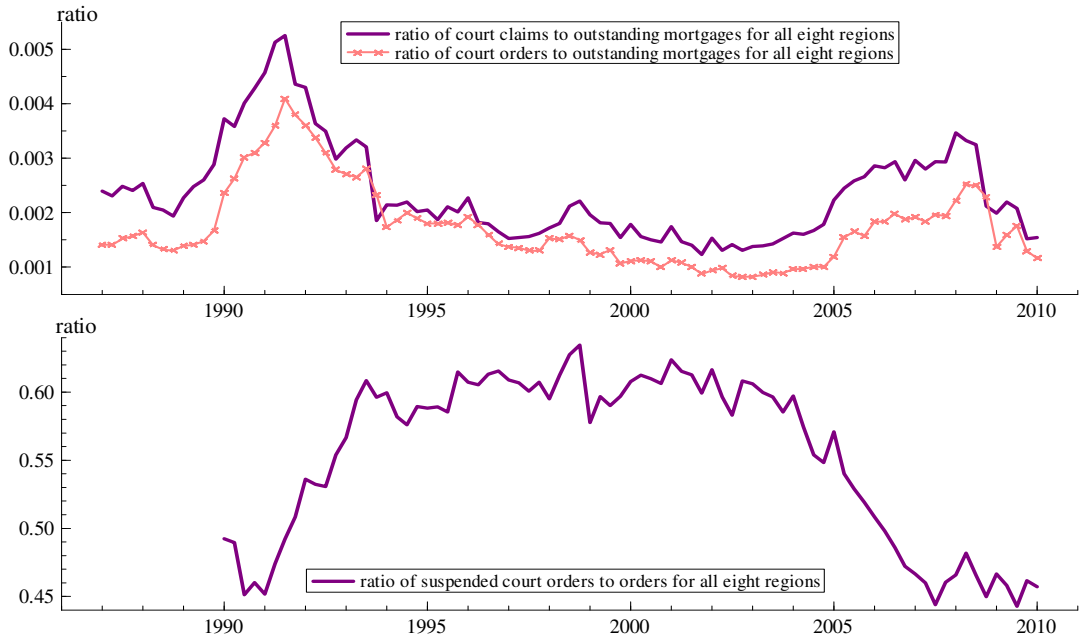
Figure 1: Aggregate possessions rates: total, voluntary and Buy-to-let (percentage of mortgages outstanding)



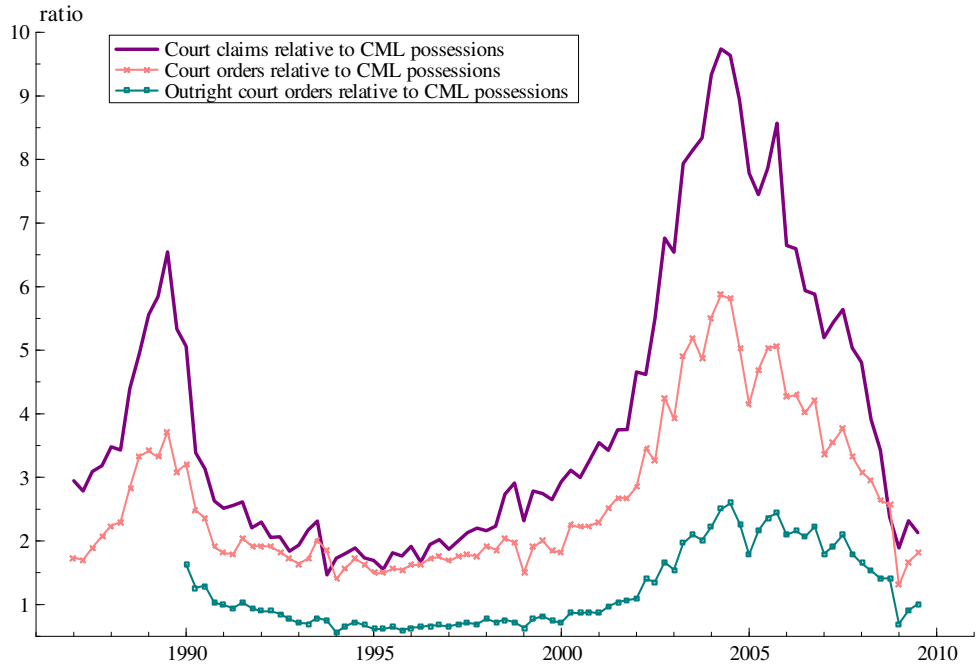
Source: CML data; our interpolations of quarterly CML data are used before 1999, see Data Appendix.

Figure 2: Court data on possessions for England and Wales: ratios of court claims (actions) and court orders as a percentage of mortgages outstanding, and ratio of suspended court orders to total court orders



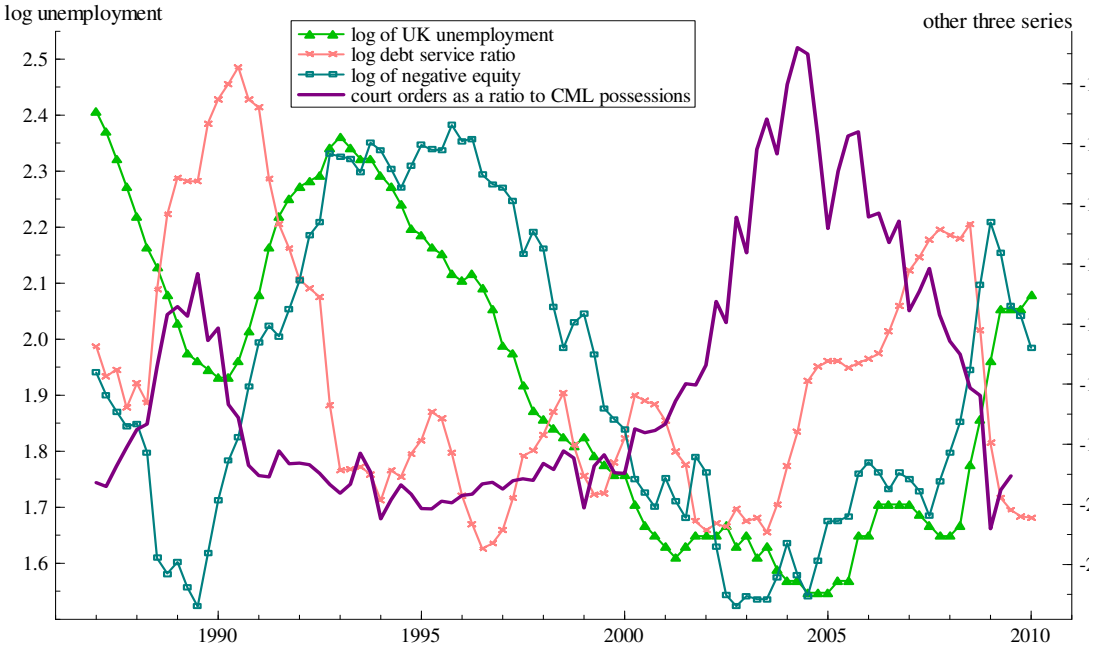
Source: Quarterly data from the Ministry of Justice. Our interpolations of quarterly CML mortgage data are used before 1999, see Data Appendix.

Figure 3: **Court claims (actions), court orders and outright court orders (i.e. court orders minus suspended court orders) relative to the CML count of possessions**



Source: Quarterly data from the Ministry of Justice. Our interpolations of quarterly CML possessions data are used before 1999, see Data Appendix.

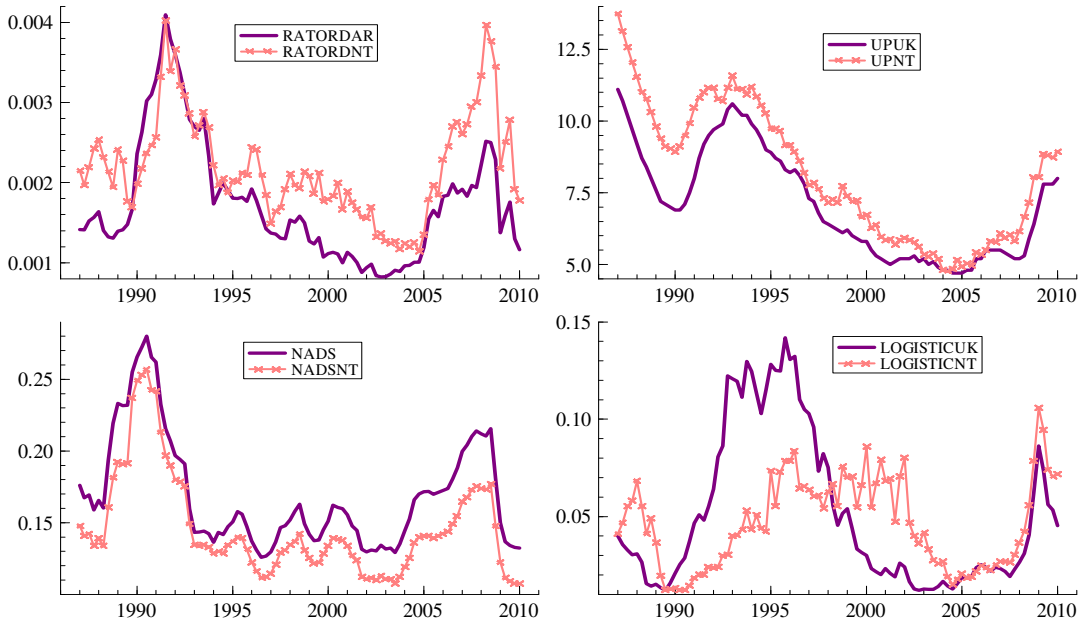
Figure 4: **UK mortgages in negative equity, the UK debt service ratio, UK unemployment, and the ratio of court orders to CML possessions.**



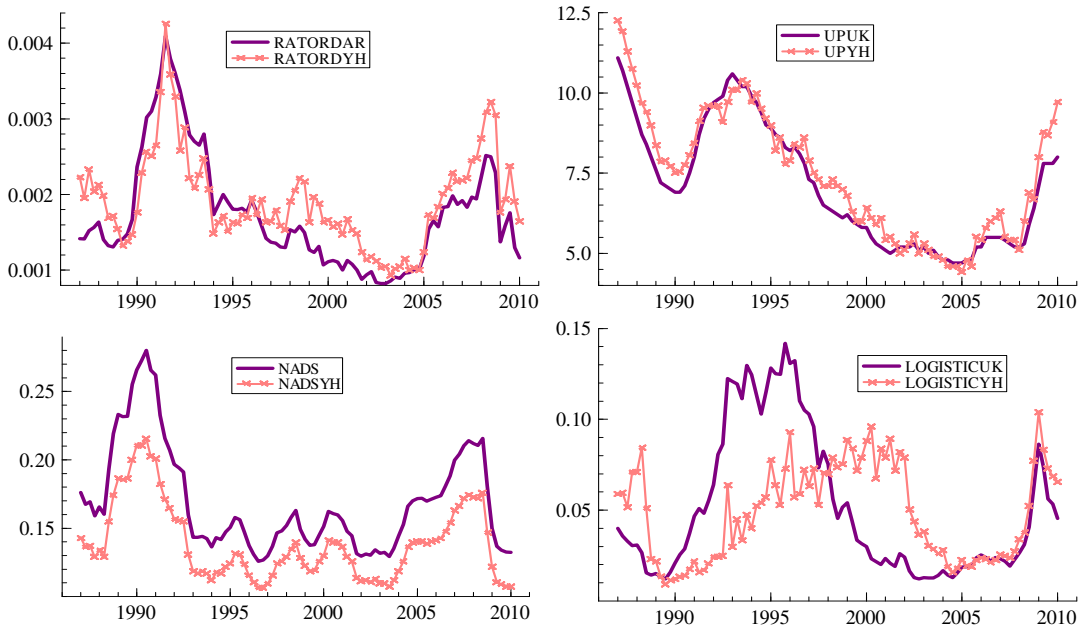
Source: Aron and Muellbauer (2010). Quarterly data from the Ministry of Justice. Our interpolations of quarterly CML possessions data are used before 1999, see Data Appendix.

Figure 5: **Regional court orders, proportion in negative equity, debt service ratio and rate of unemployment, plotted against the aggregate of eight regions**

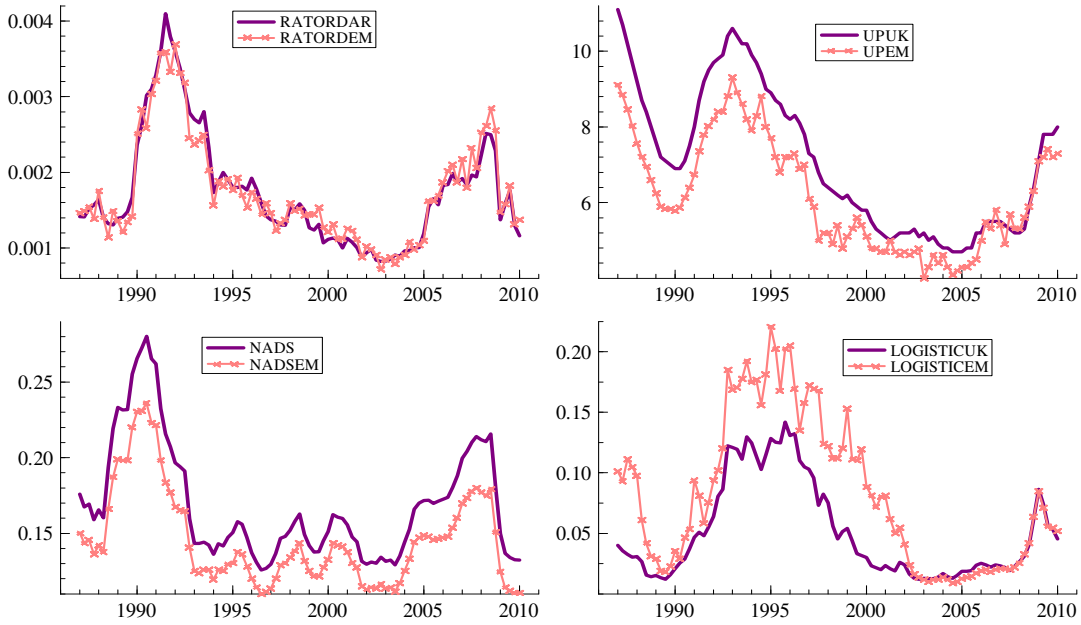
The North



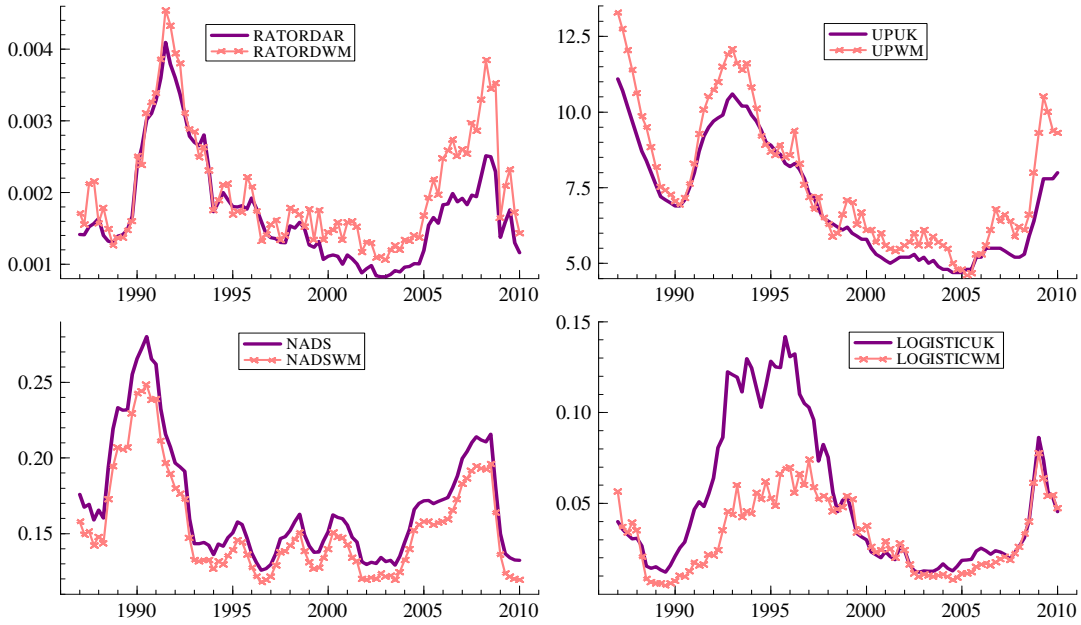
Yorkshire and Humberside



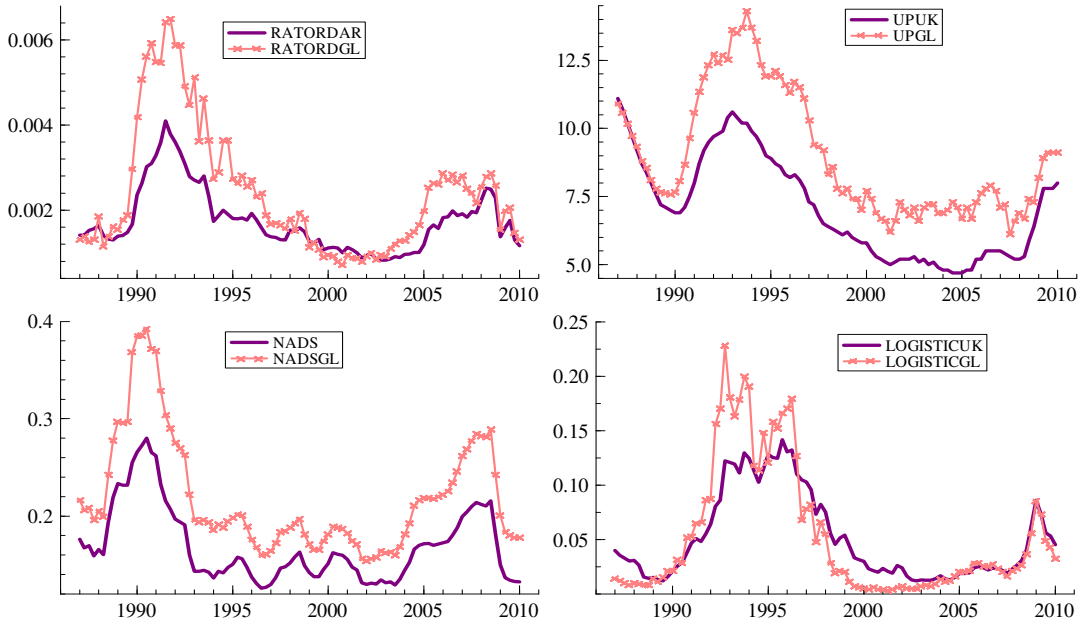
East Midlands



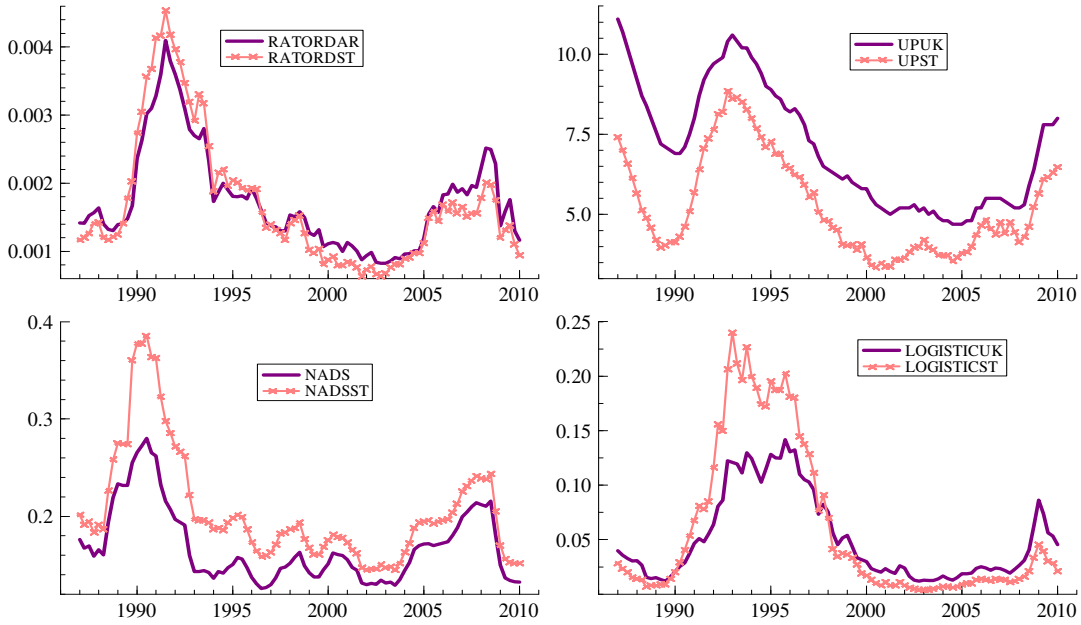
West Midlands



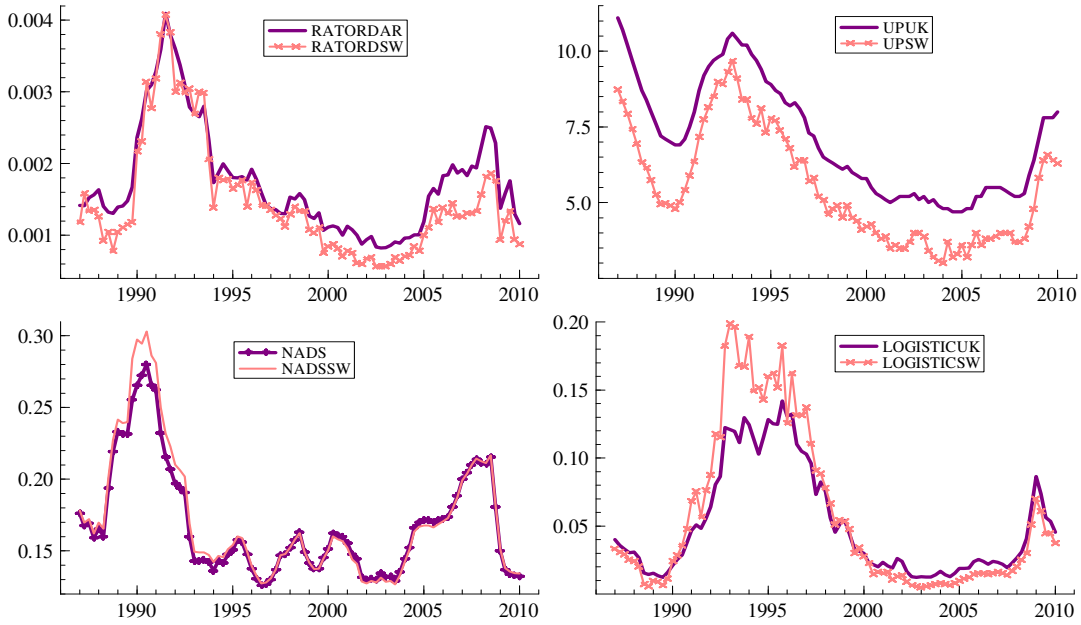
Greater London



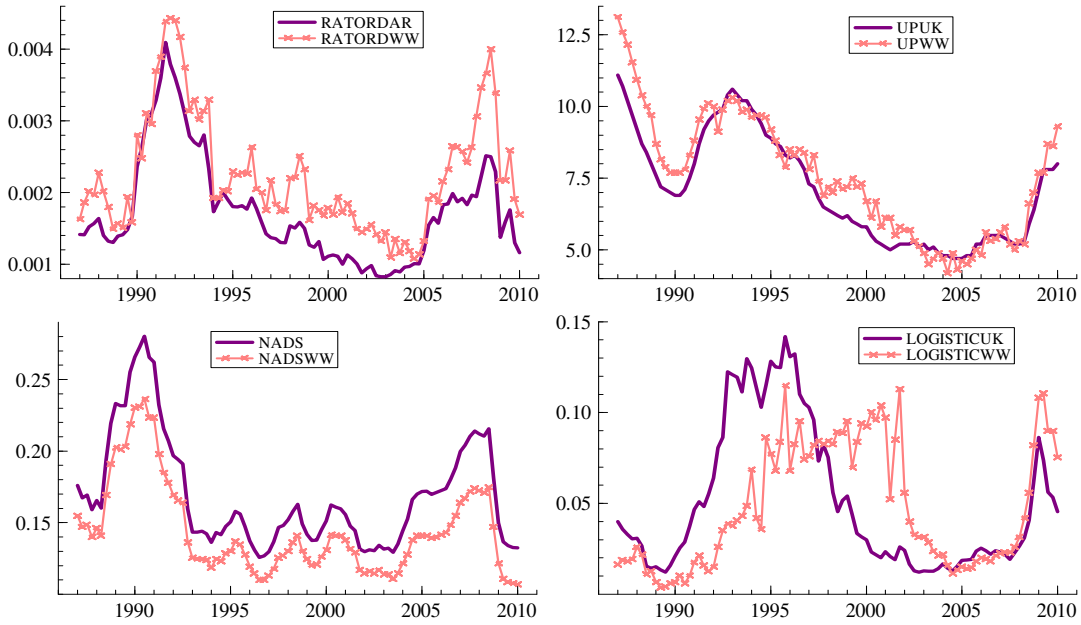
The South



South West

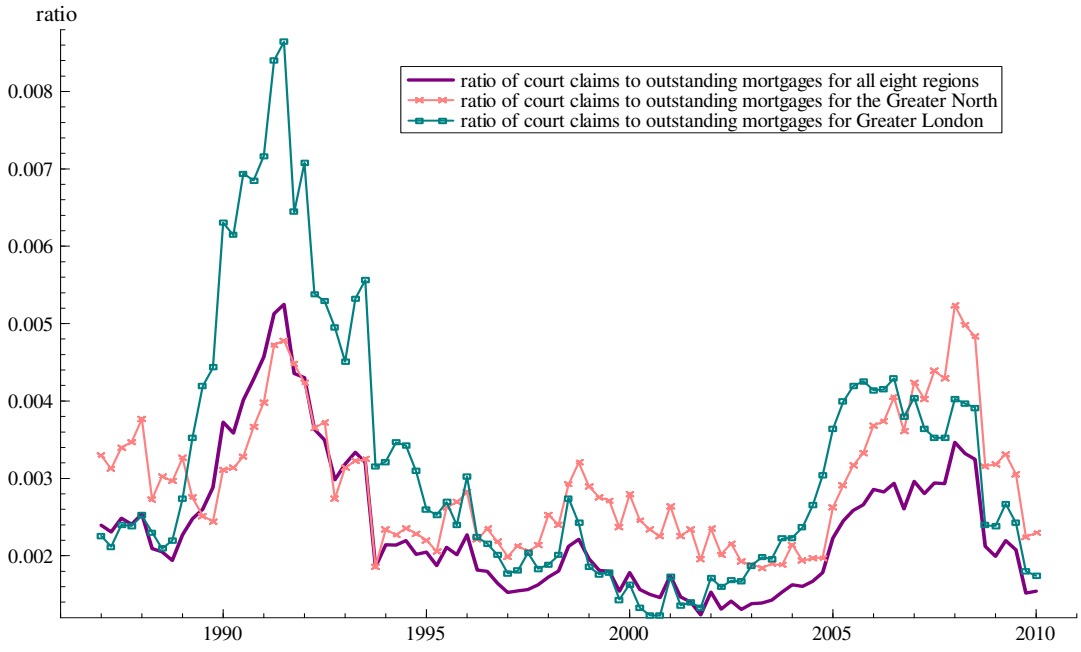


Wales



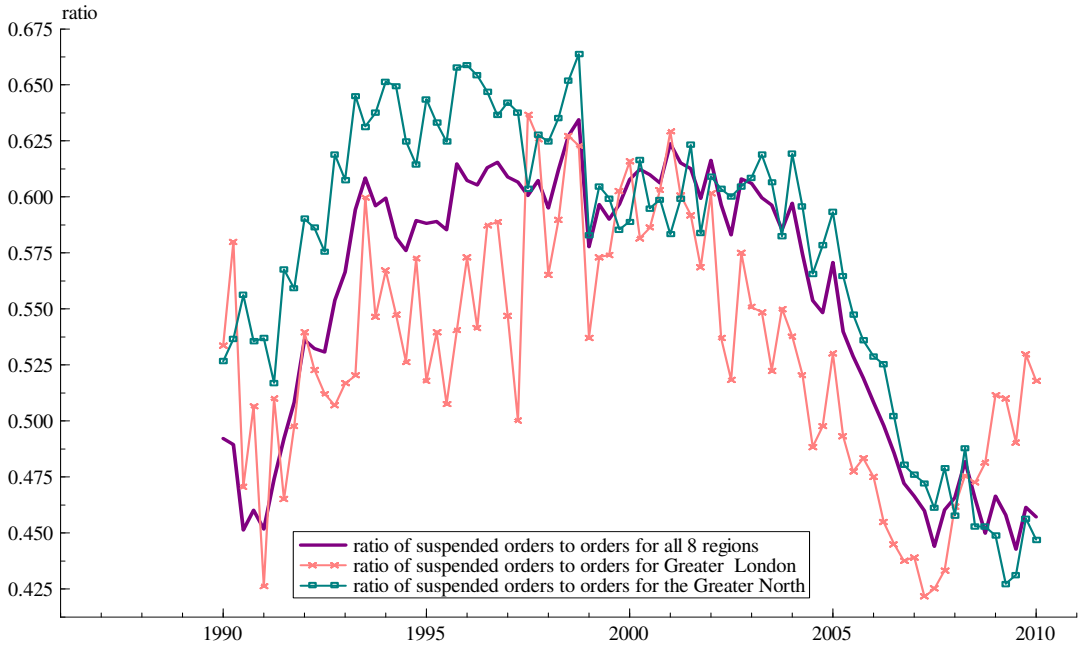
Source: Quarterly court orders are from the Ministry of Justice. For construction of the denominator in the court orders ratio, regional mortgages, see Data Appendix. For constriction of regional measures of negative equity, the debt service ratio and unemployment rates, see the Data Appendix.
KEY:
RATORD= ratio of regional court orders to regional outstanding mortgages
UP= regional unemployment
LOGISTIC= proportion in negative equity
NADS= debt service ratio
Notes: The regional suffixes are: North (NT), Yorkshire and Humberside (YH), East Midlands (EM), West Midlands (WM), Greater London (GL), the South (ST), the South West (SW), and Wales (WW).

Figure 6: **Court claims (actions) as a ratio to outstanding mortgages for the aggregate of all eight regions, Greater London and the North.**



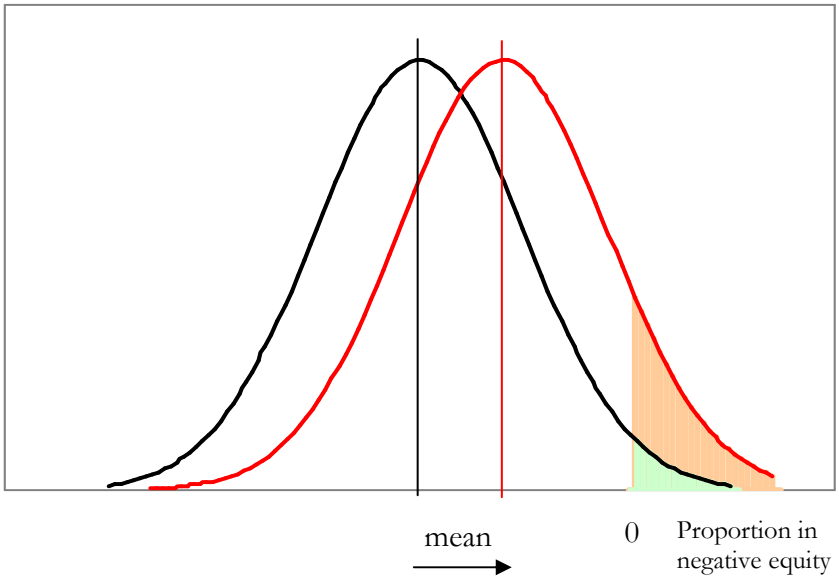
Source: Quarterly data from the Ministry of Justice. Our interpolations of quarterly CML mortgage data are used before 1999, see Data Appendix.

Figure 7: **Suspended court orders as a ratio to orders for the aggregate of all eight regions, Greater London and the North.**



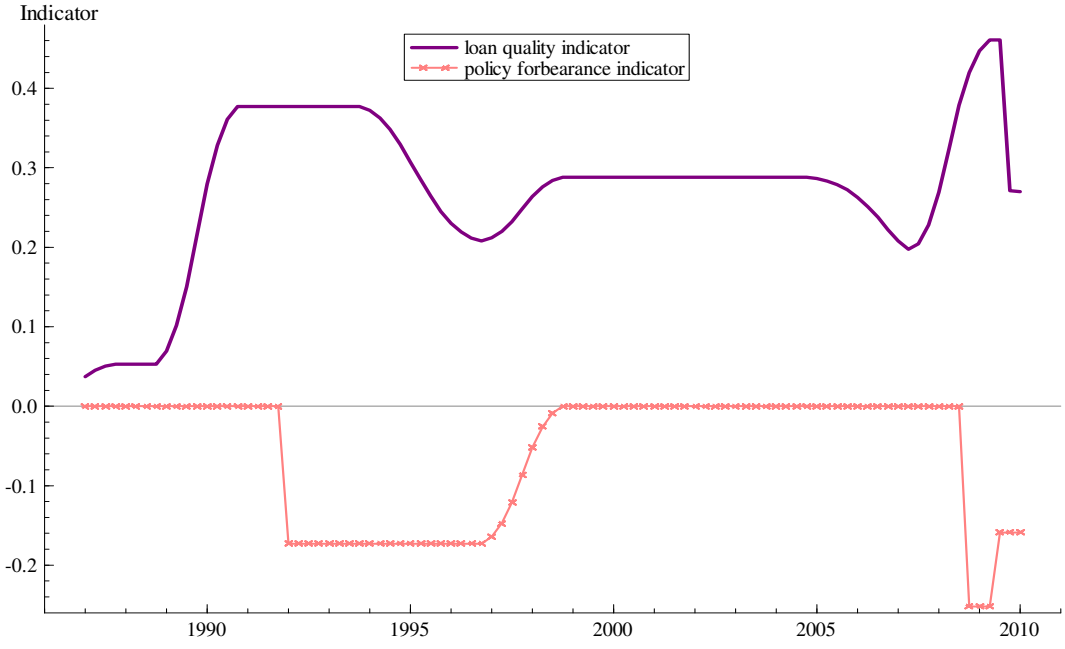
Source: Quarterly data from the Ministry of Justice.

Figure 8: The impact of an increase in the average debt equity ratio on the proportion of mortgages in negative equity



Source: Authors' own calculations

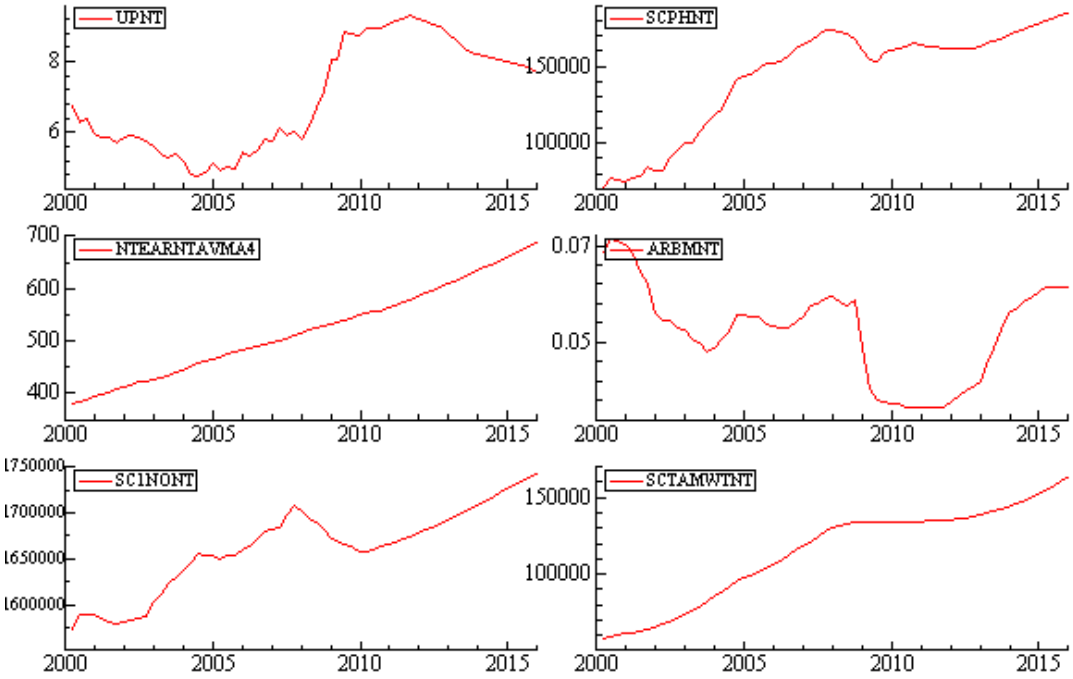
Figure 9: Estimated loan quality and forbearance functions



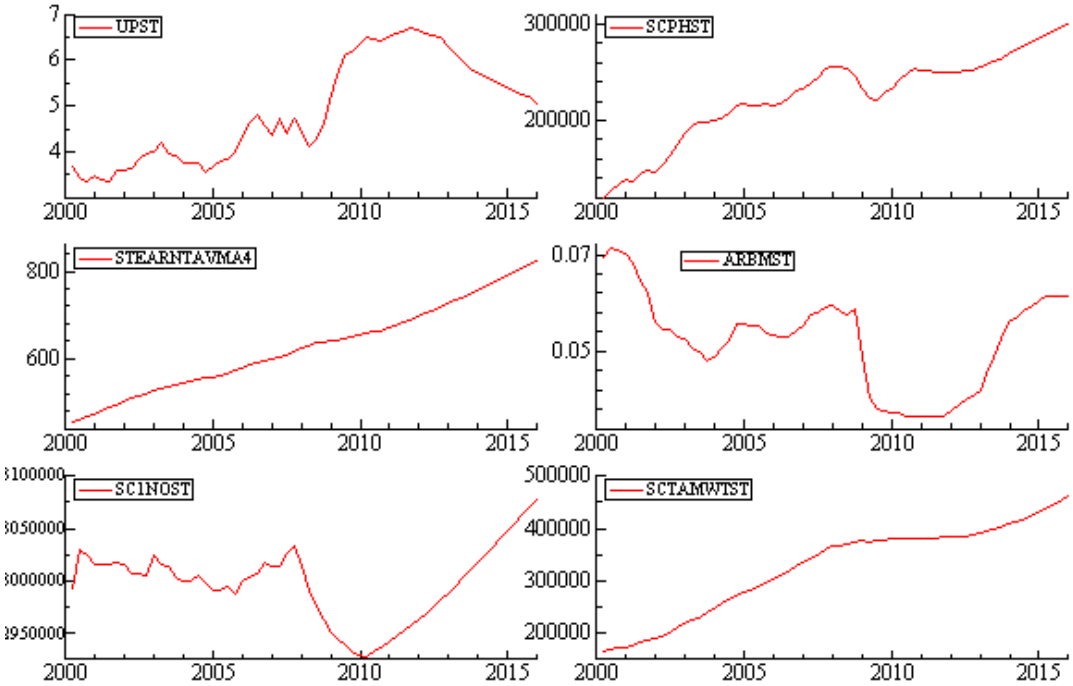
Source: Aron and Muellbauer (2010).

Figure 10: Assumptions for the North (NT) and South (ST) regions in the base scenario

North (NT) region:



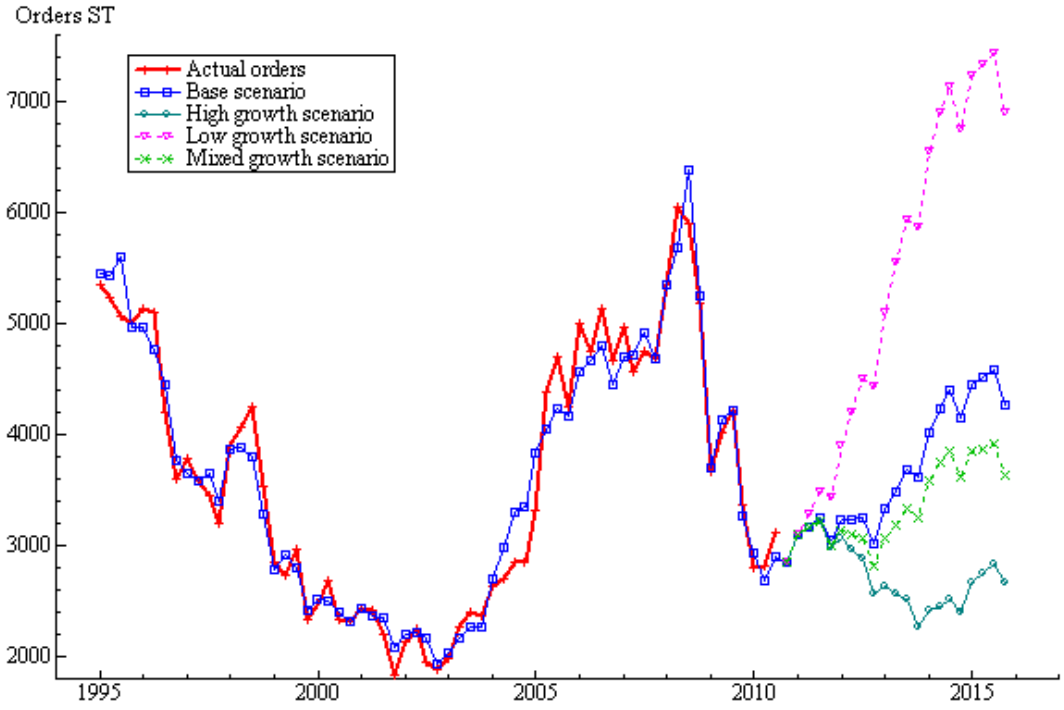
South (ST) region:



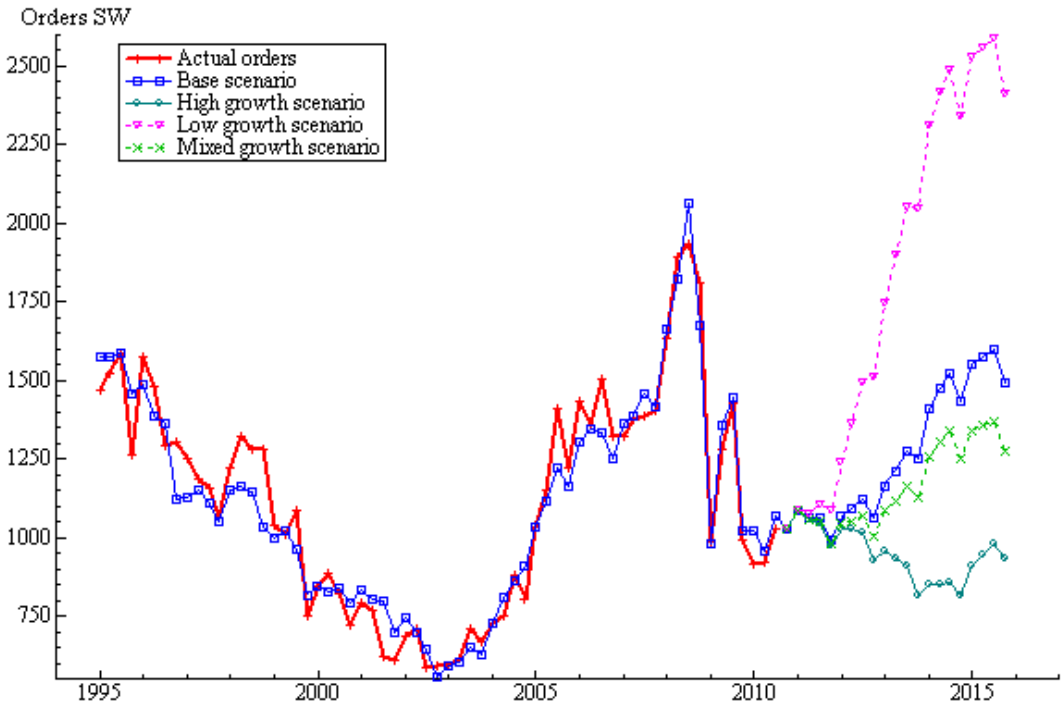
Note: in order, data shown are the unemployment rate, house prices, earnings, number of mortgages and the mortgage stock.

Figure 11: Regional outcomes under various scenarios

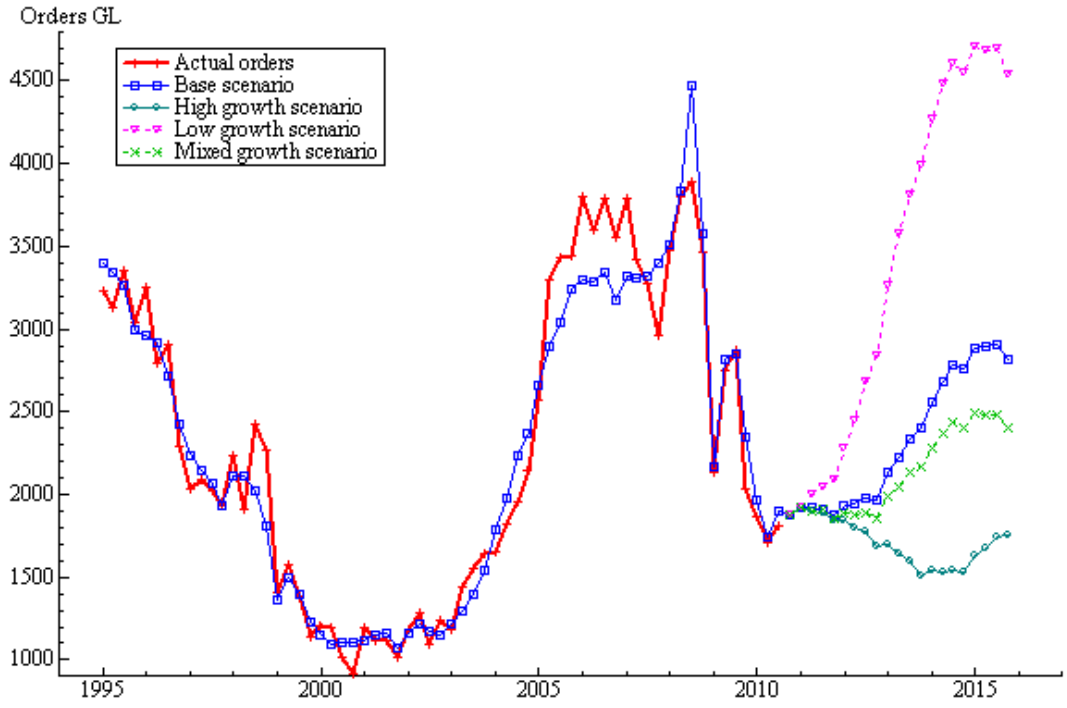
South (ST)



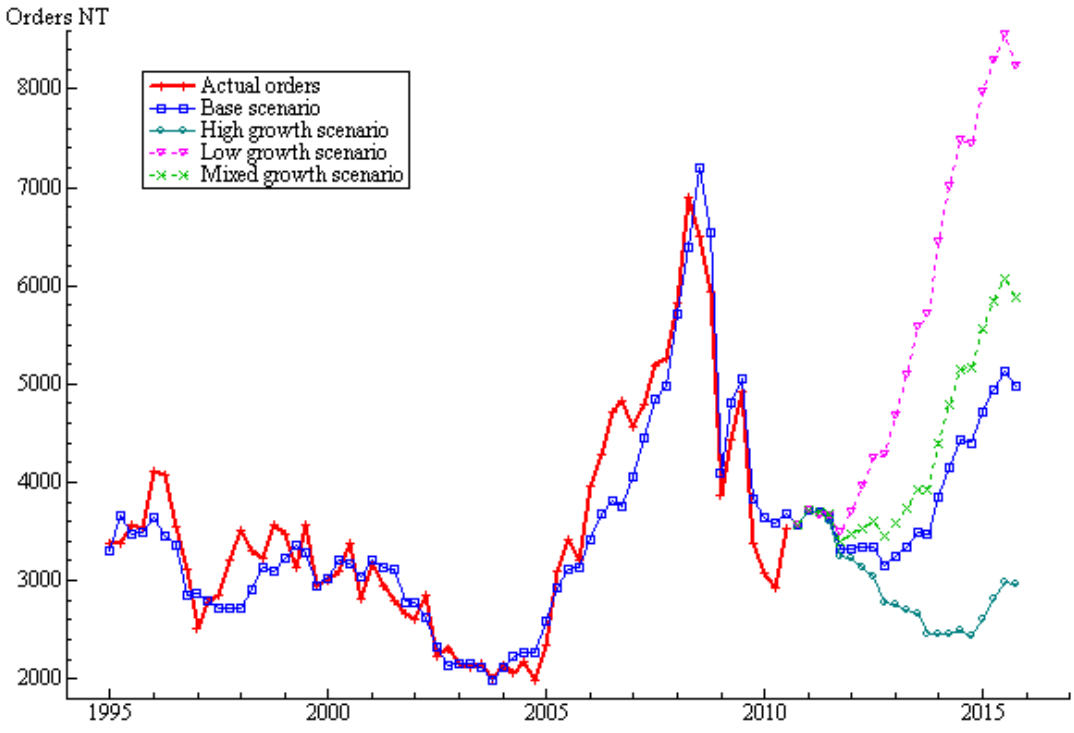
South West (SW)



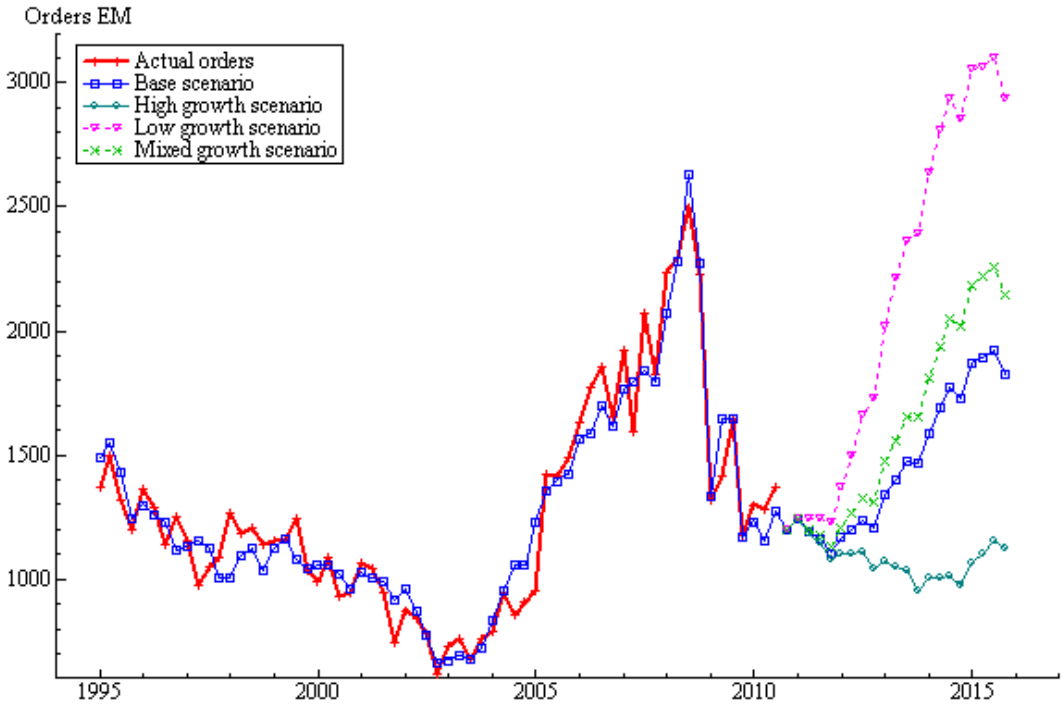
Greater London (GL)



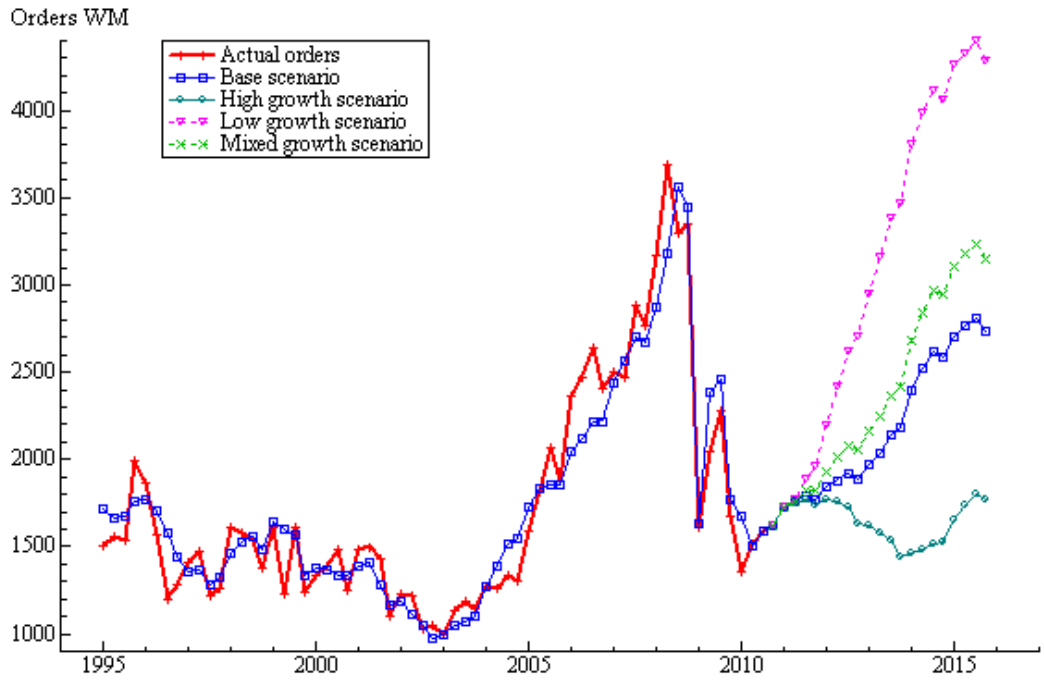
North (NT)



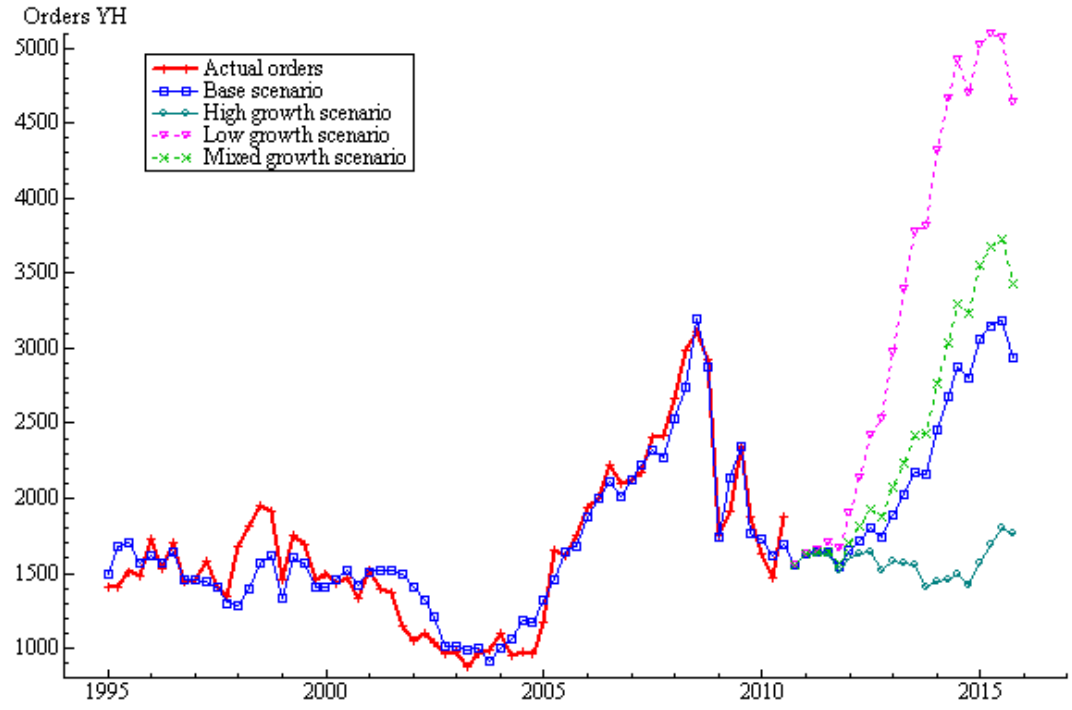
East Midland (EM)



West Midlands (WM)



Yorkshire and Humberside (YH)



Wales (WW)

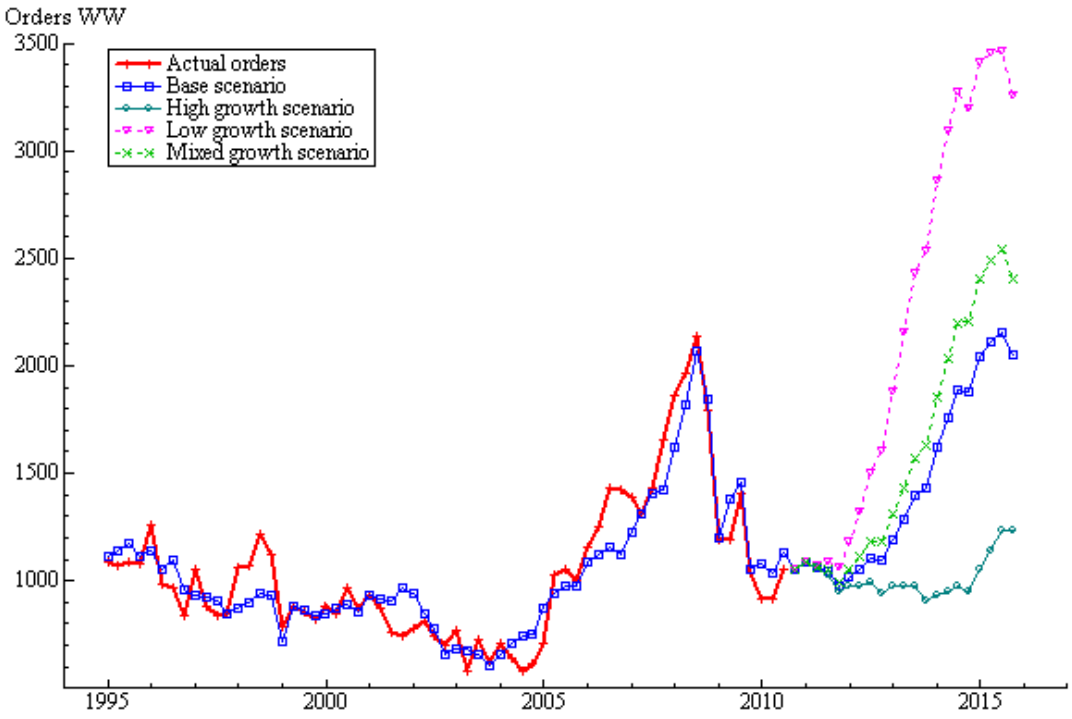
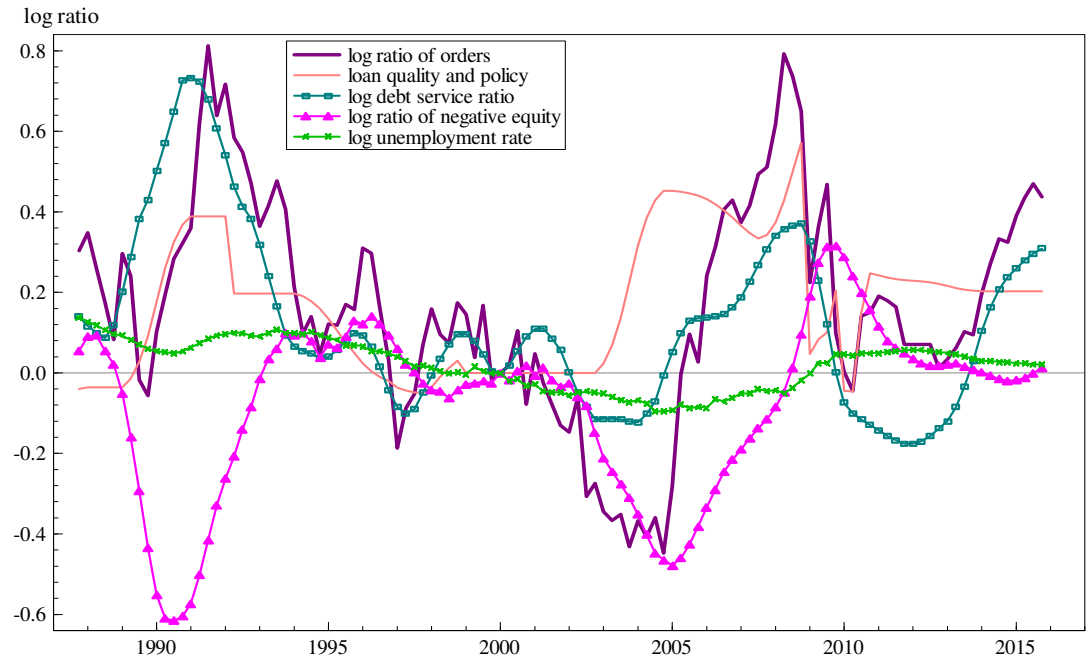


Figure 12: Decomposition of the estimated long-run effects of the economic and policy variables for the estimation and the forecast periods.

North



South

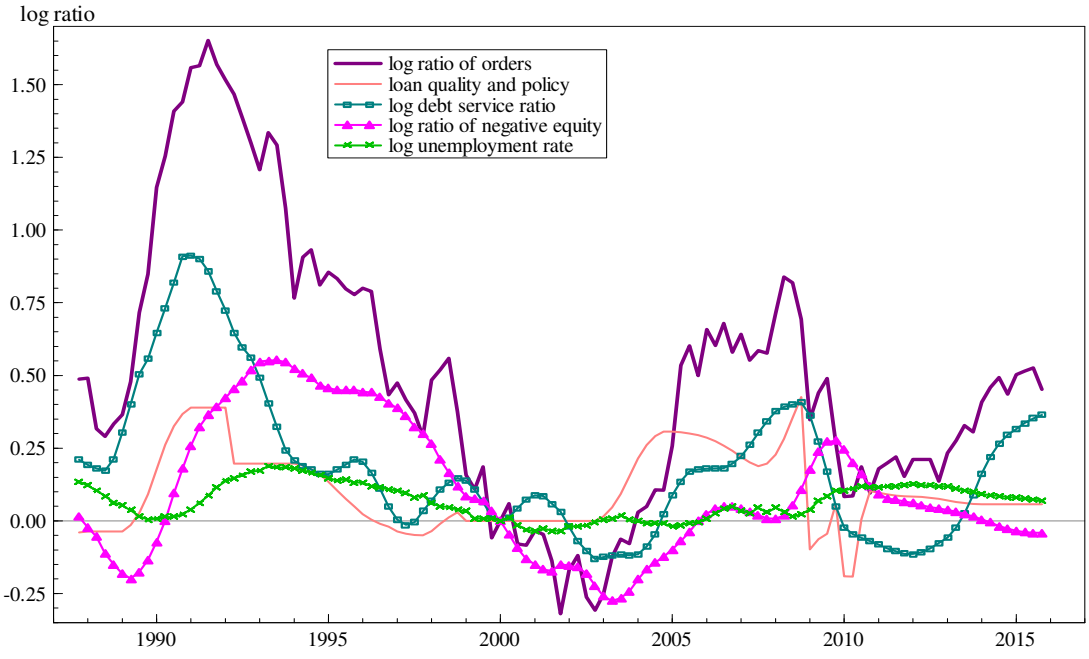


Table 1: Characteristics of the published County Courts data on court-ordered possessions

Source	*Category*	*Frequency and historical samples*		*Units and seasonal adjustment*	*Definition of coverage*
		Annual	*Quarterly*		
Court-ordered possession actions England and Wales: 10 regions: East Midlands, Eastern, London, Northeast, Northwest, Southeast, Southwest, Wales, West Midlands and Humberside (Merseyside was differentiated in the earlier data pre-1998).					
MoJ	Actions entered (no. of possession claims issued in the county courts) No. of Landlord possession claims	1987 onward	1989q2 onward See below for new disaggregated category.	Both seasonally adjusted and non-seasonally adjusted figures are given (adjustment using X12 ARIMA). Data are disaggregated into court regions back to 1987. Comparability over time is affected by new court jurisdictions being incorporated.	Mortgage data include all types of lenders whether local authority or private (e.g. banks and building societies). Landlord data include all types of landlord whether social or private sector, and cover actions made using both the standard and accelerated possession procedures. Voluntary repossessions are not included, except insofar that the property is surrendered after a claim is made by the lender or a court order is granted. Note: The mortgage possession figures do not indicate how many houses have actually been repossessed through the courts. Repossessions can occur without a court order being made while not all court orders result in repossession.
MoJ	Number of possession orders made (incl. suspended orders) No. of Landlord possession orders made (incl. suspended orders)	1987-2008 See below for change of definition.	1990q1-2009q2 See below for definitional change and new disaggregated category.		
MoJ	Orders suspended No. of Landlord suspended orders	1990 onward	1990q1 onward		
MoJ	Charging orders applications made	2001 onward			
MoJ	Charging orders granted	2001 onward			
Definitional differences in MoJ data introduced from August 2009					
MoJ	Number of possession orders made (mortgage and landlord) and also suspended orders Note: no change in the definition of claims, see above.	1999 onward	2004q1 onward published; 1999q1 onward on request	New, additional local authority level breakdown for the 'orders' and 'claims' series, with the disaggregation based on the physical location of the property which is the subject of the possession action.	Redefinition: Number of possession claims that lead to an order. This will eliminate all instances of multiple orders on the same claim. It will not eliminate all instances of multiple orders on a single household: a homeowner in arrears on more than one mortgage loan account could be subject to more than one claim (though this is likely to be a very small proportion).

1. Neither the CML nor the Financial Services Authority (FSA) produce seasonally-adjusted measures. The MoJ suggests the seasonally-adjusted figures give a more meaningful picture of short-term, quarter-to-quarter changes (removing seasonal or other calendar influences such as court closures on public holidays).

Table 2: Definitions of variables used in the regressions

Symbol	*Definition*	*Means*								
		All regions	*NT*	*YH*	*EM*	*WM*	*ST*	*GL*	*SW*	*WW*
$pclaims_t$	Regional number of court claims (actions) / regional no. of mortgages outstanding, nm_i. *claims: MoJ; mortgages: CML*	0.00236	0.00292	0.00259	0.00236	0.00290	0.00228	0.00319	0.00209	0.00309
$porders_t$	Regional number of court orders / regional number of mortgages outstanding, nm_i. *claims: MoJ; mortgages: CML*	0.00174	0.00219	0.00191	0.00174	0.00205	0.00170	0.00240	0.00148	0.00224
ur_t	Regional unemployment rate (ILO) *unemployment rate : ONS*	7.07	8.14	7.43	6.18	7.76	5.25	8.98	5.49	7.55
dsr_t	Debt service ratio, or cost of loan to income, measured for each region as: $(\frac{arbm_t}{100})(\frac{amwt_{t-1}}{y_t})$ where *arbm* is the tax-adjusted interest rate, *amwt* is housing loans, and *y* is an interpolated measure of annual average earnings *mortgages: CML; amwt: ONS* *rbm: ONS; y: ONS*	0.169	0.147	0fs.139	0.146	0.155	0.206	0.220	0.173	0.145
$negeq_t$	Debt equity ratio, measured to proxy average mortgage to house prices. Implied proportion of negative equity (*normalised*) (see data appendix): $negeq_t =$ $(1/(1+\exp(-\lambda(\log\left(\frac{amwt_t}{hp_t}\right)+F)))$ where λ and F are calibration factors, see Data Appendix.	0.0509	0.0463	0.0486	0.0818	0.0324	0.0595	0.0528	0.0572	0.0478

	hp: ONS									
sd2009q1	step dummy =1 from 2008Q4, and 0 otherwise									
sd2010q3	step dummy =1 from 2010Q3, and 0 otherwise									
$sdmmxx_t$	Double moving average of step dummies, with a smooth increasing transition from zero to one over 8 quarters, from zero in the last quarter of year xx-1, to one in the last quarter of year xx+1									
sdmm97	as above for 1997									
sdmm03	as above for 2003									

Notes:

1. The sample is the longest available for the court data, 1987Q1 to 2010Q1.
2. The regional suffixes are: North (NT), Yorkshire and Humberside (YH), East Midlands (EM), West Midlands (WM), Greater London (GL), the South (ST), the South West (SW), and Wales (WW). The Southern regions are defined as: the South, Greater London, and South West. The Northern regions are defined as: North, North West, Yorkshire & Humberside, West Midlands, East Midlands, and Wales.
3. Number of mortgages: biannual CML mortgage data interpolated to quarterly data before 1999, see Data Appendix.
4. Mortgage rate: from 2007Q1, FSA MLAR, Table 1.22 - Residential loans to individuals: Interest rate analysis. Overall weighted average interest rate on balances outstanding, all loans. From 2000 to 2006, linked to average of mortgage rate on balances outstanding for banks and building societies, previously reported in Financial Statistics. Before 2000, linked to average mortgage rate on balances outstanding for building societies, previously reported in Financial Statistics, code AJNL.
5. House prices: mix-adjusted index for UK for all dwellings from DCLG website Table 594.
6. Unemployment rates: use the Labour Force Survey definition, from ONS Labour Market Statistics Tables 18A and B from 1992 Q2; prior to this, regional unemployment rates from the ONS Claimant Count and Vacancies, Tables EGU3 and EGU4 are adjusted to the LFS basis using a regression method. Details in the Data Appendix.
7. Earnings data: from the New Earnings Survey, linked in 1998 to ASHE data, and are April figures; spliced to 2004-2009 figures from Regional Trends as described in the Data Appendix.

Table 3: Estimation results for aggregate court claims and orders in England and Wales, 1987q3-2010q1

Variable	*Symbol*	*Aggregate* Δlog (pclaims)	*Robust std. errors*	*Aggregate* Δlog (pclaims)	*Robust std. errors*	*Aggregate* Δlog (porders)	*Robust std. errors*	*Aggregate* Δlog (porders)	*Robust std. errors*
		1987-2010		*1987-2002*		*1987-2010*		*1987-2002*	
Constant	a0	-5.56	0.803	-5.38	0.864	-4.82	0.443	-4.91	0.619
$\log dsrma4_{t-1}$	a1	0.769	0.217	0.958	0.287	1.07	0.105	0.976	0.190
$\log negeqma4_t$	a2	0.089	0.0557	0.135	0.0601	0.197	0.0321	0.221	0.0368
$\log ur_{t-2}$	a3	0.493	0.249	0.617	0.242	0.396	0.148	0.402	0.193
Speed of adjustment	a4	0.521	0.114	0.620	0.145	0.806	0.0883	0.804	0.107
LQ (loan quality)	a5	0.869	0.304	0.851	0.376	0.713	0.177	0.791	0.298
PS (policy shift)	a6	1.95	0.654	1.78	0.659	0.422	0.319	0.673	0.439
Deviation of $negeq^{(iii)}$	a20	0.134	0.0930	0.0849	0.111	0.0974	0.0464	0.0935	0.0665
sd2009q1	a62	-0.370	0.158			-0.395	0.0900		
sdmm97	a97	-0.112	0.125	-0.0294	0.131	0.0211	0.0692	-2.62E-03	0.103
sdmm03	a103	0.201	0.120			0.0848	0.0800		0.619
Diagnostics									
Eq. standard error		0.0598		0.0648		0.0453		0.0450	
R squared		0.9780		0.98086		0.991		0.993	
Adj.R squared		0.9709		0.97006		0.987		0.988	
LM Het test P-val		0.993		0.927		0.180		0.191	
Durbin-Watson		2.25		2.27		2.12		2.55	
Log likelihood		140.47		96.06		169.27		122.87	

Notes:

i. Estimates are reported to three significant figures.

ii. Variables are defined in Table 2.

iii. *dev negeq = log negeqma4$_t$-lognegeqma8$_{t-8}$*

Table 4: Estimation results for regional court claims in England and Wales, 1987q3-2010q1

Variable	*Symbol*	*All regions* Δlog (pclaims)	*Robust std. errors*	*All regions* Δlog (pclaims)	*Robust std. errors*	*Southern regions* Δlog (pclaims)	*Robust std. errors*
		1987-2010		*1987-2002*		*1987-2010*	
$\log dsrma4_{t-1}$	a1	0.901	0.0940	1.06	0.108	0.947	0.103
$\log negeqma4_t$	a2	0.070885	0.0168	0.102	0.0184	0.0595	0.0436
$\log ur_{t-2}$	a3	0.126	0.0666	0.0107	0.0851	0.310	0.0913
Speed of adjustment	a4						
NT		0.401	0.0697	0.342	0.0774		
YH		0.353	0.0820	0.298	0.0939		
EM		0.487	0.0629	0.512	0.0697		
WM		0.593	0.0995	0.932	0.141		
GL		0.736	0.0717	0.947	0.108	0.703	0.0884
ST		0.591	0.0587	0.729	0.0853	0.587	0.0923
SW		0.524	0.0647	0.578	0.0754	0.538	0.102
WW		0.630	0.0762	0.771	0.0987		
LQ (loan quality)	a5	0.815	0.258	1.30	0.227	0.610	0.267
PS (policy shift)	a6	2.09	0.444	1.74	0.343	1.54	0.644
Deviation of $negeq^{(iii)}$	a20						
NT		-0.0105	0.0757	-0.0576	0.104		
YH		0.148	0.0717	0.0766	0.131		
EM		0.0645	0.0428	0.0232	0.0497		
WM		0.0492	0.0434	0.0869	0.0329		
GL		0.147	0.0233	0.109	0.0218	0.177	0.0314
ST		0.0487	0.0295	-0.0216	0.0367	0.0147	0.0446
SW		0.165	0.0304	0.146	0.0348	0.163	0.0475
WW		0.146	0.0390	0.190	0.0546		

sd2009q1	a62	-0.217	0.0631			-0.228	0.0858
sdmm97	a97	-0.265	0.0888	-0.362	0.0833	-0.0927	0.0945
sdmm03	a103						
NT		0.541	0.0768				
YH		0.347	0.0809				
EM		0.330	0.0792				
WM		0.414	0.0747				
GL		0.191	0.0715			0.0938	0.0846
ST		0.437	0.0827			0.424	0.102
SW		0.0799	0.0736			0.0191	0.0890
WW		0.385	0.0668				
Diagnostics							
NT							
Eq. standard error		0.0746		0.0845			
R squared		0.925		0.868			
LM Het test P-val		.835		.96			
Durbin-Watson		1.94		1.86			
YH							
Eq. standard error		0.0660		0.0752			
R squared		0.947		0.921			
LM Het test P-val		.879		.93			
Durbin-Watson		1.96		1.99			
EM							
Eq. standard error		0.0781		0.0885			
R squared		0.951		0.943			
LM Het test P-val		.828		.98			
Durbin-Watson		1.73		1.66			
WM							
Eq. standard error		0.0678		0.0693			
R squared		0.958		0.955			
LM Het test P-val		.9		.828			
Durbin-Watson		1.94		1.97			
GL							

Eq. standard error		0.0846		0.0923		0.0819	
R squared		0.969		0.971		0.971	
LM Het test P-val		.780		.229		.744	
Durbin-Watson		1.89		1.76		2.00	
ST							
Eq. standard error		0.0567		0.0624		0.0542	
R squared		0.982		0.983		0.983	
LM Het test P-val		[.027		.014		.040	
Durbin-Watson		1.81		1.64		1.96	
SW							
Eq. standard error		0.0775		0.0861		0.0753	
R squared		0.968		0.967		0.969	
LM Het test P-val		.911		.731		.821	
Durbin-Watson		1.971		1.833		2.07	
WW							
Eq. standard error		0.0884		.104			
R squared		0.917		0.879			
LM Het test P-val		.708		.811			
Durbin-Watson		1.92		1.71			

Notes:

i. Estimates are reported to three significant figures.

ii. Variables are defined in Table 2.

iii. *dev negeq = log negeqma4*$_t$*-lognegeqma8*$_{t-8}$

Table 5: Estimation results for regional court orders in England and Wales, 1987q3-2010q1

Variable	*Symbol*	*All regions* Δlog (porders)	*Robust std. errors*	*All regions* Δlog (porders)	*Robust std. errors*	*Southern regions* Δlog (porders)	*Robust std. errors*
		1987-2010		*1987-2002*		*1987-2010*	
$\log dsrma4_{t-1}$	a1	1.15	0.0774	1.02	0.0938	1.01	0.0918
$\log negeqma4_t$	a2	0.191	0.0182	0.209	0.0188	0.220	0.0282
$\log ur_{t-2}$	a3	0.255	0.0623	0.257	0.0760	0.290	0.0964
Speed of adjustment	a4						
NT		0.422	0.0663	0.383	0.0882		
YH		0.501	0.0724	0.435	0.0768		
EM		0.811	0.0790	0.790	0.0789		
WM		0.817	0.0833	0.980	0.0864		
GL		0.954	0.0915	1.11	0.108	0.825	0.102
ST		0.681	0.0577	0.805	0.0595	0.607	0.0634
SW		0.821	0.0613	0.881	0.0700	0.779	0.0622
WW		0.624	0.0795	0.588	0.0943		
LQ (loan quality)	a5	1.15	0.209	1.60	0.210	1.04	0.226
PS (policy shift)	a6	0.989	0.301	1.26	0.323	0.969	0.365
Deviation of $negeq^{(iii)}$	a20						
NT		0.176	0.0758	0.170	0.128		
YH		0.0943	0.0656	0.214	0.0906		
EM		0.0620	0.0407	0.0561	0.0556		
WM		0.0137	0.0452	0.0137	0.0462		
GL		0.107	0.0305	0.0961	0.0301	0.149	0.0346
ST		-0.0402	0.0428	0.0858	0.0205	0.0102	0.0613
SW		0.0422	0.0313	0.0570	0.0361	0.104	0.0474
WW		0.209	0.0574	0.189	0.0816		

sd2009q1	a62	-0.371	0.0478			-0.298	0.0641
sdmm97	a97	-0.153	0.0643	-0.266	0.0688	-0.0624	0.0762
sdmm03	a103						
NT		0.462	0.0701				
YH		0.306	0.0663				
EM		0.428	0.0599				
WM		0.448	0.0608				
GL		0.141	0.0550			0.0455	0.0642
ST		0.509	0.0974			0.406	0.121
SW		0.253	0.0541			0.160	0.0711
WW		0.348	0.0631				
Diagnostics							
NT							
Eq. standard error		0.0780		0.0818			
R squared		0.930		0.878			
LM Het test P-val		.707		231			
Durbin-Watson		2.19		2.24			
YH							
Eq. standard error		0.0826		0.0791			
R squared		0.9332		0.9195			
LM Het test P-val		.753		.377			
Durbin-Watson		1.58		1.81			
EM							
Eq. standard error		0.0920		0.0888			
R squared		0.942		0.946			
LM Het test P-val		.255		.394			
Durbin-Watson		2.01		2.13			
WM							
Eq. standard error		0.0906		0.0859			
R squared		0.937		0.941			
LM Het test P-val		.809		.840			
Durbin-Watson		1.80		1.79			
GL							

Eq. standard error		0.0966		0.0972		0.0903	
R squared		0.972		0.978		0.976	
LM Het test P-val		.303		.855		.615	
Durbin-Watson		1.75		1.89		1.97	
ST							
Eq. standard error		0.0521		0.0407		0.0496	
R squared		0.989		0.995		0.990	
LM Het test P-val		[.146		.468		.487	
Durbin-Watson		1.93		2.39		2.21	
SW							
Eq. standard error		0.0818		0.0876		0.0778	
R squared		0.972		0.973		0.975	
LM Het test P-val		..978		.574		.811	
Durbin-Watson		2.09		2.00		2.31	
WW							
Eq. standard error		0.1030		0.0968			
R squared		0.910		0.906			
LM Het test P-val		.065		.865			
Durbin-Watson		1.80		2.03			

Notes:

i. Estimates are reported to three significant figures.

ii. Variables are defined in Table 2.

iii. *dev negeq = log negeqma4$_t$-lognegeqma*

Table 6: Scenarios for regional mortgages possessions forecasts 2010q4-2015q4

EXOGENOUS VARIABLE	*SCENARIO 1 Base*	*SCENARIO 2 Positive variant*	*SCENARIO 3 Negative variant*	*SCENARIO 4 Mixed*
Policy	use base assumptions from Aron and Muellbauer (2010)			
Lending Quality	use base assumptions from Aron and Muellbauer (2010)			
2003 dummy	effect continues			
2009 dummy	effect continues			
2010q3 dummy	step dummy set to 1 from this date, to capture SMI changes from 1 October 2010			
No. of Mortgages, Nm	nm = nmbase	nm = nmbase	nm = nmbase	arbm = arbmbase for all *Southern region (ST, SW, GL):* [2] Scenario 2 assumptions but where the growth increments are halved for house prices and earnings *Northern region (NT, YH, EM, WM, WW)s:* [2] Scenario 3 assumptions but where the growth increments are halved for house prices and earnings
Unemployment Rate, ur	ur = urbase	ur base+ positive increment	urbase + negative increment	
Mortgage Rate, arbm	arbm = arbmbase	arbmbase + positive increment	arbmbase + negative increment	
House Price, hp	hp = hpbase	growth rate in base scenario has positive growth increment	growth rate in base scenario has negative growth increment	
Earnings, y	y = ybase	growth rate in base scenario has positive growth increment	growth rate in base scenario has negative growth increment	
Mortage Lending Stock, amwt	amwt = amwtbase	growth rate in base scenario has positive growth increment	growth rate in base scenario has negative growth increment	

Notes:

1. See the Annex for the values of the increments and of variables for some regions in the base scenario.

2. The eight regions are: the North (NT), Yorkshire and Humberside (YH), East Midlands (EM), West Midlands (WM), Greater London (GL), the South (ST), the South West (SW) and Wales (WW). The choice of regions is determined by the need for consistent regional boundaries since the government switched from Standard Statistical Regions (SSR's) to Government Office Regions (GOR's) in the mid 1990's. The North region is the sum of the current North East and North West GOR's, which is the sum of the old North and North West SSR's. The South region is the sum of the South East and Eastern GOR's, which is the sum of the old Rest of South East (i.e. excluding Greater London) and East Anglia SSR.

Table 7: Forecasts of regional orders for different scenarios over 2010q4-2015q4

Forecast quarter	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*
	REGION: SW				**REGION: ST**				**REGION: GL**			
2010q1	915	915	915	915	2810	2810	2810	2810	1865	1865	1865	1865
2010q2	920	920	920	920	2820	2820	2820	2820	1715	1715	1715	1715
2010q3	1030	1030	1030	1030	3120	3120	3120	3120	1805	1805	1805	1805
2010q4	1029	1029	1029	1029	2856	2856	2856	2856	1880	1880	1880	1880
2011q1	1085	1085	1085	1085	3111	3111	3111	3111	1920	1920	1920	1920
2011q2	1063	1060	1078	1061	3178	3163	3288	3166	1923	1902	1995	1904
2011q3	1065	1047	1106	1052	3251	3212	3488	3223	1914	1889	2044	1908
2011q4	994	974	1085	980	3046	2980	3441	2997	1881	1840	2095	1854
2012q1	1069	1027	1241	1044	3235	3071	3901	3144	1935	1844	2279	1891
2012q2	1091	1029	1362	1054	3242	2975	4209	3097	1939	1800	2449	1880
2012q3	1120	1018	1494	1070	3249	2885	4508	3070	1979	1775	2678	1884
2012q4	1066	930	1510	1006	3023	2572	4432	2817	1963	1691	2838	1854
2013q1	1166	959	1744	1085	3338	2631	5106	3074	2136	1695	3260	1988
2013q2	1214	935	1898	1117	3493	2575	5544	3189	2223	1644	3576	2045
2013q3	1276	910	2052	1162	3686	2518	5927	3339	2340	1598	3817	2129
2013q4	1252	818	2044	1129	3614	2270	5866	3250	2406	1504	3987	2164
2014q1	1409	853	2311	1259	4015	2418	6553	3582	2555	1544	4273	2277
2014q2	1475	855	2417	1306	4231	2454	6898	3744	2685	1534	4479	2372
2014q3	1523	857	2484	1338	4394	2514	7126	3857	2780	1538	4606	2436
2014q4	1435	815	2341	1250	4158	2403	6750	3622	2765	1527	4552	2403
2015q1	1549	908	2526	1340	4458	2671	7234	3857	2888	1636	4710	2494
2015q2	1573	948	2556	1355	4524	2753	7335	3866	2896	1674	4686	2476
2015q3	1598	984	2588	1369	4586	2839	7424	3918	2903	1745	4698	2482
2015q4	1493	935	2412	1275	4271	2677	6899	3635	2818	1750	4535	2401

Forecast quarter	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*
	REGION: NT				**REGION: EM**				**REGION: WM**			
2010q1	3070	3070	3070	3070	1300	1300	1300	1300	1355	1355	1355	1355
2010q2	2930	2930	2930	2930	1280	1280	1280	1280	1515	1515	1515	1515
2010q3	3535	3535	3535	3535	1370	1370	1370	1370	1585	1585	1585	1585
2010q4	3573	3573	3573	3573	1201	1201	1201	1201	1620	1620	1620	1620
2011q1	3725	3725	3725	3725	1242	1242	1242	1242	1727	1727	1727	1727
2011q2	3692	3689	3658	3692	1194	1187	1244	1199	1755	1751	1775	1758
2011q3	3641	3604	3665	3672	1164	1146	1247	1178	1796	1775	1889	1819
2011q4	3323	3252	3484	3398	1106	1079	1232	1132	1773	1735	1966	1823
2012q1	3330	3228	3706	3476	1166	1102	1369	1211	1845	1771	2190	1932
2012q2	3337	3141	3965	3537	1198	1104	1500	1264	1882	1756	2418	2009
2012q3	3344	3045	4248	3601	1238	1107	1660	1326	1920	1731	2619	2075
2012q4	3160	2777	4291	3458	1210	1041	1728	1312	1885	1634	2708	2055
2013q1	3237	2758	4683	3585	1343	1070	2017	1474	1969	1620	2951	2158
2013q2	3342	2709	5096	3732	1403	1053	2212	1556	2040	1578	3157	2242
2013q3	3485	2656	5578	3924	1476	1033	2365	1651	2138	1537	3377	2360
2013q4	3464	2449	5712	3934	1466	951	2395	1655	2179	1441	3465	2417
2014q1	3849	2455	6442	4403	1588	1002	2635	1807	2397	1465	3806	2678
2014q2	4153	2461	7008	4788	1688	1005	2807	1937	2522	1481	3990	2837
2014q3	4433	2500	7489	5149	1772	1015	2937	2050	2621	1519	4116	2970
2014q4	4404	2428	7446	5162	1732	975	2855	2019	2586	1523	4063	2951
2015q1	4717	2610	7976	5566	1869	1064	3054	2186	2705	1653	4258	3105
2015q2	4945	2809	8295	5847	1893	1101	3062	2218	2763	1738	4328	3176
2015q3	5132	2986	8550	6077	1923	1152	3101	2258	2810	1797	4400	3238
2015q4	4979	2966	8233	5891	1826	1127	2935	2143	2736	1767	4279	3153

Forecast quarter	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*	*Base Scenario*	*Positive Variant Scenario*	*Negative Variant Scenario*	*Mixed Scenario*
	REGION: YH				**REGION: WW**				**TOTAL: England**			
2010q1	1635	1635	1635	1635	915	915	915	915	12950	12950	12950	12950
2010q2	1465	1465	1465	1465	915	915	915	915	12645	12645	12645	12645
2010q3	1880	1880	1880	1880	1050	1050	1050	1050	14325	14325	14325	14325
2010q4	1554	1554	1554	1554	1051	1051	1051	1051	13713	13713	13713	13713
2011q1	1630	1630	1630	1630	1087	1087	1087	1087	14439	14439	14439	14439
2011q2	1645	1632	1655	1647	1063	1060	1070	1064	14450	14383	14695	14427
2011q3	1648	1635	1699	1650	1043	1028	1084	1052	14478	14308	15138	14502
2011q4	1542	1520	1666	1567	975	950	1063	995	13666	13380	14967	13751
2012q1	1650	1601	1897	1704	1020	976	1184	1056	14230	13645	16583	14401
2012q2	1721	1628	2133	1810	1055	978	1320	1111	14410	13433	18037	14651
2012q3	1802	1647	2421	1925	1106	991	1498	1183	14653	13208	19629	14950
2012q4	1738	1525	2531	1882	1097	942	1605	1185	14044	12171	20037	14384
2013q1	1896	1581	2975	2076	1194	973	1878	1312	15085	12313	22737	15441
2013q2	2024	1574	3391	2237	1288	975	2156	1433	15738	12067	24874	16117
2013q3	2175	1556	3778	2422	1397	977	2427	1571	16577	11808	26895	16987
2013q4	2167	1409	3818	2427	1434	910	2531	1627	16547	10842	27287	16977
2014q1	2453	1444	4322	2770	1618	932	2862	1853	18266	11180	30343	18777
2014q2	2673	1463	4664	3042	1762	948	3095	2035	19427	11252	32262	20027
2014q3	2870	1497	4923	3291	1890	975	3274	2199	20393	11440	33681	21091
2014q4	2799	1427	4700	3232	1879	955	3200	2204	19880	11098	32707	20641
2015q1	3062	1570	5025	3557	2041	1052	3411	2404	21248	12112	34783	22105
2015q2	3153	1688	5093	3683	2112	1144	3456	2487	21747	12711	35355	22622
2015q3	3189	1806	5068	3732	2158	1231	3465	2539	22141	13310	35828	23074
2015q4	2937	1767	4639	3437	2050	1234	3259	2404	21062	12990	33931	21934

Data Appendix

Interpolation of bi-annual data for aggregate arrears, repossessions and the mortgage stock

CML publishes quarterly data for arrears, possessions and the outstanding mortgage stock, beginning in 2008. Half-yearly data for earlier years can be interpolated into quarterly data from the early 1980s, and linked to unpublished quarterly data from CML from 1999Q1. The interpolation for arrears, which are stock data, is straightforward, as a smoothed step-function. The H1 value is given to Q1 and Q2 and the H2 value to Q3 and Q4. Then logs are taken and a two-quarter moving average is taken of the log values. For the flow of possessions, the interpolation is a bit more complex. The quarterly data are created and scaled using H1 and H2 biannual data (scaling ensures that the total of the implied quarterly flows into possession add up to the published biannual data).[28]

Definitions of regions

The switch from Standard Statistical Regions (SSRs) to Government Office Regions (GORs) in the early 1990s has necessitated some aggregation of regions in the North and the South to obtain consistent historical series. A 'greater North' region (NT) can be defined by adding SSR categories North West and North and is equivalent to the sum of GOR categories North West (including Merseyside) and North East. A 'greater South' region (ST) consists of SSR categories East Anglia plus the rest of the South East (excluding Greater London) and is equivalent to GOR categories East plus the rest of the South East (excluding Greater London). The other regions: Yorkshire and Humberside (YH), East Midlands (EM), West Midlands (WM), Greater London (GL), South West (SW) and Wales (WW) are unchanged. This gives eight regions in England and Wales.

Court action (claims) and court order on data on repossessions

Quarterly data for 1987 to the present on court orders and claims (actions) for mortgage possessions in English regions and Wales are available from the Ministry of Justice (MOJ), previously the Lord Chancellor's Department.[29] The distribution of the claims and orders between the GORs are based on where the location of the court the claim or order was dealt with as opposed to where the property in question was located.[30] There is some small discontinuity between the orders data for the two sub-periods before and after 1999. The order counts prior to 1999 represent the number of orders made, while those from 1999 onwards the number of claims leading to an order being made. Further, the pre-1999 data were sourced from manual returns which have a lower degree of accuracy than the later data sourced from the main county court administration systems.

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[28] $Q1_t = H2_{t-1}/6 + H1_t/3$, scaled by $H1_t/(Q1_t + Q2_t)$; $Q2_t = H1_t/3 + H2_t/6$, scaled by $H1_t/(Q1_t + Q2_t)$; $Q3_t = H1_t/6 + H2_t/3$, scaled by $H2_t/(Q3_t + Q4_t)$; and $Q4_t = H2_t/3 + H1_{t+1}/6$, scaled by $H2_t/(Q3_t + Q4_t)$.

[29] We are grateful to Aidan Mews and Michael Howe of the MoJ for making the historical data available.

[30] Comparisons by Aidan Mews (MoJ) indicate that the percentage changes over time in regions based on the location of the court are very similar to those based on the location of the property.

The court actions (claims) and court order data need to be scaled relative to the number of mortgages outstanding per region, nm_I. We define, *pactions*, the percentage of mortgages in the ith region in year t subject to Court actions as $(act_{it}/nm_{it-1}) \times 100$, where $claim_{it}$ is the number of claims in region i, year t, and analogously for Court orders, *porders*. In logs, these variables are denoted *log pclaims* and *log porders*, respectively.

Estimating the number of mortgages outstanding per region

Before 1992, we use annual regional estimates of the number of mortgages outstanding by Anthony Murphy. These were based on survey estimates of the number of mortgages relative to the number of owner occupiers in each region, scaled up by DCLG counts of the number of owner-occupiers in each region. From Labour Force Survey (LFS) Housing Trailers for 1971, 1981, 1984, 1988 and 1991-93, he obtained estimates of the fraction of owner-occupiers with mortgages, om_i for region i, at the end of each year.[11] Fairly accurate estimates of this fraction for the UK as a whole are obtained by dividing nm_{UK}, the number of mortgages outstanding from CML, by ohs_{UK}, the number of owner-occupied houses (DCLG Housing Statistics, where all figures are at year-end. Let rom_i be the ratio om_i/om_{UK}. By fitting a cubic function/spline in time to rom_i it is possible to generate interpolated estimates for 1985 to 1995, $from_i$. We then define the estimated nm_I, the number of mortgages in region i by,

$$nm_i = (nm_{UK})\,(from_i)\,ohs_i / ohs_{UK}$$

Thus, the share of the number of UK mortgages in the ith region equals the share of owner-occupied houses scaled by $from_i$.

From 1992, the new Survey of Mortgage Lenders included banks as well as building societies and provides a basis for a different estimation method. This cumulates the number of new advances in each region and assumes that the number of mortgages paid off each quarter is 1.5 percent of the number of outstanding mortgages. This corresponds to about 6 percent of mortgages being paid off each year. The regional estimates of number of mortgages which result are scaled by the CML count for the UK divided by the UK sum of the regional estimates.

Among the explanatory variables, several rely on estimates of am_i, the average mortgage outstanding in region i. Since there are no reliable survey measures, the average mortgage outstanding is estimated as follows: An initial estimate of the mortgage stock in each region is obtained from the sum with geometrically declining weights of the value of mortgages for home purchase[31] issued in the previous ten years for each region. Before 1991, the data come from the Five Percent Building Society Sample and may understate the size of the average mortgage particularly in London and the South. For these two regions the data are therefore scaled up by 10 percent before 1991 and by 5 percent thereafter to reflect the plausibly higher remortgage rates in London and the South. The decay factor chosen is 0.015 per quarter as for the estimate of the count of mortgages described above. The sum across regions accounts for roughly 75 percent of the total UK mortgage stock from Financial Statistics published by the ONS, taking the average of figures from 1987 to 2009. The share of region i in the sum over regions in the initial estimates of the mortgage stock is then multiplied by the total UK mortgage stock from the ONS to give an estimate of the mortgage stock in each region. Dividing by the estimated number of

[31] This is as opposed to refinancing an existing mortgage.

mortgages in each region constructed by a similar method[32], gives the average outstanding mortgage in each region. Note that systematic biases in the method of construction common to the estimates of numbers and of totals of mortgages outstanding will tend to cancel out. The ONS figure for the outstanding mortgage stock includes the cumulative effect of refinancing and additional advances beyond the initial mortgage. To the extent that these could be proportionately larger in some regions than others beyond the adjustments made for London and the South, our estimates for the average mortgage in region i could suffer from an approximation error. However, it is likely that alternative estimates, for example by imputing average mortgage sizes for each region from the Family Expenditure Survey data on mortgage payments, would be less accurate still. The response rate for the FES and its successor survey has never been significantly above 70 percent and has been closer to 60 percent in recent years. The response rate is believed to be substantially lower for younger, more affluent and more mobile households and sampling variability also makes data from this source too unreliable for our purposes.

Regional house price indices

Regional mix-adjusted house price indices for all dwellings were constructed in quarterly form from 1968 to 2004. Regions were weighted based on the owner-occupied housing stock per region, in order to convert from a Government Office Region basis to eight regions, including Wales, as described above. These data were linked to the recent data from DCLG reported on a Government Office Region basis. Again the series were weighted appropriately using 2004 weights, to combine regions forming a 'greater North' region (NT) and a 'greater South' region (ST). The two sets of data were spliced in 2000Q4.

The debt to equity ratio

We estimate average debt/equity ratios for each region by scaling the average mortgage am_{it-1} by hp_{it}, an estimate of the average house price. This multiplies the mix-adjusted house price index for the region by the average dwelling price in a base year, taken to be 2000.

Negative equity and the debt to equity ratio

We estimate average debt/equity ratios for each region by scaling the average mortgage ami_{t-1} by hpi_t, an estimate of the average house price. This multiplies the mix-adjusted house price index for the region by the average dwelling price in a base year, taken to be 2000. We assume a relationship, based on the logistic distribution, between the proportion of mortgages in negative equity and the debt to equity ratio as follows:

$$negeq_t = (1/(1 + \exp(-\lambda(log\left(\frac{amwt_t}{hp_t}\right) + F_t)$$

We assume λ=7, which is meant to be of the order of magnitude of the inverse of the standard deviation of the distribution of log debt/equity across households. The F-function is linear in time and is calibrated to match estimates of the incidence of negative equity by region at two points in time. These are estimates by the CML for 2009q1, see Tatch (2009), and estimates for 1992q1 by Gentle *et al.* (1994). The latter are defined relative to numbers of recent

[32] Note that this is different from the method described above which links to pre-1992 estimates by Anthony Murphy.

mortgages rather than of numbers of outstanding mortgages and the regional breakdown did not correspond exactly and hence required some adjustment.

The tax-adjusted mortgage rate

The tax-adjusted mortgage interest rate, *arbm*, is defined as $(1-s_{it}tr_t)$, where tr_t is the standard rate at which tax relief applies and s_{it} is an estimate of the fraction of mortgages under the tax relief ceiling. s_{it} varies from region to region. A simple estimate defines $s_{it} = 1$ if the median mortgage is under the tax relief ceiling of £30,000 and $s_{it} = 30{,}000/am_{it-1}$ otherwise. This is correct for the median mortgage but rather approximate for the average of tax adjustments as it neglects the inequality of the distribution of mortgages which would, for example, ensure that some mortgages were over the ceiling even with a median mortgage of £25,000 say.

The debt service ratio

The debt-service ratio is computed as the product of the tax-adjusted mortgage interest rate ($arbm_{it}$) and the average mortgage (am_{it-1}) divided by an estimate of full time earnings per head (y_{it}). Note that this definition of the debt-service ratio omits the repayment element in regular mortgage payments. Thus,

$$dsr_{ir} = (arbm_{it})\,(am_{it-1})/y_{it}$$

Regional earnings measures

Annual average full time earnings by region come from the New Earnings Survey linked in 1998 to ASHE data and are April figures. These data were spliced to annual 2004-2009 figures from Regional Trends as follows. Male and female mean gross weekly earnings by region (Table 9.21, Regional Trends) are available for 2004-2006 and for 2006-2009, but there are two discontinuities introduced by changes to the ASHE methodology. In 2004 supplementary information was included to improve coverage and in 2006 changes to the sample design were made to improve the quality of the estimates. These regional earnings data were weighted by the regional shares of full-time employment of males and females relative to full-time UK employment (Table 9.5, Regional Trends) to obtain the series for all workers. As the regional employment numbers for males and females include part-time workers, a correction had to be made for part-time hours worked by males and females relative to total part-time hours worked (Table 9.1, Regional Trends). These resulting series were spliced in 2006, and again to the earlier data in 2004. Then the regions were combined to form a 'greater North' region (NT) and a 'greater South' region (ST), weighting by full-time employment by region. Finally the annual data were interpolated to a quarterly frequency, using a quarterly step function from the annual data and taking a four-quarter moving average. This is centered so that the second quarter figure matches the NES/ASHE data for April in each year. The earnings data are not tax adjusted, though regional fixed effects should capture most of the differences in tax rates by region.

Regional unemployment measures

Regional unemployment rates correspond to the Labour Force Survey definition and come from ONS Labour Market Statistics Tables 18A and B from 1992 Q2. Before this date, regional unemployment rates from the ONS Claimant Count and Vacancies, Tables EGU3 and EGU4 are adjusted to the LFS basis using a regression method. The UK unemployment rate on the LFS basis is available quarterly back to the 1970s. For each region, a linear regression of the regional LFS unemployment rate on the claimant count unemployment rate and the difference between the UK LFS and claimant count unemployment rates is run on data for 1992Q2 to 2010Q1. The fitted values before 1992Q2 are then taken as estimates for each region of the LFS unemployment rates.

Use of dummies to proxy policy shifts and lending standards

This paper uses estimated latent variables based on dummies, to capture changes in loan quality and policy forbearance. The forbearance policy function estimated in Aron and Muellbauer (2010) is a simple function of dummy variables. The first is a step dummy equal to one from 1992Q1 and zero before. This reflects the December 1991 policy response to the mounting possessions crisis with an agreement between mortgage lenders and the government, see discussion In Section 2.2. After 1995, it seems likely that a gradual return began toward more standard behaviour since, in that year, the government substantially reduced the generosity of SMI, despite lender criticism. A smoothed step dummy, see below, for 1997 captures this return to normal, imposing the restriction that the 1991 shift is eventually cancelled out. In 2008Q4, forbearance policy shifted again, with government pressure on lenders to exercise generosity, see Section 2.2 for further discussion. The industry's mortgage code of practice was also tightened through the Mortgage Pre-action Protocol. The latter shift would have introduced delay on possessions procedures, and implies a partial reversal after a few quarters of the initial impact of the policy shift. A step dummy beginning in 2008Q4 and a three quarter lag of this dummy capture these possibilities.

Lending standards evolve more slowly than policy and have gradual effects on mortgage defaults; heterogeneity of individual borrowers and of lender behaviour results in smoothness in aggregate default rates in responding to shocks. A smoothed step dummy defined from a double moving average of step dummies is a good potential proxy for loan quality. For example define a step dummy *sd89* which is zero up to 1988Q4 and one from 1989Q1. The four-quarter moving average of this, termed *sd89ma*, takes the value 0.25 in 1989Q1, 0.5 in 1989Q2, 0.75 in 1989Q3 and 1 in 1989Q4. Now take a five-quarter moving average of *sd89ma*, termed *sd89mm*. This rises in an 'S-shape' from zero in 1988Q4 to reach one in 1990Q4. Linear combinations of such double moving averages of step dummies provide a simple way of representing smooth transitions.

Figure 9 plots the estimated values of LQ and PS, which are defined as follows:

The loan quality equation

$$\begin{aligned} LQ_t = {} & l86 \times sdmm86_t + l89 \times sdmm89_t + l94 \times sdmm94_t \\ & + l95 \times sdmm95 + l97 \times sdmm97_t + l05 \times sdmm05_t \\ & + l06 \times sdmm06_t + l07a \times sdmm07_{t-2} + l09a \times sd2008q4_{t-2} \\ & + l09b \times sd2008q4_{t-4} + l10 \times sdmm10_t + l12 \times sdmm12_t \end{aligned}$$

The forbearance policy equation

$$PS_t = p91 \times (sd91_{t-4} - sdmm97_t) + p08 \times sd2008q4_t$$
$$+ p09a \times sd2008q4_{t-3} + p09b \times sd2008q4_{t-4}$$

ANNEX: Forecast scenarios: underlying assumptions 2010q4-2015q4

	Quarterly rates increment				***Quarterly growth rates increments***					
	Unemployment rate		*Mortgage Rate*		*Earnings*		*House Prices*		*Mortgage Lending Stock*	
	negative variant	*positive variant*	*negative variant*	*positive variant*	*positive variant*	*negative variant*	*positive variant*	*negative variant*	*positive variant*	*negative variant*
Dec-10	0	0	0	0	0	0	0	0	0	0
Mar-11	0	0	0	0	0	0	0	0	0	0
Jun-11	0.2	0	0.002	0	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Sep-11	0.4	-0.1	0.004	0	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Dec-11	0.6	-0.2	0.006	0	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Mar-12	0.8	-0.3	0.008	-0.001	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Jun-12	0.9	-0.4	0.01	-0.002	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Sep-12	1	-0.5	0.012	-0.003	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Dec-12	1	-0.5	0.014	-0.0041	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Mar-13	1	-0.5	0.016	-0.0076	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Jun-13	1	-0.5	0.018	-0.0111	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Sep-13	1	-0.5	0.018	-0.0147	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Dec-13	1	-0.5	0.018	-0.0182	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Mar-14	1	-0.5	0.018	-0.0172	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Jun-14	1	-0.5	0.018	-0.0164	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Sep-14	1	-0.5	0.018	-0.0155	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Dec-14	1	-0.5	0.018	-0.0146	0.005	-0.005	0.0075	-0.0075	0.002	-0.002
Mar-15	1	-0.5	0.018	-0.0135	0.005	0	0	0	0	0
Jun-15	1	-0.5	0.018	-0.0135	0.005	0	0	0	0	0
Sep-15	1	-0.5	0.018	-0.0135	0.005	0	0	0	0	0
Dec-15	1	-0.5	0.018	-0.0135	0.005	0	0	0	0	0

NT REGION: BASE SCENARIO ASSUMPTIONS						
	Unemployment Rate, ur (%)	*House Price, hp (£)*	*Earnings, y (£, weekly mean)*	*Mortgage Rate, arbm (/100)*	*No. of Mortgages, Nm (number)*	*Mortage Lending Stock, amwt (£mn)*
Dec-10	9.05	164277	563.20	0.0365	1665817	134323
Mar-11	9.13	163360	568.45	0.0365	1668632	134625
Jun-11	9.21	162443	573.70	0.0365	1671574	134923
Sep-11	9.29	161525	578.95	0.0367	1674647	135172
Dec-11	9.22	161548	584.82	0.0378	1677859	135441
Mar-12	9.14	161570	590.70	0.0388	1681215	135802
Jun-12	9.06	161592	596.57	0.0398	1684722	136370
Sep-12	8.98	161614	602.45	0.0408	1688387	137223
Dec-12	8.80	163288	608.56	0.0419	1692199	138338
Mar-13	8.62	164962	614.67	0.0454	1696189	139594
Jun-13	8.43	166635	620.79	0.0489	1700259	140947
Sep-13	8.25	168309	626.90	0.0525	1704388	142418
Dec-13	8.20	170243	633.28	0.056	1708561	143959
Mar-14	8.15	172178	639.66	0.057	1712765	145662
Jun-14	8.10	174112	646.04	0.0582	1717000	147561
Sep-14	8.05	176046	652.42	0.0593	1721267	149668
Dec-14	8.00	177863	659.05	0.0604	1725566	151988
Mar-15	7.95	179680	665.68	0.0613	1729895	154555
Jun-15	7.89	181497	672.31	0.0613	1734258	157259
Sep-15	7.84	183314	678.93	0.0613	1738652	160026
Dec-15	7.71	185152	685.83	0.0613	1743079	162851

Notes:

1. The assumptions of other scenarios and other regions are available on request.
2. The assumptions are based on *Oxford Economics* forecasts. We are grateful to Adrian Cooper of *Oxford Economics* for making these available.

ST REGION: BASE SCENARIO ASSUMPTIONS						
	Unemployment Rate, ur (%)	*House Price, hp (£)*	*Earnings, y (£, weekly mean)*	*Mortgage Rate, arbm (/100)*	*No. of Mortgages, Nm (number)*	*Mortgage Lending Stock, amwt (£mn)*
Dec-10	6.50	252551	670.27	0.0365	2941614	380072
Mar-11	6.57	251387	676.43	0.0365	2946585	380926
Jun-11	6.64	250224	682.59	0.0365	2951779	381769
Sep-11	6.71	249061	688.76	0.0367	2957205	382475
Dec-11	6.65	249814	695.96	0.0378	2962877	383238
Mar-12	6.60	250567	703.17	0.0388	2968803	384257
Jun-12	6.54	251321	710.38	0.0398	2974998	385865
Sep-12	6.48	252074	717.58	0.0408	2981469	388277
Dec-12	6.31	255076	725.27	0.0419	2988201	391434
Mar-13	6.14	258077	732.95	0.0454	2995246	394987
Jun-13	5.97	261079	740.63	0.0489	3002433	398814
Sep-13	5.80	264080	748.31	0.0525	3009725	402978
Dec-13	5.73	268074	756.35	0.056	3017094	407339
Mar-14	5.65	272067	764.38	0.057	3024517	412158
Jun-14	5.57	276060	772.42	0.0582	3031996	417531
Sep-14	5.50	280054	780.45	0.0593	3039531	423493
Dec-14	5.42	284071	788.76	0.0604	3047122	430058
Mar-15	5.34	288089	797.08	0.0613	3054766	437321
Jun-15	5.27	292107	805.39	0.0613	3062471	444971
Sep-15	5.19	296125	813.70	0.0613	3070231	452802
Dec-15	5.05	300137	822.25	0.0613	3078047	460795

Notes:

1. The assumptions of other scenarios and other regions are available on request.
2. The assumptions are based on *Oxford Economics* forecasts. We are grateful to Adrian Cooper of *Oxford Economics* for making these available.

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