ISER Working Paper Series

Staying together for the sake of the home? House price shocks and partnership dissolution in the UK

Helmut Rainer
School of Economics and Finance
University of St. Andrews

Ian Smith
School of Economics and Finance
University of St. Andrews

No. 2008-31
September 2008

INSTITUTE FOR SOCIAL & ECONOMIC RESEARCH

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

www.iser.essex.ac.uk

Non-technical Summary

This paper explores the importance of unanticipated house price shocks for marital breakdown in the UK using individual household data from the British Household Panel Survey (BHPS) and county-level house price data from the Halifax House Price Index (HHPI).

The economic literature on the causes of marital instability emphasizes that couples separate when the benefits of divorcing and possible remarrying outweigh the benefits from staying married. Changes in the risk of marital breakdown are caused by changes in these expected benefits.

Although previous studies have tested for the effect of financial surprises on marital stability, these have overlooked the importance of shocks arising from the housing market. Since housing is such a large part of wealth for most couples, sudden changes in house prices might be expected to affect marital stability. This is confirmed by our research, which can be summarized as follows.

First, the decision of owner-occupier couples to split-up is particularly responsive to unexpected decreases in house prices, and these negative shocks significantly increase the probability of marital breakdown. Second, the response to negative house price shocks differs for different types of people. Younger couples with relatively low income, high mortgage debt, and dependent children are especially vulnerable to the destabilizing effects of falling house prices. Finally, unexpected increases in house prices have no significant effect on family stability for owner-occupier couples, but they reduce the probability of splitting up for couples renting houses from the local authority.

From a practical viewpoint, the results of this paper suggest that downturns in the housing market can do sustained damage to family stability, an issue which is firmly recognized as a priority by policy-makers. Since unanticipated increases in house prices have no effect on family stability, while unanticipated decreases are destabilizing, this paper implies that policy-makers can reduce the risk of family breakdown by easing the impact of unexpected decreases in house prices. Well-designed policies that support families with low income and high debt (e.g., mortgage interest deductibility) may be the key to reducing the degree to which couples are affected by money lost on their homes.

Staying Together for the Sake of the Home? House Price Shocks and Partnership Dissolution in the UK*

Helmut Rainer†
School of Economics and Finance, University of St. Andrews
hr11@st-andrews.ac.uk

Ian Smith
School of Economics and Finance, University of St. Andrews
is@st-andrews.ac.uk

September 24, 2008

Abstract

This paper explores the importance of unanticipated house price shocks for marital dissolution in the UK using individual household data from the British Household Panel Survey (BHPS) and county-level house price data from the Halifax House Price Index (HHPI). Results suggest that positive and negative house price shocks have asymmetric effects on the probability of partnership dissolution. Negative house price shocks significantly increase the risk of partnership dissolution, while positive house price shocks do not have a significant effect in general. The destabilizing effect of negative house price shocks is particularly pronounced for couples with dependent children, low family income, and high mortgage debt. Results are robust to a wide variety of specifications.

Keywords: House Price Shocks, Marital Dissolution.

JEL Classifications: C23, D10, R31.

*The data used in this paper were made available through the UK Data Archive. The British Household Panel Survey (BHPS) data were originally collected by the Institute for Social and Economic Research at the University of Essex, funded by the ESRC. We are grateful to Andrew Henley for providing access to his county house price information and to Jack Kneeshaw at the Data Archive for supplying BHPS local authority district data. The usual disclaimer applies.

†Research Associate of the Institute for Social & Economic Research (ISER). Address for correspondence: School of Economics and Finance, University of St Andrews, St Salvator's College, St Andrews KY16 9AL, United Kingdom.

1. Introduction

The housing boom in the UK over the last decade has been blamed for many socio-economic problems. The perceived negative consequences of high house prices are manifold, from an increase in social inequality (Cheshire and Sheppard, 2004) to a reduction in labour mobility (Murphy et al., 2006) to a significant decline in hours of work (Henley, 2004). During the last UK house price boom, divorce became another social phenomenon suspected of being affected by rising property prices. Indeed, informal speculation in newspapers as varied as the *Telegraph* and *The Irish Times* suggested that high and rising property prices might act as a disincentive to divorce. One comment read:

> "Property prices are now so high that it is almost impossible for divorcing couples to fund two homes where one previously existed." (*The Irish Times,* December 7, 2005)

This argument hints at the possibility that rising house prices might help to keep couples together, as individuals recognize that, whatever problems they have in their relationship, the prospect of a divorce and the associated move down the property ladder is much worse. But additionally, and perhaps more importantly, it is also conceivable that couples who see the equity in their family homes dramatically rise perceive this as a "surprise increase" in the expected gains from remaining married to the same spouse. Theoretically, the risk of marital dissolution should decline as a result. Following the UK's recent housing market slump, a similar line of reasoning has been advanced that speculates about the impact of falling house prices on marriage:

> "High inflation and falling house prices put pressure on marriages and might thus contribute to higher divorce rates." (*The Economist,* July 24, 2008)

Taken together, these arguments would seem to be consistent with both rising house prices protecting partnerships and falling house prices destabilizing them.

However, even though changes in house prices feature prominently in recent informal thinking about divorce, evidence for their empirical importance is very limited. The core contribution of this study is to make the first attempt to measure the impact of house price shocks on partnership dissolution. The starting point for our analysis is the empirical literature on the determinants of marital instability, with Böheim and Ermisch (2001) and Walker and Zhu (2006) as the contributions most closely related to ours. Walker and Zhu (2006) study the determinants of partnership dissolution focusing on the role of child support. Böheim and Ermisch (2001) explore the impact of financial surprises on partnership dissolution using survey-based expectations

data. This paper emphasizes similar issues with regard to house price surprises. This is particularly relevant at the present time given the turbulence in housing markets that has been experienced in many countries. A key question is whether these developments have consequences for marital stability. An answer to this question would not only enhance our understanding of the economic determinants of marital breakdown, but is also policy-relevant, not least because marital dissolution inextricably jeopardizes the well-being of children.

This paper examines the impact of house price shocks on partnership dissolution using individual household data from the first fourteen waves of the British Household Panel Survey (BHPS) and county-level house price data from the Halifax House Price Index (HHPI). As anticipated changes in house prices may not induce changes in observed divorce behavior,[1] we compute year-on-year house price surprises as the residuals from a logarithmic second order auto-regression using HHPI house price data for 1991-2004 with fixed effects at the county level and time dummies. We then use the cumulated residuals to obtain for each household a county and year specific house price shock variable.

The paper has several interesting findings. The first key result from a partnership dissolution model for owner-occupier couples is a negative and statistically significant coefficient on the house price shock variable. This aggregate house price shock effect is consistent with both positive house price shocks reducing the probability that a partnership dissolves and negative shocks increasing it. In order to test whether the effects of positive and negative surprises are asymmetric, we decompose the aggregate house price shock variable according to its sign. Estimates suggest that the aggregate house price shock effect is mainly driven by negative house price shocks, which significantly increase the probability of partnership dissolution. Negative shocks are particularly destabilizing for young couples with low family income, high mortgage debt, and for those with dependent children. Positive shocks have the expected sign but are are not precisely estimated. These findings are robust to a wide variety of empirical specifications and estimates across sub-samples. The other precisely estimated coefficients are as expected: the risk of dissolution declines with duration and a woman's age at the beginning of the partnership; cohabitation substantially increases the risk of dissolution; the risk of divorce increases with the number of dependent children; finally, men's earnings reduce the divorce hazard.

The remainder of this paper is organized as follows. In the next section, we discuss the theoretical basis for our empirical analysis. Section three describes the data. Section four presents the results of a partnership dissolution model and checks for robustness. Section five provides some concluding remarks.

[1] As we shall discuss below, the theory of marital instability pioneered by Becker et al. (1977) emphasizes that the phenomenon of divorce can be explained by uncertainty and deviations between expected and realized outcomes.

2. Theoretical Issues and Empirical Specification

2.1. Theoretical Issues

In theory, how should unanticipated house price shocks affect divorce decisions? The theoretical literature on the causes of marital instability (Becker et al., 1977; Weiss and Willis, 1997) emphasizes that couples separate when the utility expected from remaining married falls below the utility expected from divorcing and possibly remarrying. What determines the risk of marital dissolution are unexpected changes in the circumstances governing these expected utilities. For example, an unanticipated increase in the expected utility from continued marriage might induce a couple who otherwise would have filed for divorce to stay together. A favourable shock to opportunities outside marriage, by the same token, might cause a couple who otherwise would have remained married to split up.

Against this theoretical background, our analysis begins with the observation that for a majority of married couples the most important asset of the marriage is the family home.[2] It follows immediately, therefore, that what happens to the value of this asset should be one of the main concerns of couples considering whether to remain married or divorce. We now discuss, in more specific terms, how positive and negative house price shocks might affect the probability that a partnership dissolves.

Becker et al. (1977) argued that positive shocks would in general destabilize marriages. However, there are many reasons why *positive* house price shocks might actually reduce the risk of partnership dissolution. First, the "financial accelerator" model (Bernanke et al., 1999a; Aoki et al., 2004) when applied to households suggests that positive house price shocks permit increases in household consumption through housing equity withdrawal as well as the prospect of moving up the property ladder through the provision of higher levels of collateral. Consequently, a positive house price shock and the opportunities it opens up might allow owner-occupier couples to avoid addressing difficulties in their relationship, which would have come to the fore in the absence of the positive shock. Second, there is the divorce affordability effect identified earlier in newspaper commentary. If house prices rise, it is more difficult for divorcing couples to buy two homes were one previously existed without excessively compromising lifestyles. As a result, the feasible levels of utilities that can achieved if couples divorce are reduced. This raises the gains from marriage over divorce and might thus contribute to a lower divorce risk. Yet the same factors might also make splitting up more attractive: rising property prices mean that selling the family home may provide more funds for two separate homes.

Consider next the effects of *negative* house price shocks on partnership dissolution.

[2] According to the Office for National Statistics, approximately two-thirds of all British households owned their own houses in 2001. Moreover, the value of housing represented more than 40% of total UK household wealth in 2001 (Aoki et al., 2004).

The first effect of negative house price shocks is to reduce directly the wealth of owner-occupier couples. As Becker et al. (1977) noted, couples with less property wealth would be expected to have smaller gains from marriage and consequently higher probabilities of divorce. Moreover, falling house prices would bring to a halt household consumption through equity withdrawal and reduce the prospect of moving up the the property ladder by cutting collateral. Thus an unanticipated fall in house prices and the lost opportunities it entails would reduce the gains from marriage over divorce and might therefore increase the probability of divorce. Couples are also at risk of plunging into negative equity if house prices fall. Negative equity, and other economic problems associated with falling house prices, might put pressure on marriages and therefore contribute to a higher divorce risk, as suggested in an earlier quote. However, negative house price shocks might also reduce the risk of partnership dissolution, with struggling couples choosing not to divorce because they would have less equity in their property to share upon separation. Indeed, selling the family home during a housing market downturn might not provide divorcing couples with sufficient funds for two separate homes. Alternatively, cheaper property in a buyers' market might facilitate dissolution.

Taken together, the theoretical issues listed above suggest that the effects of positive and negative house price shocks on partnership dissolution are a priori ambiguous and therefore an empirical issue.

2.2. Empirical Specification

Böheim and Ermisch (2001) investigate the impact of financial surprises on partnership dissolution risk using data from the first eight waves of the BHPS and estimate the relationship using a standard Probit model. As the probability of dissolution in period t is conditional on the union having survived up until period $t-1$, it is necessary to account for this prior survival probability. Following Jenkins (1995), Böheim and Ermisch point out that Probit estimation yields consistent parameter estimates if a total elapsed partnership duration variable and a vector of explanatory variables all measured at $t-1$ are included in the model. The specification is then equivalent to a discrete-time transition rate model for couple separation.

Böheim and Ermisch measure surprises using the response to a question on an individual's expectation of financial gain in the forthcoming year and their retrospective evaluation in the subsequent wave of whether their perceived financial situation had changed favourably or not. Restricting their sample to couples with dependent children and women aged less than sixty years, the main finding is that positive surprises reduce the dissolution risk. Negative surprises are found to be destabilizing but the coefficients of these dummy variables are statistically insignificant. This result is consistent with the empirical findings of Weiss and Willis (1997) on earnings shocks,

but contradicts earlier theorizing from Becker et al. (1977) that both positive and negative financial surprises adversely affect the divorce rate.

Despite the dominance of housing assets in the total wealth of most couples, it is rare to find housing variables included in divorce equations. Given the substantial volatility in the housing market over the past twenty years, surprises generated by house price variation might be expected to have an important impact on partnership stability. This paper proceeds by employing the same baseline specification and variable definitions reported in Böheim and Ermisch.[3] In addition to their financial surprise indicators, the model includes a vector of various partnership and household characteristics and labour market variables. They found their main results to be robust with respect to modelling selection into marriage, the inclusion of educational controls and the use of alternative measures of income. Our primary innovation is to augment Böheim and Ermisch's specification with a housing wealth shock while retaining their financial surprise variables. The impact of the asset price shock is permitted to vary with mortgage debt and income levels and to be asymmetric with respect to the effect of positive and negative shocks.

We restrict our attention initially to homeowners as house price shocks are expected to have their most powerful impact on owner occupiers. We do not constrain the sample in terms of partners' age or presence of children. Robustness checks are used to test the sensitivity of the results to sample restrictions.

3. Data Description

The study utilizes longitudinal data from the British Household Panel Survey (BHPS) over the 14 year period 1991 to 2004. The BHPS is a nationally representative longitudinal survey of around 5000 households containing approximately 10000 original sample members who are interviewed annually. The second wave of the BHPS collected lifetime histories of co-residential partnerships, providing data on the number of previous partnerships and the duration of those continuing relationships formed prior to the first wave. For our primary regressions, we select a subsample of households occupied by a couple who are owner occupiers, whether formally married or informally living together. The woman is selected as representative of each partnership. Thus variables referring to a partner designate men. These selection rules generate 16171 couple year observations in the sample for home owners, comprising data on 1996 couples of which 179 (8.97%) dissolve their partnership.[4]

[3] A table of descriptive statistics for the variables is provided in the appendix.

[4] By excluding renters from our main sample, we eliminate 3066 couple year observations for 530 couples of which 70 dissolve. As we will demonstrate below, the exclusion of renters from our main sample does not alter our qualitative insights. We will also discuss estimates from a partnership dissolution model for couples in rented property.

A natural approach to modelling house price shocks is to use the annual subjective estimates provided by respondents of the current value of their main residence. However, there are several problems with using this self-reported measure to derive estimates of equity windfall gains or losses. As Disney et al. (2007) correctly note, respondent estimates are contaminated by moving behaviour. However, even excluding from the sample those households that change address, the estimated housing value measure remains affected by investment in property improvements. Such investments are only partially measured by the BHPS questionnaire insofar as they are financed by borrowing.

Incomplete measurement generates a potential endogeneity problem with the housing value variable in a divorce equation. Large, unmeasured do-it-yourself home improvement projects not only affect the value of property but may also have an impact on the gains to marriage, either positively in terms of enhanced marital contentment or else negatively as a source of conflict. Thus divorce risk and housing value are jointly determined by unobserved housing investment. As a result, estimates of the effect of house price shocks may suffer from bias.

Our preferred approach to modelling house price shocks is to follow Disney et al. (2007) and use real annual average house prices for semi-detached properties from the Halifax House Price Index (HHPI) across 65 counties over the sample period. Implementing the same method as Disney et al. (2007), the county data are used to estimate a logarithmic second order house price auto-regression with time and county fixed effects. Alternative specifications of the autoregressive process are tested as a robustness check and these results are reported below. In all cases, house prices are deflated by the UK retail price index excluding mortgage interest payments (RPIX). The cumulated residuals from this $AR(2)$ equation are treated as a measure of the unanticipated component of changes in real house prices and account for 4.5% of the variation in real house prices at the county level.[5]

This residual-based measure of the house price shock should be interpreted as the deviation of house prices from trend. Theoretically, it is these unexpected gains or losses in house prices that are of interest, since it is shocks rather than anticipated changes in economic circumstances that destabilize marriage according to standard Beckerian theory. Econometrically, use of county house price data is likely to resolve the potential violation of exogeneity induced by measurement problems in subjective estimates of house valuations.

By construction, the residual based shock variable has an almost symmetric distribution. The mean value of the cumulated $AR(2)$ shock is close to zero at 0.069 with a standard deviation of 0.45. For the estimating sample, slightly more observations

[5] An alternative approach to constructing shocks is adopted by Campbell and Cocco (2007) who use an $MA(1)$ structure in the residuals in their investigation of the consumption effects of house price shocks.

on the shock variable are positive (8,153) than negative (8,018). This difference is an artefact of the matching of the annual county shock variable with the household panel data. As the BHPS uses local authority districts rather than county identifiers to record the geographical location of each household, the data are mapped from the 65 counties to the 278 local authority districts according to the location of each household by wave.[6] Using this method, we obtain for each household a county and year specific house price shock.

4. Estimation and Results

4.1. The Effects of House Price Shocks on Partnership Dissolution

Column (1) of Table 1 presents the results from the baseline specification of the partnership dissolution equation and column (2) decomposes the house price shock variable into positive and negative surprises. The key finding from the benchmark estimates in the first column is a negative coefficient on the lagged house price shock variable that is significant at the 5% level. The sign is consistent with both unanticipated positive house price changes protecting partnerships and negative shocks destabilizing them.

In order to test whether the effects of positive and negative surprises are asymmetric, two new variables are constructed that decompose the shock variable according to its sign. Following convention, the values of these variables are set to zero when the alternate shock occurs.[7] For ease of interpretation, negative shocks are converted to absolute values. The implication is that the coefficient estimate of the negative shock would be expected to have a positive sign if it destabilizes marriages, and negative otherwise. The results of the decomposition in column (2) show that the aggregate house price shock effect is driven chiefly by the adverse impact on partnership stability of negative surprises.[8] The positive shock has a negative sign but it is not well determined, though a Wald test for the equality of the shock coefficients in absolute terms cannot reject the null ($\chi^2(1) = 1.08$, $p = 0.298$).

The main innovation in the Böheim and Ermisch and paper was the construction of the financial surprise variables. Our results are consistent with the replication of Walker and Zhu (2006) who adopt Böheim and Ermisch's financial surprise equation as a baseline for their investigation of the impact of changes in child support

[6]We thank Andrew Henley for providing the data and the mapping from Halifax counties to BHPS local authority districts.

[7]The same procedure for constructing positive and negative shock variables is utilized in the macroeconomic literature on money supply shocks (see, e.g., Cover, 1992).

[8]Adding renters to the sample for owner occupiers makes little difference to the results. The estimated coefficient of the house price shock variable is -0.165 (0.040) and the coefficients of the positive and negative shocks are -0.062 (0.559) and 0.338 (0.026) respectively where p-values are in parentheses.

Table 1: Probit model of partnership dissolution for homeowners

	(1) Coefficient	(p-value)	(2) Coefficient	(p-value)
Partnership characteristics				
Cohabiting$_{t-1}$	0.720	(0.000)	0.722	(0.000)
Number of marriage if married$_{t-1}$	0.237	(0.014)	0.240	(0.012)
Age at start of partnership	-0.032	(0.001)	-0.033	(0.001)
Log duration of partnership$_{t-1}$	-0.388	(0.000)	-0.405	(0.000)
Partners from same ethnic group	-0.338	(0.069)	-0.336	(0.072)
Partners have same religion	-0.039	(0.614)	-0.039	(0.613)
Partners are not religious	0.119	(0.159)	0.114	(0.174)
Youngest child $<$ 5 years$_{t-1}$	-0.233	(0.010)	-0.231	(0.010)
Number of children$_{t-1}$	0.142	(0.000)	0.140	(0.000)
Partners have same education	0.027	(0.676)	0.030	(0.651)
Age difference				
Woman more than 5 years older	0.038	(0.849)	0.043	(0.831)
Woman 3 to 5 years older	0.118	(0.519)	0.116	(0.530)
Woman 0 to 3 years older	-0.161	(0.179)	-0.162	(0.178)
Partner 2 to 4 years older	-0.055	(0.517)	-0.054	(0.531)
Partner more than 4 years older	-0.002	(0.980)	-0.002	(0.984)
Labour market				
Labour income$_{t-1}$ ($\times 10^3$)	0.003	(0.593)	0.003	(0.620)
Partner's labour income$_{t-1}$ ($\times 10^3$)	-0.007	(0.044)	-0.007	(0.043)
Employed$_{t-1}$	0.087	(0.339)	0.087	(0.344)
Unemployed$_{t-1}$	0.159	(0.523)	0.155	(0.532)
Partner employed$_{t-1}$	0.210	(0.123)	0.209	(0.125)
Partner unemployed$_{t-1}$	0.280	(0.142)	0.285	(0.136)
Financial development				
Large positive surprise	-0.076	(0.788)	-0.073	(0.797)
Positive surprise	-0.055	(0.553)	-0.057	(0.535)
Negative surprise	0.120	(0.110)	0.121	(0.108)
Large negative surprise	0.405	(0.000)	0.406	(0.000)
House price shock$_{t-1}$	-0.173	(0.051)		
Positive house price shock$_{t-1}$			-0.081	(0.501)
Negative house price shock$_{t-1}$			0.325	(0.050)
Constant	-0.683	(0.081)	-0.661	(0.094)
N (couple-years)	16171		16171	
Wald χ^2 (df)	267.25 (26)		266.35 (27)	
Pseudo R^2	0.1189		0.1194	
Log-likelihood	-867.2		-866.7	

Notes: the construction of the house shock variables is described in the main text. The p-values are adjusted to allow for correlation of disturbances among the observations on each couple over time.

liabilities on dissolution risk. Just as reported here in Table 1, they find that it is negative surprises, especially large shocks, which are destabilizing for couples, with no significant partnership protection effect from positive surprises. Consistent with this pattern, our main result is that it is negative house price shocks that have a statistically significant impact on partnership dissolution. This is difficult to reconcile with the findings of Böheim and Ermisch for whom it is only positive surprises that matter.

The results for the control variables are similar to those reported by Böheim and Ermisch. Consider first those variables that are statistically significant. Consistent with standard theoretical explanations of Becker et al. (1977), dissolution risk declines with partnership duration and a woman's age at the formation of the relationship. As is well known, cohabiting relationships are less stable than marriage, and for married women the risk of divorce increases with the number of previous marriages. While the presence in the household of a child below the age of five years protects a relationship from breakdown, there is a positive association between dissolution probability and the number of dependent children. Conditional on employment, partnership dissolution risk is decreasing in a husband's earnings, but both the labour income of the wife and the employment status of the partners are statistically insignificant. Likewise, age differences or homogamy in terms of religion or education do not seem to matter for the partnership break up decision, though sharing the same ethnicity appears to be protective.

4.2. Population Heterogeneity

Given negative externalities often arise from partnership dissolution, there is strong public policy interest in regulating divorce and its consequences. In particular, it is of policy concern to know whether the partnerships of vulnerable socioeconomic groups are disproportionately harmed or advantaged by house price shocks. Heterogeneity in the impact of shocks is investigated with respect to differences in four potentially relevant household characteristics, namely: income; mortgage debt; presence of dependent children and age. Households are divided into high and low income categories according to whether they exceed the median value of earned income in each wave. The mortgage debt variable is computed as the ratio of outstanding housing loan to income and the sample median is used to allocate households to high and low debt sectors.[9] The boundary between young and old age categories is defined at the sample median age for owner occupiers of 48 years. To examine whether the sensitivity of partnership dissolution to house price shocks depends on these characteristics, the shocks are interacted with dummy variables for each category.

[9] As the median debt-income ratio varies little across BHPS waves, it makes no material difference to the results whether the median is calculated by wave or for the sample as a whole.

Table 2: Interactions with house price shocks

	(1) Coefficient (p-value)		(2) Coefficient (p-value)	
A. Family income				
House price shock*high family income	-0.193	(0.071)		
Positive shock			-0.148	(0.308)
Negative shock			0.271	(0.189)
House price shock*low family income	-0.135	(0.401)		
Positive shock			0.050	(0.787)
Negative shock			0.416	(0.080)
B. Mortgage debt				
House price shock*low mortgage debt	-0.167	(0.174)		
Positive shock			-0.233	(0.307)
Negative shock			0.089	(0.704)
House price shock*high mortgage debt	-0.164	(0.218)		
Positive shock			0.014	(0.918)
Negative shock			0.494	(0.020)
C. Children				
House price shock*no dependent children	-0.085	(0.494)		
Positive shock			-0.049	(0.776)
Negative shock			0.153	(0.523)
House price shock*dependent children	-0.241	(0.051)		
Positive shock			-0.111	(0.459)
Negative shock			0.421	(0.051)
D. Age				
House price shock*old owner	-0.211	(0.113)		
Positive shock			-0.310	(0.189)
Negative shock			0.069	(0.820)
House price shock*young owner	-0.158	(0.164)		
Positive shock			-0.009	(0.945)
Negative shock			0.409	(0.032)

Notes: the construction of the house shock variables is described in the main text. All variables employed in interaction terms are measured at $t-1$. All 8 equations include the explanatory variables specified in Table 1. The p-values are adjusted to allow for correlation of disturbances among the observations on each couple over time. $N = 16171$ in all cases except for the mortgage debt equations where $N = 12950$.

Table 3: Alternative house price shock specifications

	(1) AR(1)	(2) AR(2)	(3) Cumulative AR(1)	(4) Cumulative AR(2)
House price shock$_{t-1}$	-0.621	-0.607	-0.154	-0.173
	(0.113)	(0.106)	(0.081)	(0.051)
Positive house price shock$_{t-1}$	-0.049	-0.008	-0.069	-0.081
	(0.932)	(0.988)	(0.569)	(0.501)
Negative house price shock$_{t-1}$	1.348	1.394	0.304	0.325
	(0.077)	(0.060)	(0.085)	(0.050)

Notes: the construction of the house shock variables is described in the main text. The 8 regressions include the explanatory variables specified in Table 1. p-values in parentheses below the estimated coefficients.

The first column of Table 2 presents the results from estimating four equations, one for each household characteristic, showing the interactions between the house price shock and dummy variables by category. The second column provides further decomposition by dividing each interaction into its positive and negative shock components. As before, none of the positive house price shocks are well determined. It is the negative shocks that are most powerful and statistically significant. In particular, negative shocks are destabilizing for couples with below median family income, above the median housing debt, and for those with dependent children and the relatively young. It is those couples experiencing the most financial stress on the family budget whose relationships are the most fragile in the face of negative house price shocks. The fact that it is families in relatively poor, young and indebted households which are most vulnerable to breaking down in the face of negative housing market shocks, clearly has consequences both for demands on welfare expenditures and the social well-being of the disadvantaged.

4.3. Robustness of Results

As there may be error in the measurement of the house price shocks (Disney et al., 2006), Table 3 reports alternative specifications of this price shock in the partnership dissolution equation as a robustness check. For comparative purposes, the fourth column repeats the results from the baseline specification using the cumulative residuals from an $AR(2)$ logarithmic county house price regression. Column (3) lists the estimates using the cumulative residuals from an $AR(1)$ specification. The first two columns presents the results for the case in which the residuals are not cumulated over time. In general, these alternative shock measures turn out to be close substitutes. In all cases, the negative house price shock is significant below the 10% level whereas

Table 4: Alternative sample restrictions

	(1) Dependent children	(2) Aged less than 60	(3) Married couples
House price shock$_{t-1}$	-0.235	-0.168	-0.177
	(0.042)	(0.068)	(0.060)
Positive house price shock$_{t-1}$	-0.179	-0.079	-0.063
	(0.264)	(0.527)	(0.613)
Negative house price shock$_{t-1}$	0.315	0.314	0.359
	(0.161)	(0.070)	(0.036)
N (couple-years)	6479	12351	15643

Notes: the construction of the house shock variables is described in the main text. The 6 regressions include the explanatory variables specified in Table 1. p-values in parentheses below the estimated coefficients.

the positive shock is consistently badly determined. In unreported regressions, we also estimated specifications that additionally included fitted values from the autoregressive county house price equation as a measure of *anticipated* house price changes. Consistent with Becker et al.'s (1977) theory of marital instability, this variable never attained statistical significance.

Table 4 provides estimates for the house price shock parameters of the baseline partnership dissolution model using three alternative sub-samples. As before, two equations are presented for each sub-sample, both with and without the decomposition into positive and negative shocks.

First, in column (1) the equation is re-estimated with the sample restricted to those women with dependent children. Despite this constraint imposing a loss of 60% of our observations, the estimates are materially similar to those for the full sample, though the unreported standard error of the negative shock is now much larger and the variable loses statistical significance as a result. Column (2) lists estimates for partnership dissolution when the sample is constrained to individuals under the age of sixty and column (3) reports the results for married couples alone. In both cases, the outcomes remain very similar to the baseline specification both for the aggregate house price shock and its decomposition.[10] Specifically, the asymmetry of the effect of unanticipated real house price gains and losses remains.

[10]We also estimated a sub-sample equation for homeowning cohabitants. However, in this case, there are only 476 observations and the estimates are poorly determined. The results are available from the authors on request.

4.4. Do Positive House Price Shocks Matter at All? The Case of Renters

Thus far, the sample has been constrained to model the impact of house price shocks on homeowners, with renters excluded. Nevertheless, it is possible that there are spillover effects of these shocks on couples in rented property, though the mechanisms are likely to differ markedly between the public and private rental sectors.

For private tenants, unanticipated increases (decreases) in house prices could be perceived as damaging (improving) their prospects of climbing on to the property ladder, and thereby diminishing (augmenting) their marital gains. In other words, house price shocks could have the opposite effects on private renters as to those on owner occupiers.

For tenants in public housing, the Conservative government's privatization policy affected housing market prospects very powerfully. Following the Housing Act of 1980, secure tenants in local authority (council) housing received the right to buy their property at heavily discounted prices. Initially, those resident in council housing for at least three years were entitled to a discount of between 33%-50% on the market value depending on length of tenancy. In 1984, the minimum residency requirement was reduced to two years and the maximum discount increased to 60%, though the magnitude of discounts was capped in cash terms (Wilcox, 2007).[11] Effectively, the right to buy scheme provides tenants with an option that generally increases in value as house prices rise. If the gains from marriage are increasing in the value of this option, then positive (negative) shocks to house prices should strengthen (weaken) marriages for renters in the local authority sector.[12]

Table 5 presents sub-sample partnership dissolution estimates for renters in both the public and private sectors. In terms of the signs of the coefficients of the house price shock, the asymmetry between the two sectors is clearly apparent. Positive surprises stabilize partnerships for tenants in local authority housing but destabilize in the case of private renters. Negative surprises have the opposite signs, consistent with the proposed theoretical mechanisms. However, it is only the positive shock for council house tenants which is statistically significant. When house prices escalated faster than anticipated, this unexpectedly enhanced the value of the right to buy in most cases, reducing the divorce risk. The right to buy policy then had the unintended

[11]The cash cap for discounts was set at £25,000 in 1980, £35,000 in 1987 and £50,000 in 1989 for England and Wales. These were reduced in 1999 and varied by region. There were no maximum cash limits for discounts in Scotland. Note that from 1986, discounts for flats were greater than for houses, ranging between 44%-70% (Wilcox, 2007).

[12]Housing association renters are treated as belonging to the private rental sector. Although right to buy policies initially applied to some housing associations, this was only the case for those that were not registered charities. Importantly, government policy changed in 1989 to exclude new housing association tenants from the scheme. Given that the household panel dates from 1991, it is unlikely that many of our housing association renters retained a right to buy.

Table 5: Renters

	(1) Local authority renting	(2) Private renting
House price shock$_{t-1}$	-0.840	0.249
	(0.006)	(0.238)
Positive house price shock$_{t-1}$	-1.258	0.294
	(0.035)	(0.266)
Negative house price shock$_{t-1}$	0.661	-0.054
	(0.171)	(0.934)
N (couple-years)	1872	1148

Notes: the construction of the house shock variables is described in the main text. The 4 regressions include the explanatory variables specified in Table 1. p-values in parentheses below the estimated coefficients.

consequence of protecting partnerships against dissolution.[13]

For private renters, the statistical insignificance of the shock variables at conventional levels indicates that they are relatively unaffected by spillovers from surprise house price variations. Still, the signs and relative magnitudes of the coefficients support the hypothesis that unexpected setbacks to prospects of climbing on the property ladder tend to destabilize the partnerships of private renters.

5. Conclusion

This paper investigates a novel hypothesis regarding the impact of house price shocks on partnership dissolution. Although previous studies have tested for the effect of financial surprises, these have overlooked the importance of shocks arising from the housing market. Since housing is the dominant component of wealth for most owner occupiers, partnership stability is unlikely to be insensitive to real house price surprises. Our results show that the partnership dissolution decision of owner-occupier couples is particularly responsive to unanticipated adverse real house price movements compared to unexpected gains. In addition to this asymmetry, there is considerable heterogeneity in the response to negative shocks. Younger couples with relatively low income, high household debt, and dependent children are especially vulnerable to the destabilizing effects of negative house price surprises. By contrast, for couples renting houses from the local authority, it is positive house price shocks that mat-

[13]Given that right to buy discounts became less generous from 1999 under the Labour government, the local authority equations were re-estimated including terms that interacted the shock variables with a dummy set to one for the post 1999 period. However, these interaction dummies were always highly statistically insignificant.

ter, and these reduce the probability of partnership dissolution. These results have implications for both theorists and policy-makers.

With regard to theory, there is scope for constructing formal models to identify the nature and relative importance of the mechanisms through which house price shocks affect marital stability. There are several channels that we consider plausible candidates.

First, house price surprises are known to affect consumption decisions, either through direct effects on perceived wealth or through their impact on borrowing constraints (Campbell and Cocco, 2007). Interestingly, the evidence presented in US studies (Skinner, 1996; Engelhardt, 1996) demonstrates that negative house price shocks have a larger and more important effect on household consumption than positive house price shocks. Insofar as unexpected changes in consumption possibilities induce a revised assessment of marital gains, this body of evidence could help explain our finding that positive and negative house price shocks have asymmetric effects on the probability of partnership dissolution.

Second, house price surprises affect future prospects on the property ladder. That is, unanticipated price changes can shape a couple's evaluation of their likely opportunities in the housing market. Insofar as either shattered housing dreams or equity windfall gains affect the value of a partnership, such shocks will influence the dissolution risk. An important competing effect arises from the impact of house price surprises on divorce payoffs. To the extent that the house price shock changes the perceived affordability on the housing market of dissolving a relationship and forming two households, marital stability will again be affected.

With regard to policy, the past few decades have witnessed the emergence of major boom-bust cycles in the prices of various assets (e.g., equities, commercial real estate, residential housing) in a number of industrialized countries. Associated with the "bust" part of these cycles were in many cases significant contractions in real economic activity (Bernanke and Gertler, 1999b). The results of this paper suggest that house price crashes can also do sustained damage to family stability, an issue which is firmly recognized as a priority by policy-makers. Since unanticipated increases in house prices have no effect on family stability for owner occupiers, while unanticipated decreases are destabilizing, this paper implies that policy-makers can reduce the risk of family breakdown by preventing or reducing the average size of unexpected decreases in house prices, i.e., by reducing the variance of the distribution of unanticipated changes in house prices (Becker et al., 1977). As the broad aim of monetary policy is to stabilize expected inflation, it would seem that monetary policy is not an appropriate tool to combat the potentially damaging socio-economic effects of busts in house prices. Well-designed micro policies that support families with low income and high debt (e.g., mortgage interest deductibility, council tax rebates) may be the key to reducing the degree to which couples are affected by money lost on

their homes.

References

[1] Aoki, K., Proudman, J. and Vlieghe, G. (2004). 'House Prices, consumption, and monetary policy: a financial accelerator approach', *Journal of Financial Intermediation*, Vol. 13, pp. 414–435.

[2] Becker, G., Landes, E. and Michael, R. (1977). 'An economic analysis of marital instability', *Journal of Political Economy,* Vol. 85, pp. 1141–1187.

[3] Bernanke, B., Gertler, M. and Gilchrist, S. (1999a). 'The financial accerlerator in a quantitative business cycle framework', in Taylor, J. and Woodford, M. (eds.), *Handbook of Macoeconomics*, North-Holland.

[4] Bernanke, B. and Gertler, M. (1999b). 'Monetary Policy and Asset Price Volatility', *Federal Reserve Bank of Kansas City Economic Review*, Vo. 84, pp. 17–52.

[5] Böheim, R. and Ermisch, J. (2001). 'Partnership dissolution in the UK - the rôle of economic circumstances', *Oxford Bulletin of Economics and Statistics,* Vol. 63, pp. 197–208.

[6] Campbell, J.Y. and Cocco, J.F. (2007). 'How do house prices affect consumption? Evidence from micro data', *Journal of Monetary Economics*, Vol. 54, pp. 591 – 621.

[7] Cheshire, P. and Sheppard, S. (2004). 'Introduction to feature: the price of access to better neighbourhoods', *Economic Journal*, Vol. 114, pp. F391–F396.

[8] Cover, J.P. (1992). 'Asymmetric effects of positive and negative money supply shocks', *Quarterly Journal of Economics*, Vol. 107, pp. 1261–1282.

[9] Disney, R., Bridges, S. and Gathergood, J. (2006). 'Housing wealth and household indebtedness: is there a household 'financial accelerator'?', Czech National Bank, Working Paper No. 12/2006.

[10] Disney, R., Gathergood, J. and Henley, A. (2007). 'House price shocks, negative equity and household consumption in UK', Unpublished Manuscript, University of Nottingham, Centre for Policy Evaluation.

[11] Engelhardt, G.V. (1996). 'House prices and home owner saving behavior', *Regional Science and Urban Economics*, Vol. 26, pp. 313–336.

[12] Henley, A. (2004). 'House price shocks, windfall gains and hours of work: British evidence,' *Oxford Bulletin of Economics and Statistics,* Vol. 66, pp. 439–456.

[13] Jenkins, S. P. (1995). 'Easy estimation methods for discrete time duration models', *Oxford Bulletin of Economics and Statistics,* Vol. 57, pp. 129–138.

[14] Murphy, A., Muellbauer, J. and Cameron, G. (2006). 'Housing market dynamics and regional migration in Britain', Centre for Economic Policy Research, Discussion Paper No. 5832.

[15] Skinner, J. (1996). 'Is housing wealth a sideshow?', in Wise, D. (ed.), *Advances in the Economics of Aging*, Chicago University Press.

[16] Walker, I. and Zhu, Y. (2006). 'Child support and partnership dissolution', *Economic Journal*, Vol. 116, pp. C93-C109.

[17] Weiss, Y. and Willis, R. J. (1997). 'Match quality, new information, and marital dissolution', *Journal of Labor Economics,* Vol. 15, pp. S293–S329.

[18] Wilcox, S. (2007). *UK Housing Review 2006/2007*, Chartered Institute of Housing, London.

Appendix

Means (Standard Deviations) of Explanatory Variables by Partnership Outcome

	(1) Continuing		(2) Dissolving	
Partnership characteristics				
Cohabiting$_{t-1}$	0.031	(0.173)	0.179	(0.384)
Number of marriage if married$_{t-1}$	1.070	(0.393)	0.972	(0.555)
Age at start of partnership	24.196	(5.866)	23.341	(5.434)
Log duration of partnership$_{t-1}$	3.095	(0.626)	2.538	(0.664)
Partners from same ethnic group	0.990	(0.100)	0.972	(0.165)
Partners have same religion	0.578	(0.494)	0.587	(0.494)
Partners are not religious	0.202	(0.402)	0.341	(0.475)
Youngest child $<$ 5 years$_{t-1}$	0.138	(0.345)	0.223	(0.418)
Number of children$_{t-1}$	0.724	(1.014)	1.251	(1.151)
Partners have same education	0.387	(0.487)	0.352	(0.479)
Age difference				
Woman more than 5 years older	0.028	(0.166)	0.034	(0.180)
Woman 3 to 5 years older	0.025	(0.155)	0.039	(0.194)
Woman 0 to 3 years older	0.128	(0.334)	0.078	(0.269)
Partner 2 to 4 years older	0.198	(0.399)	0.168	(0.375)
Partner more than 4 years older	0.220	(0.414)	0.263	(0.441)
Labour market				
Labour income$_{t-1}$	5430.672	(7067.019)	7106.443	(9226.310)
Partner's labour income$_{t-1}$	13189.66	(13994.13)	14527.030	(9642.727)
Employed$_{t-1}$	0.596	(0.491)	0.765	(0.425)
Unemployed$_{t-1}$	0.010	(0.101)	0.022	(0.148)
Partner employed$_{t-1}$	0.712	(0.453)	0.894	(0.309)
Partner unemployed$_{t-1}$	0.019	(0.137)	0.045	(0.207)
Financial development				
Large positive surprise	0.015	(0.121)	0.011	(0.105)
Positive surprise	0.165	(0.371)	0.134	(0.341)
Negative surprise	0.209	(0.407)	0.274	(0.447)
Large negative surprise	0.034	(0.182)	0.112	(0.316)
House price shock$_{t-1}$	0.070	(0.452)	-0.014	(0.357)
Positive house price shock$_{t-1}$	0.372	(0.418)	0.248	(0.313)
Negative house price shock$_{t-1}$	0.238	(0.214)	0.236	(0.214)
N (couple-years)	15992		179	