Housing Studies, Vol. 16, No. 2, 179–198, 2001

Determinants of Mortgage Protection Insurance Take-up

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[Paper first received June 1999; in final form October 1999]

ABSTRACT *The aim of this paper is to identify the factors which affect the take-up of Mortgage Payment Protection Insurance (MPPI), to estimate the sensitivity of take-up to changes in determinants. The paper finds that: (1) MPPI premiums have a negative but marginal effect on take-up; (2) the probability of being unemployed has a positive effect: a 10 per cent rise in the probability resulting in a 3 per cent increase in take-up; (3) the local male unemployment rate has a positive effect on take-up (around 1 per cent increase in take-up for every 10 per cent rise in the male unemployment rate); (4) there is likely to be a pro-cyclical element in the take-up rate, but the variation is substantially damped compared with the volatility of the unemployment cycle; and (5) ISMI cover was found to have a negligible negative effect on take-up (a 10 per cent fall in ISMI would cause a 0.3 per cent rise in take-up), an effect that could not be statistically distinguished from zero.*

KEY WORDS: insurance, mortgages, crowding out

Introduction

This paper uses data from the Scottish House Condition Survey (SHCS) and Family Resources Survey (FRS) to identify the factors which affect the decision by mortgage borrowers to take out Mortgage Payment Protection Insurance (MPPI). MPPI policies are private insurance products, designed to protect mortgage borrowers against the risks of accident, sickness or unemployment. In the event of any of these adverse outcomes, the insurer is committed to cover the borrowers' monthly mortgage payments for up to 12 months. These policies have gained political significance following the decision of the Conservative Government to promote MPPI. This strategy has been continued by the current government, demonstrated by the recently announced public/private partnership to improve information about mortgage risks and MPPI, and to ensure minimum standards for MPPI policies (Armstrong, 1999; CML and ABI, 1999). The most radical component of the strategy to encourage private mortgage protection has been to diminish Income Support for Mortgage Interest (ISMI)—the welfare safety net for mortgage borrowers who become entitled to Income Support through illness or unemployment. ISMI was thought to be holding back ('crowding out') the take-up of MPPI and so in 1995 the period of nil payment of ISMI was increased to 39 weeks.

0267-3037 Print/1466-1810 On-line/01/020179–20 © 2001 Taylor & Francis Ltd
DOI: 10.1080/02673030120038474

This paper tests whether changes to ISMI have any effect on MPPI take-up, and also examines the effect of variations in local male unemployment rates, premiums and savings. The paper begins by outlining the importance of each of these factors, and then discusses the theoretical foundations of the empirical estimation. Details of the empirical methodology are then provided, followed by the results and conclusion.

Crowding Out, Premiums and Unemployment

The Importance of the Crowding Out Debate

One of the main arguments for state provision of a particular good or service is that, left to market forces, the product would be inadequately provided or prohibitively expensive. If it can be shown that market allocation would be at least as comprehensive and efficient as state provision, then the case for public provision is substantially weakened. The 'crowding out' argument asserts that, for goods which *can* be adequately provided by the market, provision by the state will merely displace, rather than supplement, private provision. Such arguments are usually employed to support the reduction of public expenditure on a particular good or service with a view to stimulating the private sector.

It is this argument which has been applied to the mortgage insurance sector and used to justify the radical changes to ISMI in 1995. ISMI was thought to be 'crowding out' MPPI, and so the policy of increasing the period of nil payment—widening the 'ISMI gap'—was anticipated to have a substantial positive effect on the demand for private mortgage insurance. The ISMI modifications would also affect MPPI supply, jump-starting the insurance market into providing new and innovative insurance products to meet the needs of mortgagors caught in the 39-week 'ISMI gap'. It was even thought that the new ISMI rules would actually reduce arrears and repossessions (Oldham & Kemp, 1996, p. 44). By weakening the crowding out effect of ISMI, mortgage borrowers would enthusiastically embrace private insurance cover. Sceptics argued that take-up would be unresponsive to changes in the benefits system, and that the real motive for the ISMI cut-backs was simply to reduce public expenditure.

But whether the motivation was ulterior, or as stated, is of less importance than whether the crowding out thesis is valid, and as such the hypothesis needs to be given serious consideration. That the issue of adequate safety nets for mortgage borrowers is still worthy of political priority is confirmed by the apparent 'ratchet-effect' in repossession rates since the early 1980s observed by Pryce & Keoghan (1999). Industry changes, such as the introduction of flexible mortgages, appear to have had little positive impact. Take-up of flexible mortgages has been low, with many lenders viewing such products as too financially complex and expensive to become mainstream. Existing products seem to be more suited to the professional self-employed, rather than the low income contract worker and so flexible mortgages will probably remain a niche product for some time to come. The validity of the crowding-out will continue to be an important issue for housing policy. For if the thesis holds true, retrenchment of the welfare system may well be the optimal strategy for reducing repossession rates.

It could be argued that, for those who have paid their premiums, private insurance offers considerably more comprehensive cover in the event of a valid claim than even the pre-October 1995 ISMI system, with full mortgage costs

usually being covered for up to 12 months. Even with full and immediate ISMI payments, many borrowers would find it very difficult to avoid mortgage arrears following redundancy, particularly where interest payments cover only a small proportion of total mortgage costs. Moreover, given that the purchase of a house implies the accumulation of purely private wealth, and that this purchase has already been long subsidised through Mortgage Interest Tax Relief and the absence of capital gains tax, is it so unreasonable for the state to step back from insuring the mortgagor against repayment problems? Certainly no other private purchase receives this kind of government indemnity. Thus, if widespread take-up of MPPI could be achieved through reducing ISMI, the October 1995 widening of the welfare gap could be viewed as appropriate if not inevitable. Indeed, further reductions in ISMI may be required to encourage the purchase of MPPI, particularly by those most at risk.

However, there are a number of arguments against eroding ISMI provision. First, to say that MPPI offers more comprehensive cover than ISMI is misleading, for although MPPI covers capital as well as interest payments, for many borrowers the difference is small. In addition, many of the risks covered by ISMI are not covered by MPPI (such as job loss due to long-standing health problems); and payments of ISMI can continue indefinitely, unlike MPPI cover which has fixed duration. It should also be noted that Kempson *et al.* (1999) found that more than half of those in receipt of ISMI were not in arrears.

Second, authors such as Jenkinson (1992) have argued that housing is a unique good, comprising the largest single component of household expenditure and having an unparalleled role in providing security and social structure to individuals and households. Housing has a role in shaping our lives and communities which other goods do not have, and very often is complementary, if not essential, to the consumption of many other goods and services (most would agree that on a rainy day the enjoyment of carpets, curtains, furniture, furnishings, toasters and televisions is significantly enhanced if consumed within the shelter and warmth of a house). Moreover, well-maintained dwellings and gardens benefit everyone in the community, not just the owner occupier (the 'positive externality' argument). As such, housing and its consumption, though essentially a private purchase, justify public subsidy and support, particularly when subject to the volatility of the market system. Unless MPPI could be guaranteed to prevent arrears and repossession (an assumption questioned by Ford *et al.*, 1995, pp. 60–61), and unless this protection could be ensured for all mortgagors (100 per cent take-up), then some form of public intervention is essential.

A further argument against widening the ISMI gap arises from doubts over the responsiveness of MPPI take-up to changes in the benefits system, and hence over the crowding out argument itself. If MPPI take-up is in fact unaffected by changes to the safety net for mortgage borrowers, cut-backs in ISMI would be not only unjustified, but would also exacerbate the repossessions problem.

Prima facie, it would appear that the crowding-out hypothesis can be rejected simply on the basis of observing events which have unfolded since 1995. Despite the substantial changes, MPPI take-up stands at less than one in three mortgagors (see Pryce & Keoghan, 1999). However, the inertia of take-up rates may not in themselves disprove the crowding-out hypothesis since the sluggishness may simply be the result of contemporaneous movements in other determinants. Falling unemployment since 1995 may have counteracted the effect of state

cut-backs. In order to isolate the crowding out effect, it would be necessary to model the insurance decision in a way which could simulate the effect of reducing ISMI cover whilst controlling for other determinants. Equally, to identify the responsiveness of take-up to changes in unemployment, one would have to control for variations in ISMI entitlement. This is the rationale behind the employment of the logistic regression techniques presented below which in principle make it possible to decipher the effects of different determinants. If, by controlling for unemployment and other affects, the take-up of MPPI can be shown to be sensitive to changes in ISMI, then the crowding out hypothesis will be validated. If not, the controversial conjecture can be laid to rest.

Empirical estimation of this kind is important because it is difficult to assess the strength of the crowding out thesis on purely theoretical grounds. One of the strongest arguments against it (recently put forward by Chiu & Karni, 1998) is that in most countries there was no private unemployment insurance on offer prior to the introduction of public provision. This suggests that "other, more fundamental, reasons explain the universal absence of private unemployment insurance" (p. 807). A number of authors (Chiu & Karni, 1998; Pryce & Keoghan, 1999; Walker *et al*., 1995) suggest that there may be constraints on the growth of products such as MPPI due to the nature of the product. The summary argument is that in order for MPPI policies to be profitable they have to include extensive exclusion clauses and relatively expensive premiums. The corollary is that there will always be a large element of the mortgagor population who either face risks not covered by MPPI clauses (such as long-term health problems and unstable employment), or who feel they cannot afford MPPI. Consequently, changes in ISMI and in the benefits system will have little effect on MPPI take-up, particularly if the take-up rate is close to its maximum (i.e. if the great majority of those who are ever likely to purchase MPPI have already done so).

That so many MPPI claims are unsuccessful further undermines the potential of MPPI to become a popular product. Quilgars (1999, p. 23) notes that: "information from insurers suggests around a third of all claims are rejected". Reports such as these have undermined the reputation of MPPI as a quality product and highlight the problem that policies may not be covering some of the most important risks faced by borrowers (in particular, MPPI does not cover either relationship breakdown or significant reductions in earnings). The recently announced partnership between the government and the mortgage industry (Armstrong, 1999; CML and ABI, 1999) has attempted to rectify this deficiency by establishing a baseline product, although it is questionable whether the minimum standards have been set high enough to make much of a difference (Blake, 1999; Gumpel, 1999; Pryce & Keoghan, 1999).

Another factor which may weaken the crowding-out effect is the eligibility criteria for ISMI entitlement. In order to qualify for ISMI, mortgage borrowers have to be entitled to Income Support. Many households, however, are ineligible even in the event of the head of household being made redundant because of savings over £3000 or income from a second earner. Additionally, there is considerable ignorance and confusion amongst borrowers regarding the amount of ISMI they would receive in the event of unemployment or ill health (Ford & Kempson, 1997). Together, these factors suggest that the impact of ISMI modifications on the take-up of MPPI are likely to be minimal.

The Importance of Sensitivity to Price

One possible cause of the sluggishness in the take-up of MPPI is the price. To some extent, this appears to be supported by the Burchardt & Hills (1997a, 1997b, 1998) finding that the MPPI fair odds premium—the premium needed to cover claims—was less than two-thirds of the average premium actually being charged by insurers at the time. The calculation did not, however, take into account administrative costs, which could account for a substantial proportion of the apparent mark-up. Even if premiums could be reduced, there would be no guarantee that take-up rates would increase greatly. Consumers may simply be insensitive to changes in price. Their purchase decision may be driven by other criteria, such as whether MPPI covers the most important risks they face, and their perception of, and response to, risk generally.

The sensitivity of take-up to price is of considerable importance to both insurers and policy-makers since it will determine what is the most effective marketing strategy—whether to sell on price or quality—and will indicate the extent to which take-up can be boosted by encouraging greater competition in the insurance industry. Given the importance of this parameter, it is surprising that relatively little work has been done to estimate it. Although Ford & Kempson (1997) present a model of the odds of take-up of mortgage insurance, this model is preliminary and *ad hoc*, and does not constitute an attempt to construct a theoretically consistent model of MPPI take-up. (It is effectively a reduced form of the simultaneous interaction of demand and supply, where it is difficult to identify the underlying structural form being tested, and impossible to calculate take-up elasticities with respect to changes in ISMI; it also omits any attempt to model the Income Support and ISMI benefits system, which are essential to estimating the impact of ISMI changes.) The only estimate, other than the one presented here, therefore, is by Pryce (1998b), which found take-up to rise by around 5 per cent for every 10 per cent fall in premium. This could not be construed as a high level of sensitivity, though it was noticeably greater than the estimated responsiveness to other variables.

The Importance of Sensitivity to Unemployment

Particularly pertinent to the debate over whether MPPI is suitable as a long-term alternative to ISMI, is the responsiveness of take-up to unemployment cycles. If take-up is strongly pro-cyclical, with mortgagors only purchasing insurance when unemployment rates are high, and terminating policies when unemployment rates are low, then there will be dynamic adverse selection. This violates one of the criteria of a profitable insurance product: that risks are either independent or that 'bad times' can be subsidised by 'good'. Insurance companies can attempt to respond to cyclical changes in unemployment risk by raising the premium during recessions, although this may simply have the effect of screening out low risk policy holders.

There may, however, be mitigating factors which dampen the cyclical connection of MPPI take-up to unemployment. In particular, unemployment rates are not easily predicted. Most consumers know when the economy is starting to go into recession (to some extent it is a self-fulfilling prophecy, driven by consumer confidence and expectations). However, they are unlikely to know just how much unemployment rates are likely to rise, and even less likely to predict the

precise effect on local unemployment. Even if a mortgagor does have perfect knowledge of how the anticipated recession will effect the local rate of unemployment, it will be difficult for him/her to gauge how this will feed through to his/her own probability of job loss. Indeed, for many, unemployment risk is independent of local unemployment rates, because their employer's profits are driven by national, or even international, demand.

The paper now goes on develop a model that will allow us to estimate the sensitivity of MPPI take-up to changes in unemployment, and to changes in premiums and ISMI. It also aims to simulate the effect of cyclical variations in unemployment on MPPI take-up.

Theoretical Foundations

There is very little theoretical work on the take-up of mortgage protection insurance, other than that of Pryce (1998b). Given the lack of alternatives, Pryce's work was chosen as the theoretical basis of the model, although a less formal approach to the estimation procedure was adopted.

Pryce's model characterises the mortgagor decision to take-out MPPI in terms of a consumer facing three possible states of the world: (1) he/she retains his/her existing job and stays in good health; (2) loses his/her job but quickly finds another and remains in good health; (3) loses his/her job through redundancy or ill-health and does not return to work within the given time horizon.

It is assumed that each of these possible outcomes has an associated probability (as perceived by the mortgagor) and an associated level of financial benefit/cost. The interaction of these perceived probabilities with their financial implications determine whether or not a consumer takes out MPPI. Because different households have different probabilities and dissimilar financial resources associated with each possible outcome, there will be a spectrum in the likelihood of taking out MPPI across mortgagors.

For example, some mortgagors will perceive their probability of unemployment to be very high and chances of finding another job to be very low. Other things being equal, such individuals will obviously be more inclined to take out mortgage protection insurance than those who view their employment status as stable.

Probability of unemployment, however, will not be the only determining factor. Suppose the individual with a high unemployment probability has substantial financial resources available in the event of redundancy (such as savings or the income of another household member) compared with the person who has low risk of redundancy. In such circumstances, it may actually be possible for the individual with less stable employment to be the one *less* inclined to take out MPPI.

Model Used Here

Although the theoretical foundations of the empirical work presented in this report are largely based on Pryce (1998b), there are a number of ways in which we depart from his approach. First, we consider only changes in status of the head of household. This is partly because of data constraints associated with the Scottish House Condition Survey (much of the relevant employment information relates only to the head of household), and partly as means of simplifying the

analysis. The implication is that if the head of household is recorded as having a partner, that partner is assumed to remain in their current circumstances, irrespective of what happens to the head of household. This, of course, is an important limitation to our analysis.

Another simplification is that we do not consider the probability of the head of household returning to work within the timeframe of the insurance decision. This assumption is made largely for empirical reasons. First, there was no suitable information in the SHCS to enable us to identify the head of household's thoughts on his/her ability to find another job, should the need arise. Second, even if such information were available, the estimated probability would be so closely correlated to the probability of the head of household retaining his/her existing job, that it would add little to model of MPPI take-up.

A further point of departure relates to the way we formulate the determinants of take-up in the regression model. In Pryce (1998b), the perceived probabilities and associated financial implications of each state of the world are combined mathematically to give the expected gain in 'utility' (i.e. satisfaction) from taking out insurance. This 'utility gain' variable is then included as the main determinant of MPPI take-up. The individual effects of component variables are computed via the effect of expected utility gain on MPPI. The approach adopted here, however, estimates directly the effect of individual components (such as the probability of becoming unemployed).

Each of the determinants of MPPI take-up will now be considered separately, noting the details of the construction of the variable from the available data sources and, where appropriate, the anticipated effects on take-up as suggested by the theory (ibid). (Note that the 'anticipated effects' considered below are those independent of changes in other factors.)

Construction and Description of Variables

The measurement and rationale behind the key variables in the model will now be considered, including the influences mentioned above plus further determinants of take-up, such as the loan to value ratio, savings, turnover rates, household structure, first-time buyers and mortgage source. Apart from the premiums, all variables are derived from the 1996 Scottish House Condition Survey which proved to be a rich source of information on mortgage borrowers and comprised relatively large samples (the 1996 SHCS had 6342 owners with a mortgage, of which, 2576 had MPPI), with the only drawbacks being that no question was asked as to the size of MPPI premiums, and the lack of employment information of non-head of household members. The Family Resources Survey (FRS) was used to calculate the local average MPPI premium. In order to boost the number of observations for Scotland, two years of the FRS (1994–95 and 95–96) were used to give a combined sample of 468 mortgagors with MPPI.

The Perceived Probability of Retaining Existing Job

Although no question was included in the SHCS that directly asked the head of household about the expected probability of retaining his/her job, a proxy can be constructed using logistic analysis of whether or not the head of household was employed or not. The rationale behind such an approach is straightforward, even if the underlying mathematics are not. Assume first that whether a person

is unemployed at time of interview will not be entirely random—that there will some characteristics which make a certain person more likely to be in this unfortunate state than another. Such characteristics might include his/her age, gender, type of job, and unemployment rate associated with the area in which he/she lives. Logistic analysis allows us to estimate the effects these characteristics have on the probability of being unemployed and, from this estimated relationship, to derive a predicted probability of unemployment for each head of household in the sample.

Table 1 lists the results of the logistic estimation. The second column (labelled 'coefficient') indicates the estimated relationship between the explanatory variable and the probability of the head of household retaining his/her job. It should be noted that this is not the first partial derivative, as in OLS regression analysis, although the f.p.d. can be derived from the coefficient (see Greene, 1990, p. 639). The third and fourth columns give the Wald statistic and significance levels respectively. These statistics test the hypothesis that the estimated coefficient is equal to zero (i.e. the variable has no relationship with the dependent variable): the higher the Wald statistic (and hence the lower the significance level), the greater our confidence that this hypothesis can be rejected.

As a general rule, variables with a Wald statistic less than one have been dropped out. A wide range of potential determinants were experimented with, most of which had no significant effect on the unemployment probability and were discarded. Hence, the Table below includes only the most significant variables, with the exception of the local male unemployment rate since this is included despite its low significance. (It has been included it because it is required later to estimate the responsiveness of MPPI take-up to the unemployment rate holding everything else constant.) Female, total, and gender specific unemployment rates, were also attempted but all proved to be far less statistically significant than the male rate.

The Table also shows that the local male unemployment rate, age of head of household (HoH), and whether the HoH is in manual employment and male; all have a negative effect on the probability of the head of household retaining his/her job. The variables that were most statistically significant were gender and job type. The high chi-square value indicates that we can reject the null hypothesis that all coefficients are zero, a result supported by the high Wald statistics and count R^2.

From Table 1, an estimated probability of the head of household retaining his/her job was derived. It should be noted that this method assumes that borrower's beliefs about remaining in employment will be determined by the same factors which determine the chances of being employed at the time of interview.

The Perceived Probability of Ill Health

The ill health perceived probability was defined as the probability that the head of household becomes unable to work due to ill health (equivalent to one minus the probability that the head of household remains well). This was calculated using a similar method to that used to derive the probability of unemployment.

Logistic analysis of whether or not the head of household was not working due to ill health at the time of interview was used to derive a list of coefficients which allow us to estimate a probability of ill health for all heads of household

Table 1. Logit analysis of probability of Head of Household retaining job

Variable	Coefficient	Wald	Significance
Local male unemployment rate	−0.0075	1.0003	0.3172
Gender of HoH	0.4448	10.4786	0.0012
Age HoH	−0.0086	3.6698	0.0554
HoH skilled manual	−0.3403	9.9282	0.0016
HoH semi-skilled manual	−0.6625	21.0240	0.0000
HoH construction worker	−0.2693	4.1060	0.0427
HoH public admin or defence worker	0.3181	2.4781	0.1154
Constant	2.5880	117.0313	0.0000
n	5786		
Chi-square	47.208		0.0000
Count R^2	90.93%		

Note: Count R^2 measures the in-sample prediction accuracy and is calculated as the ratio of predicted to actual values of the dependent variable.

(the results of the logistic regression are listed below in Table 2 below). The results show that by far the most significant determinant of health is age, followed by whether or not there is someone else in the household who is long-term sick. The high chi-square value indicates that the null hypothesis that all coefficients are zero can be rejected, a result supported by the high Wald statistics and count R^2. It can be seen that the main determinants of the probability of ill health were: the age of HoH (which has an exceptionally large Wald statistic), whether the HoH was a professional, whether anyone else in the household was sick, and whether the respondent had problem neighbours.

It is anticipated that the greater the probability of ill-health, the greater the mortgagor's inclination to take out MPPI. This will to some extent be mitigated by the individual's own ignorance about their state of health and likelihood of future illness, and by clauses in MPPI policies which may deter prospective purchasers by precluding claims for illness caused by conditions known at the start of the policy.

Table 2. Logit analysis of probability of HoH remaining well

Variable	Coefficient	Wald	Significance
Age of HoH	−0.1310	213.8234	0.0000
HoH professional	1.0733	5.4297	0.0198
Anyone else in HH sick	−0.7107	6.6880	0.0097
Pollution problem	−0.2265	0.9905	0.3196
Neighbour problem	−0.4693	6.2856	0.0122
Constant	9.6539	407.1395	0.0000
N	5786		
Chi-square	316.432		0.0000
Count R^2	96.66%		

Note: Count R^2 measures the in-sample prediction accuracy and is calculated as the ratio of predicted to actual values of the dependent variable.

Welfare Benefits

A key determinant of the financial status of mortgagors in the event of sickness or unemployment is their entitlement to state benefits. This is particularly important given that entitlement to ISMI is itself based on entitlement to Income Support, and that one of the aims of the report is to estimate the responsiveness of take-up to changes in ISMI. It was therefore necessary to model the benefits system in order to estimate the welfare payments each household would be likely to receive in the event of the head of household being out of work and whether or not they would be entitled to ISMI. Unsurprisingly, this proved to be a highly complex exercise, as it involved designing a mathematical simulation of the welfare system that could utilise the information on each household supplied in the SHCS.

Using details from Webster's (1995–96) *National Welfare Handbook 95/96* on personal allowances, premiums, family credit rates etc. a figure was computed for each household indicating the benefits they would receive given the household's characteristics and the assumption that the head of household is unemployed and that the status of all other household members remain unchanged.

It is anticipated that the higher the level of benefits the head of household expects to receive in the event of job loss, the lower probability of MPPI take-up, since the higher the level of benefits, the greater the scope the mortgagor has to continue with mortgage payments.

The Level of ISMI Cover

This is defined as the proportion of mortgage payments that would be met by ISMI over the year following the SHCS interviews, should the head of household be unemployed or ill. A number of factors had to be taken into account when calculating this variable:

- Whether the household would be entitled to Income Support in the event of the head being out of work. Households not entitled to Income Support receive no ISMI.
- The date the mortgage was taken out. Mortgages initiated before October 1995 are entitled to up to 50 per cent of eligible interest payments after eight weeks, and 100 per cent after 26 weeks following a claim for Income Support, whereas mortgages that began after this date receive no support for 39 weeks, and full cover thereafter.
- The age of the borrower and his/her partner, since claimaints over the age of 60 are entitled to full and immediate ISMI.
- Type and maturity of the mortgage: interest payments as a proportion of total monthly mortgage payments decline (from almost 100 per cent to near zero per cent) over the maturity of the mortgage for repayment mortgages, whereas the proportion remains constant (assuming constant base rates) for endowment mortgages. This means that a mortgagor entitled to Income Support with a relatively new repayment mortgage would have almost almost all of his/her mortgage payments covered by ISMI (after the 39-week gap). This contrasts to an endowment mortgage, or a repayment mortgage near the end of its duration where only a fraction of mortgage costs would be met by ISMI since interest payments would be a relatively small proportion of payments.

Loan to Value Ratio

This was calculated simply as the ratio of the original size of mortgage to the value of the house at the time of purchase. The anticipated effect of the loan to value ratio on take-up of MPPI is ambiguous. Individuals with high loan to value ratios might perceive themselves to be more vulnerable to repayment difficulties (due to the higher interest rates they face, for example), and so more likely to take-out MPPI. However, high LTVs may reflect a less cautious approach to financial decisions, and so indicate a greater inclination to remain uninsured.

Insurance Premiums per Pound (£) of Cover

Most insurance companies charge a flat rate premium. That is to say, there is a fixed price per pound (£) of cover charged to all customers at a given point in time. Since our empirical analysis is cross-sectional (i.e. attempts to explain variation in take-up across individuals at a given time-point), it would appear on the face of things that premiums should not be included in the model since there would be no variation across individuals. In practice, however, premiums do vary across regions, primarily because MPPI is sold almost entirely via mortgage lenders who have regional market concentrations. Each lender will usually only have a contract with one insurer to offer policies with all its mortgages. Hence, any variations in price across insurers are likely to reflect the market concentration of mortgage providers. Premiums also vary over time and so mortgagors who have policies taken out at different dates may well be paying different premiums.

Because the SHCS does not provide information on premiums, this variable had to be imputed as an average for each Scottish Local Authority from the Family Resources Survey (FRS). This procedure does not violate the theoretical structure of the model because consumers are assumed to base their MPPI decision on the local average prevailing price. Thus, even if SHCS data did record the premiums paid by insured borrowers, because the majority of borrowers did not take out mortgage protection insurance, observations on premiums would be limited to a small proportion of the sample. Hence, local averages would have to be imputed in any case, and so there is little to be compromised in imputing these averages from the FRS rather than from the SHCS.

Using local averages overcomes the problem of regional variation, but does not deal with the problem of changes in premiums over time. Thus, one area may have an average premium that is higher than another area simply because the sample on which the average is based happens to include a larger proportion of mortgagors who took out their premiums at an earlier date when, for example, premiums generally were higher. To control for this we adjust the premiums reported in the FRS by the UK unemployment rate index since a certain element of the premium is likely to rise and fall with the unemployment rate.

Another difficulty encountered was the relatively small number of observations on which the LA averages are based. Consequently, outliers can significantly bias the means reported for individual areas, and as a result, we have chosen to use the median as a summary measure rather than the mean.

Simply excluding authorities with low sample sizes would be unacceptable since this would distort the results if there is any relationship between sample size and average premium. Mortgagors in sparsely populated LAs may, for example, face higher premiums, perhaps because of the increased likelihood of borrowing from a small local lender, or because of lack of competition. Indeed, a simple OLS regression of MPPI median LA premiums on sample size, revealed that the sample size had a highly significant (t-value of -11.802) negative effect on premiums.

As such, the premiums used in the analysis were based on the time adjusted median FRS MPPI premium per pound (£) of cover, for all local authorities for which there were insured mortgagors in the FRS sample.

Savings

If it is assumed that consumers are not credit constrained (that is to say, they will always be able to gain access to credit, irrespective of their risk level), and are willing to pay the appropriate interest rate, then savings can be excluded from the analysis of take-up (as in Pryce, 1998b). However, if one relaxes this assumption to allow consumers to face difficulty in obtaining credit, particularly in the event of being out of work and facing mortgage repayment problems, then savings become an important element of the insurance decision. For if mortgagors cannot meet all their outgoings during periods of unemployment by simply dis-saving (i.e. accumulate further debt), there are only three possibilities open to the mortgagor seeking to guard against repossession. First, take out mortgage payment protection insurance. Second, purchase a dwelling that can be easily sold in the event of repayment problems. Or third, accumulate sufficient savings to cover mortgage costs for prolonged periods of illness or unemployment. Thus savings are important for credit constrained consumers. For those with substantial savings there seems little to be gained from taking out MPPI.

It should be noted, however, that the outcome may not be so straightforward if savings are illiquid, since to be of any use, accumulated funds would have to be readily available. Indeed, depending on the insurance premium being offered, MPPI may still be attractive to those with large savings because the cost of holding cash in accessible but low interest deposits may outweigh the cost of being insured.

Turnover Rates

Anecdotal evidence has pointed to the propensity amongst some mortgagors of purchasing a property in 'easy to sell' areas as a means of guarding against repossession. Put another way, mortgagors in areas with high housing stock turnover rates may be less inclined to take out MPPI if a quick sale (often with the possibility of capital gain) is a feasible option. We would therefore anticipate the average turnover of private owner occupied stock to have a negative effect on MPPI take-up.

Household Structure

In order for a high mobility strategy to be a viable mechanism for guarding

against repossession, the head of household him/herself has to be amenable to idea of moving house in a fairly short space of time. Not all owner occupiers, however, would be so willing to move. Married couples with children may, for example, be averse to the notion of changing residence, partly because of the multiplied cost and effort; and partly because family units are perhaps more likely to feel 'settled'.

Household structures also affect subsistence consumption levels and so may have an affordability effect. In other words, consumers may be more influenced by existing wealth, than anticipated wealth in the event of job loss. This could be interpreted as cognitive dissonance (denial of any prospect of change in employment circumstances) or heavy weighting of current consumption over future consumption.

Consequently, a variety of household structure variables were included as possible determinants of MPPI take-up.

First-time Buyers and RTB Purchases

It is possible that lenders may target certain categories of mortgage borrower for marketing MPPI. Anecdotal evidence (and to some extent empirical, see Pryce, 1998b) suggests two such groups may be first-time buyers, and those who purchase under the Right to Buy scheme. Both may be (or perceived to be) vulnerable to repayment problems, having had little experience of the inflexibility of mortgage finance and the sparsity of welfare safety nets as compared with other tenures. Consequently, it is anticipated that both these groups will be more inclined to take out MPPI, all other things being equal.

Mortgage Source

Given that the vast majority of MPPI is sold through mortgage lenders, it is likely that a determinant of the probability of take-up will be the mortgage source. Considerable variation may exist between lenders as to their commitment to selling MPPI, depending in part on the nature of their loan book and their flexibility toward borrowers in arrears, and so ideally we would like to identify which lending source has the biggest impact on the likelihood that a mortgagor will take out MPPI. Unfortunately, the SHCS does not ask for the name of the lender, but does ask for the lender's type (e.g. bank, building society, local authority) and from this we are able to identify which source has the largest impact on MPPI.

Results

Having constructed the variables likely to affect the take-up of MPPI, we entered them in a logistic regression equation. This allowed us to identify and select the most significant determinants. Various variables other than those listed above (such as the ratio of mortgage costs to income) where also included at various stages, but were found to be statistically insignificant in the final regressions, and so are excluded from the results presented below.

Regression Results

Results from three of the logistic regressions are reported below in Table 3. Regression 1 includes all the variables listed above as possible determinants. It can be seen, however, that at least four of these (welfare-benefits in the event of job loss; loan to value ratio; turnover rate; and number of children) have unacceptable significance levels (see parenthesized figures below the estimated coefficients), indicating that we can have only limited confidence that their coefficients are different from zero. Most of the variables in this category are dropped from regression 2, although some variables are retained, either because they form a central component to the purpose of the report (such as the insurance premium and ISMI cover), or because their significance level falls when the other variables are removed (such as RTB, and whether head of household has a partner).

It can be seen in regression 2 that all variables are significant at the 95 per cent level of confidence except for the insurance premium and ISMI cover. Because the confidence level associated with the insurance premium is so low in regression 2 (less so in regression 1), a third regression is presented with this variable omitted. Even when the premium is omitted, the Wald ISMI statistic remained small. That ISMI cover was not statistically significant in any of the three regressions, would appear to reject the crowding out hypothesis that ISMI cover has an important negative effect on the level of MPPI take-up.

Most of the coefficients are stable across the three regressions, with the exception of the premium, and the square of the probability of being sick. (This variable was entered as a quadratic, along with the loan to value ratio, in an attempt to capture the anticipated non-linear nature of their link with MPPI take-up; indeed, in both cases the significance levels were superior to their linear counterparts.)

Apart from welfare benefits, and the number of children (both of which were excluded in regressions 2 and 3 due to low Wald statistics) all variables had the anticipated sign. MPPI premiums, the level of ISMI cover, savings, and turnover rates all had a negative impact on the probability of take-up. The probability of unemployment, the head of household having a partner, purchasing through RTB, being a first-time buyer, and obtaining a mortgage from a bank (as opposed to a building society or local authority) all had a positive effect.

It can be seen from the favourable chi-square results that we can reject the null hypothesis that all coefficients are equal to zero. That the models are reasonably well specified is confirmed by the count R^2 results which demonstrate that the models are adequately at predicting whether a household has actually taken out MPPI.

It should, perhaps, be reiterated at this stage that the probability variables listed in Table 3 (i.e. the probability of the HoH being sick and the probability of the HoH being unemployed) are assumed to reflect the borrower's *perceived probability* of sickness and unemployment. That is, every borrower bases their insurance decision *inter alia* on their perception of their own risk of ill health or unemployment. This perceived probability is assumed to be an informed one, based on the borrower's knowledge of his or his/her own personal and economic characteristics and the his/her awareness of how these characteristics affect the probability of ill health and redundancy amongst workers as a whole. (These assumptions reflect the way in which we calculated the probabilities,

Table 3. Logit analysis of the probability of take-up of MPPI

Variable	Regression 1	Regression 2	Regression 3
Premium per £ cover (adjusted)	−1.6101	−0.3256	—
	(0.1721)	(0.6948)	
Probability of HoH unemployment	7.5416	6.6189	5.8832
	(0.0005)	(0.0001)	(0.0004)
Probability of HoH sick	−5.5786	−4.5323	−4.4649
	(0.0177)	(0.0005)	(0.0004)
Probability of HoH sick squared	9.3189	5.5020	5.3935
	(0.2089)	(0.0332)	(0.0332)
ISMI cover (as a proportion of mortgage costs)	−0.5691	−0.4368	−0.4196
	(0.2555)	(0.2162)	(0.2235)
Welfare benefits received if out of work	4.31E-06	—	—
	(0.7606)		
Savings	−1.9E-05	−2.4E-05	−2.1E-05
	(0.0245)	(0.0005)	(0.0015)
Loan to value ratio squared	−0.0881	—	—
	(0.3266)		
Turnover (average for UA)	−0.0093	—	—
	(0.9111)		
HoH has a partner	0.1861	0.2310	0.2079
	(0.2098)	(0.0505)	(0.0694)
Number of children in household	−0.0373	—	—
	(0.5517)		
Right to Buy purchase	0.3578	0.3892	0.4044
	(0.4013)	(0.0007)	(0.0003)
Mortgage from bank	0.4957	0.4131	0.4377
	(0.0000)	(0.0000)	(0.0000)
First-time buyer	0.1783	0.2386	0.2786
	(0.1165)	(0.0162)	(0.0038)
Constant	−0.9413	−1.0675	−1.0434
	(0.0307)	(0.0000)	(0.0000)
N	1766	2547	2692
Chi-Square	61.441	89.986	92.948
	(0.0000)	(0.0000)	(0.0000)
Count R^2	62.68%	61.37%	61.18%

Notes: Figures in brackets are significance levels. These are estimates of the probability that the null hypothesis (that the coefficient is equal to zero) has been incorrectly rejected. The lower the significance level, the greater our confidence in the estimated coefficient(s).
Count R^2 measures the in-sample prediction accuracy and is calculated as the ratio of predicted to actual values of the dependent variable.

outlined earlier.) It should also be emphasised that these probabilities are exogenous in the sense that they are independent of whether or not the mortgagor actually has MPPI. It is possible, for example, that once a borrower is insured, he/she will be more selective and take longer to search for new employment following redundancy, knowing that mortgage costs are fully covered. Burchardt & Hills (1998) found no evidence of such 'moral hazard', however.

Having estimated the relationship between take-up and determinants, we then computed the responsiveness of take-up to changes in determinants most relevant to the discussion (namely: premiums, probability of unemployment,

local male unemployment rates, ISMI cover, and savings). These estimates of responsiveness, termed 'elasticities', are presented and discussed below.

Elasticities

The coefficients listed in the regressions of Table 3 are of some interest in themselves, but their real use lies in the role they play in calculating elasticities. These are defined as: "the proportionate increase in the take-up probability in response to a given proportionate increase in one of the determinants". Thus an elasticity of 0.5 for with respect to variable x means that for every 10 per cent increase in x, MPPI take-up rises by 5 per cent. Elasticities are thus measures of responsiveness of the dependent variable to changes in its determinants.

Table 4 lists the elasticities for five of the key determinants of MPPI take-up, based on the coefficients from regressions 1, 2 and 3 respectively. When an elasticity is calculated to be greater than 1 (or less than -1), the dependent variable is said to be *elastic* (i.e. relatively responsive) to changes in the respective determinant. Similarly, when an elasticity lies between -1 and 1, the dependent variable is said to be *inelastic* (i.e. relatively unresponsive) to changes in variable in question. By this measure, the Table clearly shows that MPPI take-up is unresponsive to changes in any of its determinants.

The largest elasticity in all three regressions is with respect to the probability of unemployment, indicating that MPPI take-up is most sensitive to this variable (although strictly speaking, still inelastic). Most importantly, MPPI take-up is found to be highly unresponsive to ISMI cover, clearly refuting the hypothesis that ISMI crowds out private mortgage payment insurance. In the context of the empirical model, ISMI cover is defined as the proportion of total mortgage payments that would be met by ISMI over the year following hypothetical cessation of employment of the head of household. For every 10 per cent reduction in ISMI cover, the take-up rate is found to rise by a mere 0.2 per cent. Although larger than the Pryce (1998b) estimate, and although having the right sign for crowding out, this result does not contradict his finding that there is little empirical support for crowding out thesis. It should be emphasised again that our estimates of the ISMI effect were not statistically different from zero in any of the three regressions, and so it seems reasonable to conclude that we can reject the crowding out hypothesis which says that ISMI cover has an important negative effect on the level of MPPI take-up.

Another important parameter is the unemployment rate elasticity, which although not an element of the MPPI take-up regressions, was a component of the probability of unemployment, and could be derived accordingly. The estimates suggest that for every 10 per cent increase in the unemployment rate, the MPPI take-up rate rises by 1 per cent.

The elasticity of take-up with respect to the MPPI premium is shown to be very small, the rate of take-up only rising by at most 0.7 per cent for every 10 cent reduction in premiums (the savings elasticity is found to be of a similar magnitude). This is lower than previous estimates of the premium elasticity which have been around 0.5 (Pryce, 1998b). This may be due to the way we constructed the premium variable, which had to be imputed from the FRS.

Table 4. MPPI take-up elasticities

Determinant of Take-up:	Regression 1	Regression 2	Regression 3
ISMI Cover	−0.029	−0.021	−0.020
MPPI Premium	−0.071	−0.014	—
Local male unempl. rate	0.108	0.093	0.085
Prob. HoH unemployed	0.393	0.341	0.309
Savings	−0.072	−0.087	−0.076

Simulations and Forecasts

Having computed the responsiveness of take-up to changes in rates of unemployment, it would be desirable to use this to forecast the cyclical movements in take-up due to anticipated fluctuations in the male unemployment rate. This is particularly pertinent to the debate over whether MPPI is sustainable in the long term as an alternative to state unemployment insurance. With this in mind, we have attempted to simulate the movement in take-up of MPPI in response to future changes in male unemployment rates. Because unemployment rates are difficult to predict in the medium and long term, the numbers used in are inevitably hypothetical. Our aim has been to graphically simulate the cycle in male unemployment rate and also to incorporate an upward trend typical of the UK of the past quarter century.

Figure 1 shows how MPPI take-up falls and rises with unemployment (all other things being equal), but that this fluctuation is very much dampened as compared with the unemployment cycle. This suggests that MPPI may well be sustainable in the long term, since although there will be a degree of adverse selection over time, the effect is likely to be marginal. Care should be taken, however, in interpreting the diagram since it does not present a 'forecast' in the usual sense, but a simulation of how take-up would respond to hypothetical movements in unemployment assuming the relationship between the two variables remains stable. Caution should also be applied because we are translating what are essentially cross sectional results into a dynamic context.

One of the problems to be aware of in such an exercise is that it is difficult in cross-sectional work to identify whether the elasticities being estimated are short term or long term (the latter being defined as when all factors of production are variable, hence the common assumption for many economic relationships that long run elasticities are infinite). However, researchers in other fields who have employed cross-sectional methods, such as De Leeuw & Ekanem (1971), have argued that data from cross-sections yield long run supply elasticities because markets have had "ample time to adjust to basic market forces". As such, we can be reasonably confident that the elasticities estimated in the previous section are likely to remain constant at least over the medium term. In any case, "it is usually ambiguous what the true long run elasticity is, since it may never be reached within a given cyclical or policy timeframe, and so long run estimates may have no practicable purpose. Thus it could be argued that estimates of intermediate elasticities would be more relevant to policy makers" (Pryce, 1998a).

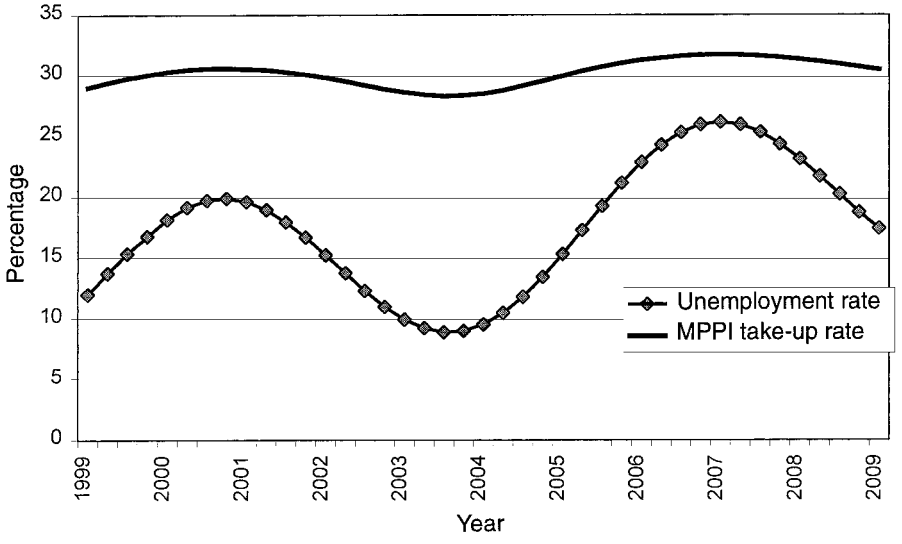

Figure 1. Simulation of response of MPPI take-up to hypothetical unemployment rate cycles.

Summary and Conclusions

This paper has presented the results of the logistic regression analysis of MPPI take-up and has attempted to estimate the sensitivity of take-up to unemployment rates, premiums and ISMI (*inter alia*). It was found that:

- MPPI premiums have a negative but marginal effect on take-up.
- Probability of being unemployed has a positive effect: a 10 per cent rise in the probability resulting in a 3 per cent increase in take-up.
- The local male unemployment rate, as a component of the unemployment probability, has a positive effect on take-up (around 1 per cent increase in take-up for every 10 per cent rise in the male unemployment rate).
- Simulations showed how this implies a procyclical element in the take-up rate, but that the cycle would be substantially damped compared with the unemployment cycle.
- The level of ISMI cover was found to have a negligible negative effect on take-up (a 10 per cent fall in ISMI would cause a 0.3 per cent rise in take-up), an effect that could not be statistically distinguished from zero.

Other variables found to be significant include: the source of mortgage finance (banks apparently having higher MPPI take-up than building societies), whether mortgagor is first-time buyer and whether he/she purchased through the Right to Buy scheme (both of which had a positive effect on take-up).

Given that changes to ISMI appear to have such an insignificant effect on MPPI take-up, it seems reasonable to conclude that the crowding out hypothesis, which asserts that ISMI has a substantial effect on MPPI take-up, can only be rejected. As such, one of the key motivations put forward for the October 1995 changes can no longer be considered justified. Whether there exist other reasons which validate the reforms of ISMI is a question which lies beyond the scope of this paper. However, given that repossession rates have remained at relatively

high levels compared with previous decades, there is a strong case for saying that the existing policy provisions for mortgage borrowers need to be reviewed in the light of the findings of this paper. It is worth noting, however, that the effect of significant changes other than ISMI on mortgage borrowers (such as the broadening of risks with access to mortgage finance, and the movement towards a more flexible labour market) mean that a return to the pre-1995 ISMI provisions may be prohibitively expensive, and that a combination of measures (such as those suggested by Pryce & Keoghan, 1999), rather than any single solution, will be necessary to reduce the repossessions problem.

Acknowledgements

This paper is based on research funded by Scottish Homes (Pryce & Keoghan, 1999). Useful comments were received from the Scottish Homes steering group and from Kenneth Gibb, University of Glasgow. The usual disclaimer applies.

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