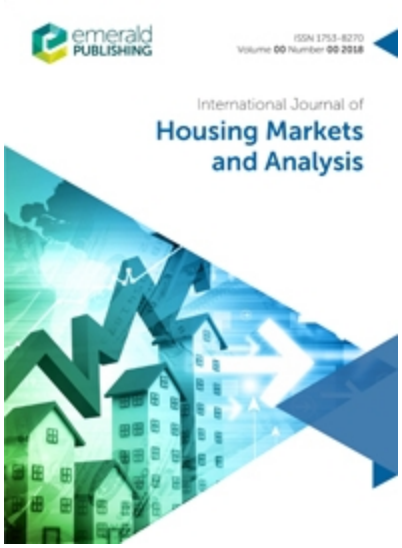

MENTAL AND GENERAL HEALTH AT THE EDGES OF OWNER OCCUPATION

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Mental and general health at the edges of owner occupation

Purpose

One test of a well-functioning housing system is its impact on wellbeing. Addressing one indicator of this, we track changes in mental and general health across a mix of tenure transitions and financial transactions in three jurisdictions: Australia, the UK, and the USA.

Design/methodology/approach

Using matched variables from three national panel surveys (HILDA, BHPS/UKHLS and PSID) over 17 years (2000-2017), we adopt a difference-in-difference random-effects model specification to estimate the mental and general health effects of tenure change and borrowing behaviours.

Findings

There is an enduring health premium associated with unmortgaged owner-occupation. Mortgage debt detracts from this, as does the prospect of dropping out of ownership and into renting. A previously-observed post-exit recovery in mental health – a debt-relief effect – is not present in the longer run. In fact, in some circumstances both mental and general health deficits are amplified, even among those who eventually regain homeownership. Though there are cross-country differences, the similarities across these financialised housing systems are more striking.

Originality

The paper extends the duration of a previous analysis of the impact of tenure transitions and financial transactions on wellbeing at the edges of ownership in the UK and Australia. We track households over nearly two decades from the start of the millennium into a lengthy post-GFC era of declining housing affordability. We add to the reach of the earlier study by adding a general health variable and a third jurisdiction, the USA.

Practical implications

The wellbeing premium traditionally associated with owner occupation is under threat at the edges of the sector in all three jurisdictions. In this there is cross-national convergence. There may therefore be scope to introduce policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems.

Key Words: Tenure transition, Panel surveys, Owner-occupation, Mortgage debt, Mental health, General health

1. Introduction

Well-functioning housing markets bring advantages to individuals, communities, and whole societies, securing quality, choice, affordability, stability and more in the residential environment. There are many criteria against which the successful functioning of housing markets can be bench-marked. One of them has traditionally been high rates of owner-occupation – a useful proxy for many things, that has, historically, been associated with a wellbeing premium (Angel and Gregory, 2021; Foye *et al.*, 2018; Munford *et al.*, 2020; Zumbro, 2014).

However, the character of owner occupation is changing. There is growing evidence, especially in the English-speaking world – where some of the highest rates of owner-occupation have been observed – that the sector is becoming less accessible, more costly, and less sustainable (Arundel and Ronald, 2021; Perraton, 2019; Author, 20xx), and less able to extend access to opportunity in the way that it once did (Rohe *et al.,* 2002), So it is possible that high rates of ownership are already less appealing as a measure of well-functioning housing systems than once was thought. To test this claim, we consider whether and to what extent the mix of financial transactions and tenure transitions required to sustain owner occupation may compromise the wellbeing of home occupiers. If positive health is a key measure of the impact of public policy (Leppo *et al.,* 2013), a system that detracts systematically from that could hardly be thought of as "well-functioning."

Specifically, using panel survey data, we scrutinise three major ownership-centred housing systems – in the USA, Australia and the UK. These English-speaking countries between them formed the leading edge of the expansion of owner-occupation through the late 20th century and into the present millennium. In all three countries, that sector is now contracting (Authors, 20xx), and as it does so, the edges of ownership are expanding (Authors, 20xx). These edges have come under growing scrutiny in recent years; they form an under-instituted, highly indebted and increasingly precarious zone between owning and renting (Haffner *et al.,* 2017). Such margins may soon accommodate more households than the mainstream and merit more attention.

The edges of ownership are characterised by a surprising degree of flux. Conventionally following a scramble to get into the sector, and gradually pay down debts, we expect households to enter the more secure mainstream of near or completely outright ownership. Increasingly however mortgagors add to their debts, perhaps to move upmarket, but often to raise funds (through equity borrowing) to meet other pressing needs – a process which, arguably, places them closer to the edges of ownership than they once were (Authors, 20xx; Authors, 20xx). Furthermore, while some households are vulnerable to dropping out altogether (lasting leavers), others shelter for a while in the rented sector before regaining ownership – a transition they might make more than once as these 'churners' bid to retain owner occupation (Author 20xx). Although 'churn' has been documented before for these jurisdictions, in this paper we cover a particularly long run of data – nearly two decades – to cast new light on the experiences of an important group that has been neglected in the literature and in policy circles.

In short, we consider what happens to the health premium traditionally associated with owner-occupation when households engage in the mix of tenure transitions and financial transactions required to navigate the edges of the sector. To explore this, we construct matched samples of owner-occupiers for all three jurisdictions and track them and their myriad characteristics over time as they move away from, towards or across the edges of ownership, adding to assets, adjusting debts and changing tenures. Wellbeing is of course much more than positive health,

and there is a cluster of measures in the panel surveys that usefully tap into that. However, not all of the measures are comparable across jurisdictions and health is a common denominator. We therefore rely on two measures of health, general and mental health, as proxies for wellbeing in this paper.

First, we use a measure of mental health. Even though this measure is only available for the UK and Australia, it enables us to replicate, extend and test some of the findings from an earlier study (Authors 20xx). We are able to extend the study timeframe by seven years to capture both the impacts of the Global Financial Crisis (GFC) and a period of recovery. That post-GFC dimension is important because at the same time as property values recovered and equity positions were restored, an institutional leaning to "business as usual" was coupled with underemployment, labour market precarity, and a new round of credit constraints. So, this longer run of observations offers a potentially important addition to our understanding of how wellbeing fares as housing systems adjust to external shifts and shocks.

Second, we extend the analyses of the previous work using the complementary general health indicator, which allows us to capture a different aspect of wellbeing and to broaden the geographical reach to include the USA. The USA introduces a new dimension: it was the epicentre of the enormous disruption to housing markets triggered by the GFC, has less complete mortgage markets than Australia or the UK, less regulated housing markets, and a relatively weak welfare safety net. In contrast, the UK has a relatively large, albeit shrinking, social housing system, while Australia has generous income support programmes and private sector delivery of key welfare benefits such as pensions and minimum wages. So it might be that such ontological security as near or outright homeownership implies is more keenly felt in the USA, and more easily damaged than in countries with more developed welfare states.

We proceed by describing the data resources and specifying the models. Then we report in turn on the mental and general health effects of two styles of tenure transition and two financial transactions. We offer both conclusions and recommendations.

2. Data resources

In the paper, we employ the British Household Panel Survey (BHPS) together with its successor, Understanding Society (UKHLS), the Household, Income and Labour Dynamics in Australia (HILDA) Survey, and the Panel Study of Income Dynamics in the USA (PSID). In an earlier study, Naoi *et al.* (2018) applied a similar approach by using panel surveys for Australia, the UK and Japan to explore the role of institutions in mortgage demand behavior in these three countries.

Our sample timeframe commences in 2001, which coincides with the start year of the HILDA Survey. Waves prior to 2001 in BHPS and PSID were excluded to provide the same start year across all three countries. The latest wave available at the time of analysis was for the year 2017. Thus the maximum timeframe is 17 years. For those who died before 2017, the end year is the year of death. Those who formed independent households after 2001 enter the sample timeframe in the year they become independent and ends in 2017.

We employ a sample design that includes all independent adults who report one or more spells of owner-occupation (each spanning one or more years) between 2001 and 2017 (or the year of death if it occurs before 2017), commencing from the first wave in which an individual is observed to be independent and an owner occupier. An unbalanced panel for each respective country is used, and the unit of analysis is person-year observations. That is for each person in

the sample, we included one count per year from the first year in which the person is observed as an owner. For example, suppose a person entered ownership for the first time in the data timeframe in the year 2005, exited ownership in 2010, and remained in the rental sector till 2017 (a leaver). We count 14 person-year observations comprising episodes from 2005 to 2017. So, although each individual is assigned to one of three ownership types – ongoing owner, lasting leaver or churner – we measure their various characteristics (in a single year for a given person) in all circumstances: when they are renting, when they are owning, when they are in debt, when their assets are unmortgaged and so on.

[Table I here]

Table I summarises the housing trajectories of the whole sample across the timeframe of the study. *Ongoing owners*, who have unbroken ownership spells from their first year of entry till the end of the timeframe, form the majority, accounting for three-quarters of the UK sample, two-thirds in the USA and just under sixty per cent in Australia. This is high, but not as high as in the previous study, which might be expected over the long-time frame, though it might also tap into a structural change over time in the sector. *Lasting leavers* have one ownership spell which ends before 2017 and is followed by a rental spell ongoing to the last observation. These form the minority, accounting for less than ten per cent of the sample in the UK and Australia and just over ten per cent in the USA. *Churners* have two or more ownership spells within the observation period: one third of Australians, one quarter of the USA sample, and less than one in five in the UK fall into this group.

The dominant impression, then, is that, for the majority, once owner occupation is attained, it is generally sustained notwithstanding the impact of the GFC. This is consistent with other findings (Authors, 20xx). However, two in five Australians, one in three Americans and one in four in the UK left the sector during the observation period: double the proportions of the earlier study. The fact that, among those who exit, most return to owner occupation at least once (four in five returns in Australia, just over 70% in the UK, and just under 70% in the USA) confirms that any apparent stability may be an illusion. These housing markets are equally characterised by flux.

[Table II here]

As well as tracking tenure transitions, we are interested in the financial transactions that position households relative to the edges of ownership and help prevent or precipitate movements out of, or back into, the sector. For these variables, key descriptives can be viewed in Table II, which mainly counts person-years. Among financial transactions, mortgage debt is the obvious and widely used measure, and most owner-occupied spells, and most of the person-years comprising them are accounted for by mortgagors. During their spells in ownership, 86% of US owner occupiers still had mortgages to pay in at least one year of their spells; this is true for 71% in Australia and 64% in the UK where outright ownership is more common than in the other jurisdictions.

A particular feature of our analysis is that it also measures the effects of equity borrowing, which occurs when home buyers add to their mortgage to raise funds for non-housing expenditure. This facility was, until recently, routinely built into mortgage contracts, and was commonly used, especially among borrowers with pressing spending needs and a narrow non-housing investment portfolio. In the short run, equity borrowing can help home buyers cling on to the edges of ownership longer than might otherwise have been the case (Authors, 20xx), but equally, for some at least, the practice is unsustainable in the long run (Authors, 20xx).

Between 2001 and 2017, equity borrowing during spells of ownership was employed during three in every five (61%) person-years in Australia and the USA, and by nearly half (47%) in the UK. Although households with ongoing mortgage contracts sustained these rates through the GFC, the sharp credit constraints that followed generally reduced access to this facility, which nevertheless continues to play a significant role, especially for households with narrow wealth portfolios and pressing spending needs (Authors 20xx)

To capture the effect of a mix of housing transitions and financial transactions on wellbeing we use two dependent variables: mental health (in the UK and Australia) and general health (in all three jurisdictions). HILDA records the mental health component of the SF-36, on a scale of 0 (least healthy) to 100 (most healthy); BHPS and UKHLS use the GHQ12 on a scale of 0 (least distressed) to 36 (most distressed). For heuristic purposes, we follow Searle (2008) by using the inverse of the GHQ12 scale in our analysis so that, in the case of both countries, higher scores on the mental health variable denote less distress.

We measure general health using a five-point self-assessed general health measure. In HILDA, UKHLS and PSID, the general health measures are perfectly matched, with rankings of 1 to 5 representing excellent, very good, good, fair to poor health. In the BHPS, the rankings have slightly different labels, with rankings of 1 to 5 representing excellent, good, fair, poor and very poor health. However, we ignore this inconsistency, assuming that respondents simply rank their health outcomes from best to worst from 1 to 5. We also reverse-score the general health variables in the surveys, so that 1 represents worst health and 5 represents best health. This achieves some consistency in the treatment of all health measures – both mental and general – across all models in the paper. Note that because mental health is measured in different units in Australia and the UK, the means and medians shown in Table II are not comparable. With respect to self-assessed general health, however, we find that the health scores are much more skewed towards the best health score of 5 in the USA and UK than in Australia.

We complete the data resource by adding a variety of demographic and socio-economic control variables, whose descriptives are also shown in Table II. In summary, the USA sample presents the most youthful age profile with a median age of 51 years, compared to 54 years in Australia and 56 years in the UK, where we also record the most child-free cycles. The majority of person-years in all jurisdictions are spent in marriage, though this is markedly higher at 79% in the USA as compared to the other two countries. The USA also has the highest incidence of university education (36%), and of full-time employment, as well as the greatest disparity of incomes.

3. Analytical strategy

To capture the health effects of occupying the edges of owner occupation, we specify two models for each of the two measures of health. The first quantifies the effects on mental and general health of tenure transitions out of, and where applicable back into, owner-occupation. The second adds the effects of debt.

In the models, we adopt a difference-in-difference model specification using a random effects estimator that is defined by:

$$Health_{it} = \alpha_0 + \alpha_1 Leaver_i + \alpha_2 Leaver_i * post_{it} + \alpha_3 Churner_i + \alpha_4 Churner_i * post_{it} + a_i + u_{it} (1)$$

where *i* and *t* subscript individuals and time period respectively, and $Health_{it}$ is a measure of mental health (or general health) for individual *i* at time *t*. Time-invariant indicator variables distinguish between ongoing owners ($Owner_{i)}$, lasting leavers ($Leaver_i$) and churners ($Churner_i$). $Owner$i equals one if the person has retained ownership throughout the data timeframe, zero otherwise. $Leaver_i$ equals one if the person loses ownership and has not returned to owner-occupation by 2017, zero otherwise. $Churner_i$ equals one if the person loses ownership but returns to owner-occupation at least once by 2017, zero otherwise. These variables enter regression models separately, with ongoing owners being the omitted category. The included ownership pathway categories are interacted with a variable ($post_{it}$) identifying whether wave *t* belongs to an episode when leaver *i* (or churner *i*) has left homeownership andis renting. Hence, $Post_{it}$ equals one in wave$t$ if individual i is renting in that wave, zero otherwise.

With respect to mental health these models replicate an earlier two-country study using random effects regression models (Author 20xx) [1]. In the model of general health, which brings in our third jurisdiction, random effects ordered logit estimates were obtained, with self-assessed general health ranked on a scale of 1 to 5, where 1 represents the worst health outcome and 5 represents the best health outcomes. A key assumption of the ordered logit model is the proportional odds assumption, which presumes that the relationship between each pair of outcome categories is the same. Hence, the coefficient attached to each predictor gives the log-odds of achieving a rank of $r+1$ relative to a rank of r as a result of a unit change in the predictor.

4. Results

4.1. The health impacts of tenure transitions

Table III presents the random effects estimates from the tenure transitions models. After taking account of a range of common controls (including gender and age), they indicate that, for mental health in the UK and Australia and for general health in all three countries, the prospect, risk and fact of dropping out of ownership for the long run (being a lasting leaver) is associated with a strong and significant wellbeing deficit compared to ongoing owners.

[Table III here]

All else equal, the mental health profile of leavers and churners in Australia and the UK before and after they exit owner-occupation lies well below that of ongoing owners. For lasting leavers these disparities are substantial and eclipsed in magnitude only by the mental stress of long-term disability or illness, unemployment, and separation. For churners, the effects are less marked but still on a par with, for example, divorce.

To the extent that this taps into the mental stress of households approaching the edges of ownership there are many reasons for returning lower scores than those accommodated in the mainstream, including affordability stress (Bentley *et al.,* 2022) and indebtedness (Keene *et al.,*2015), which we return to later. These financial stressors may interact with and exacerbate the stress associated with a range of other biographical disruptions known to put family homes at risk, and the findings are consistent with a well-documented sustainability stress effect at the precarious edges of ownership experienced by households who are at risk of leaving the sector (Authors, 20xx).

In an earlier study, spanning most of the decade from 2001, as well as a stress effect among those who drop out of owner-occupation, we found evidence of a mental health rebound during rental spells, which might have reflected the immediate effects of shedding mortgage debt, and/or of finding a 'soft landing' in parts of the rented sector (Author, 20xx). However, the earlier study spanned less than a decade, so some rental spells would have been short – too short perhaps to explore a suggestion in the wider literature that the mental health gains of residential relocation can be short-lived (Foye, 2016; Stotz, 2019). The model estimates listed in Table III address this by analysing rebound impacts over a longer duration and presenting an interaction term that isolates the mental health effect of having left owner-occupation. For leavers in both Australia and the UK, these terms are insignificant: that is, any rebound effect has all but disappeared. For churners in the UK, moreover, there is evidence of significantly more, not less, mental stress after exit, perhaps reflecting the pressure they feel to regain a housing position they have lost.

So, the extended time period is important. It appears that the rebound in wellbeing detected in the earlier study could be a short-lived response to the alleviation of financial pressures that most leavers experience. As spells in rental housing lengthen, so the rebound in wellbeing may be eroded perhaps, for example, as some are forced to move again when short leases are terminated. Alternatively, it may reflect adaptation to new housing situations that gradually lose their novel character as individuals tend to focus less attention on them (Stotz, 2019, p.100). It is also possible that the earlier study captured a sense of wellbeing among a group who *appeared* to be lasting leavers but who in fact returned to ownership after the cut-off in the previous study.

The measure of *general* health, available in all three jurisdictions, may represent a slightly different story. Lasting leavers in every country report worse general health than ongoing owners in all circumstances. This suggests that people in poor health may find it hard to sustain owner-occupation (perhaps reflecting the impact of health on earnings, job security, households' expenditures and so on); i.e. exit may be selective against those with depressed general health, for a variety of documented reasons (Authors, 20xx). The interaction term leaver x left homeownership shows a significant further dip in general health among lasting leavers following their loss of ownership. This could offer support for the selection effect idea if it is capturing the course of conditions that are anyway progressive. But it might also reflect a dip in general health that would not have happened if ownership had been sustained, and that has been exacerbated by life as a renter.

The general health of churners differs from that of lasting leavers, as might be expected; the churners after all are set to regain ownership in due course. It is only in the USA that their overall profile is depressed relative to ongoing owners, and this is true whether they are in an ownership or a rental spell; perhaps they are switching between owning and renting to manage the changing costs and needs of ongoing health conditions that keep them close to the margins of homeownership. Uniquely in the UK, however, where during ownership spells churners are more like ongoing owners in their overall general health profile, after leaving the sector, health worsens.

To explore this further, we considered the possibility that the health effects of exiting ownership differ according to where people 'land'. This depends in part on the nature of the rented sector, and on this we can expect some institutional variety between the three countries. Generally, leavers and churners departing owner occupation exit into a variably regulated largely private rental sector whose quality, cost and conditions cannot be assured. Some, however, move into secure and affordable settings such as social renting or into some other

'soft landing' such as rent-free accommodation with family. Such 'soft' landings may avoid the risk of private landlords terminating leases, increase the prospect of securing housing well matched to needs, and may offer – in the case of family accommodation – a welcoming environment. For those slipping out of ownership because of acute financial stress and poor health, into these settings, we might expect more rebound in mental health than, say, exiting into costly, possibly lonely, mixed-quality private rental.

To check whether a health-cushioning effect might be detected, and might indeed endure, conditional on entry into social (rent free) housing, we re-ran both models. The specifications differentiate between those who did, and did not, secure a 'soft landing' either by entering the social sector (which we can expect to cater to housing needs more effectively than private renting), or by securing rent free accommodation to help cushion debt overhang or other financial stress. The results are presented in Table IV [2].

[Table IV here]

In Australia, but not the UK, there is a strong and significant mental health rebound for the minority of lasting leavers who exit into social housing or rent-free living of some kind (the numbers are too small to differentiate). Churners, on the other hand, who we know often benefit financially from living rent free - it is indeed a factor that helps propel them back into owner occupation (Authors, 20xx) – do not experience any significant wellbeing gains from that fact. In the UK, where there is no lasting benefit from dropping out into the social sector compared to any other rental outcome, churners exiting into social or rent-free housing not only fail to report any general health improvement (a tendency shared by lasting leavers) but also suffer a mental health penalty. While this may seem counter-intuitive, given the aims of the social sector, it could reflect the likelihood that, unlike lasting leavers, churners may have very strong ownership aspirations, and so find their time in social/rent free housing an uncomfortable one. It is not, however, clear why they should do worse than their Australian counterparts, except that British churners tend to hang on to their ownership status for longer and may find a 'soft landing' particularly difficult (especially if they end up living with family or friends which underlines all they have lost). They are also much slower to return to homeownership and so any frustration associated with their social/rent free housing experience is likely to be more persistent in Britain (Authors, 20xx).

We also looked at this within-renting differential for general health (see Table IV). There are no significant findings in the US model estimates where the institutional setting post-departure appears to be of no import. In Australia, the general health of churners shows little change post-exit, and it does not matter where in the rental sector they land. However, a post-exit dip in general health among lasting leavers characterizes both rental settings; if anything, Australian leavers fare worse with a soft landing – or viewed another way, access to the welfare role of housing may be conditional on deteriorating health, especially progressive health conditions that would worsen whatever the housing circumstances. This latter explanation is certainly relevant in the UK, where the general health profile of those who exit into private rental is much the same as it was in their ownership spell, whereas those who exit into the social sector are in poorer health, something that could have given them priority access to social housing. So, this extra piece of analysis confirms that there are different narratives for mental and general health – stress effects and health selection, respectively – which is an important policy-relevant finding.

4.2 Financial transactions: Impacts on mental and general health

So far, we have shown that the transition from ownership to renting represents a major biographical shift that can be associated with an enduring dip in mental and/or general health in all three countries. There are many factors driving this but the most widely recognised causal mechanism cited in the literature is financial stress, particularly that arising from unsustainable debt, and especially from debt secured against homes. To explore the effects of debt, we re-estimate both the random and fixed effects models (as above, the latter add little so that only the former are presented in detail). To capture a "mortgagor effect" on wellbeing, we employ a time-invariant binary variable equal to one if an individual was a mortgagor at any point during the timeframe, zero otherwise. We interact this indicator variable with each ownership trajectory (ongoing owners, leavers, and churners) [3].

We also add a binary measure of in situ equity borrowing which we interact with mortgage-holding to identify the independent health effects for mortgagors of increasing their outstanding mortgage debt without moving home (thus raising money to spend on other things.) This variable is equal to one if an individual adds in situ to their outstanding mortgage debt at any point during an ownership spell, zero otherwise. This model specification is more nuanced than that in Author (20xx) [4] because the interaction variables not only split each ownership trajectory into mortgaged and un-mortgaged pathways, but also signal, for mortgagors, whether they have engaged in equity borrowing or not. An outstanding mortgage burden inflated by equity borrowing may, on the one hand, help pressure the leaver to exit, while on the other hand, for the ongoing owner and churner, it may reduce binding budget constraints by funding discretionary spend. The longer time frame, and hence much larger number of observations, facilitates the more complex analysis of indebted ownership trajectories in this paper.

The results of this financial transactions specification are summarised in Table V [5]. Note that although we initially ran a set of additional models to again capture exit into different rental settings (social/rent free on the one hand and private rental on the other), the findings add little to the points made above and the exercise is not, therefore, repeated in the results presented below.

[Table V here]

Table V confirms, with one caveat, that the previously observed substantial and significant mental health premium for ongoing outright ownership endures across the board in both Australia and the UK. The caveat is in the UK, where, among ongoing owners, mortgagors' mental health scores are in line with those of outright owners, *as long as* they avoid equity borrowing. For UK owner occupiers, whatever spending needs equity borrowing might meet, the net effect of adding to housing debt detracts from mental wellbeing. Among ongoing owners in Australia, in contrast, while all mortgagors report worse mental health than outright owners, equity borrowers fare slightly better than other mortgagors. Here the added funds have a cushioning effect on mental health.

Turning to leavers and churners we see that, in both countries, for the most part these groups report worse mental health outcomes than ongoing outright owners. In Australia, whether renting or owning, leavers and churners fare worse than any ongoing owner (mortgaged or not), whereas in the UK, leavers and churners who were once outright owners retain the mental health premium attached to that (reflecting, perhaps, that they are unlikely to have been in financial stress before their exit). In part these results simply amplify the exit effect on mental health noted above, for all housing finance positions other than those who were once mortgage

free owners in the UK. For the other leavers and churners - those carrying mortgage debt during their ownership spells - and, again, as compared to ongoing outright owners, a relatively large negative exit effect is detected. Its size, all else equal, is similar to that estimated for a biographical status such as divorce or bereavement that is known to have large negative effects [6]. More importantly what these results underline is the importance of financial stress associated with carrying mortgage debt on the edges of ownership across the board.

With the exception of lasting leavers in the UK these effects are slightly cushioned for those who, as owner occupiers, engaged in equity borrowing: that is, for churners in both countries, and for lasting leavers in Australia, equity borrowing during ownership eased their journey into renting, and may have helped position churners for return. Perhaps mental health benefits from having funds to draw down for discretionary spending, and is depressed among conventional mortgagors who pay down debts more quickly yet have less flexibility/liquidity. For UK leavers, however, this is not the case; they, like their mortgagor counterparts in ongoing ownership, find that equity borrowing exacerbates the debt effect on mental health. It may therefore be that equity borrowing in Australia and the UK serves different purposes. For example, rather than using equity borrowing to meeting discretionary spending needs such as school fees, and home renovations, leavers and ongoing owners in the UK may use it to fund more acute spending needs – arising from unexpected adverse events such as redundancy – thus adding debt to the stress of other adverse shocks

Turning now to *general* health effects, and bringing the USA into the panel of countries, the key finding for all three jurisdictions is that among ongoing owners, there is no debt effect on general health. Put another way, mortgagors have the same general health profile as outright owners provided ownership is enduring. That is also true for most churners. These groups report better general health than lasting leavers who, whether they were equity borrowers or not (though equity borrowing again amplifies the effect in the UK), report significantly worse general health than the rest. These findings seem most likely to testify to a selection effect - much as hinted at earlier - whereby those in poorer general health simply cannot sustain the costs and meet the conditions of sustaining owner occupation.

Outright owners who become lasting leavers in the USA underline this point: they show worse general health than their counterparts who do not drop out of ownership. It may be that with only limited public health safety nets, and credit constraints imposed by their incomes or employment options, those with serious health conditions have to sell up to finance medical treatments and manage the costs of living with ongoing, perhaps worsening, ill heatlh. The outliers in the UK are outright owners who become churners: they also show worse health than those ongoing in the sector. The likelihood here is that they are trading on into accommodation better suited to health needs, and/or trading down to release funds to meet spending needs associated with, or exacerbated by, their health condition.

In the *general* health models, there is no evidence among lasting leavers of a cushioning effect from equity borrowing in the USA and Australia. In fact, in these countries equity borrowers who become lasting leavers report slightly worse general health than mortgagors who left ownership without adding to their loans Perhaps pressing medical treatment needs help precipitate equity borrowing among lasting leavers. The same trend does not obtain in the UK, however, where there is a national health service that is paid for by taxation.

5. Discussion and conclusion

This paper explores the complex relationships between owner-occupation on the one hand and mental and general health on the other, as they are shaped at the edges of ownership. Specifically, we test for the mental and general health effects of tenure transitions between owning and renting, and of two financial transactions at the heart of modern housing markets: mortgage debt and equity borrowing. We track these indicators over the first 17 years of the millennium across three jurisdictions, during an unprecedented cycle of house price appreciation, through a global financial crisis and into an era of both recovery and austerity.

Regarding tenure transition, we found growing flux at the expanding edges of owner-occupation: between a quarter and nearly half of owners in the study dropped out at some point before 2017. In Australia and the UK this carries a substantial mental health penalty, whether or not homeownership is later regained. Lasting leavers in all three jurisdictions also report worse *general* health than ongoing owners, both as owners, prior to exit, and subsequently as renters. This points not only to a stress effect on exit, but also to a degree of health selectivity in housing, both in precipitating exit from owner-occupation, and in stacking the odds against regaining the sector.

The financial transactions models underline the well-documented mental health premium attaching to outright ownership in all three jurisdictions, notwithstanding the upheavals the sector has endured in recent years. Mortgage borrowing, which most owner-occupiers have to engage in at some point, immediately, significantly and substantially detracts from that. The added impact of equity borrowing, so evident early in the millennium, is complex, though as a financial buffer it may play an important role for those seeking to maintain owner occupation through failing general health.

The experience of churners, documented here in unprecedented detail, is intriguing because they are neglected in the literature, under-serviced, and thought far rarer than they are. They report better mental health than lasting leavers, but fare worse than ongoing owners. On *general* health they do as well as ongoing owners in Australia, though not in the USA, nor, after leaving owner occupation, in the UK. It may be that the character of churning is distinctive in Australia, its health impacts eased by the size and diversity of the rental sector and cushioned by social policy.

If the test of housing systems anchored on owner-occupation is their capacity to support public health, this analysis, while documenting some institutional variety across jurisdictions, raises three key common concerns.

First, the mental and, importantly, general health premium attached to owner-occupation (in the case of general health, even mortgaged owner occupation) reflects a degree of health selectivity into and out of the sector that bears further scrutiny, as Hofmann *et al.* (2019) suggest in relation to households' position in the socio-economic structure. If the costs, conditions and accessibility of owner occupation cannot be attained or sustained by those with poor or declining health, then housing systems anchored on owner occupation are unlikely to be inclusive or well-functioning overall.

Second, tenure change carries a substantial mental health cost. This is partly about the stress of exiting owner-occupation, which is well-documented.However, there is a great deal more churn at the edges of ownership than policy makers acknowledge, and this has its own implications for wellbeing, the complexities of which have still to be fully unpacked (Popham

et al., 2015). Moreover, to the extent that churning is about adjusting costs to needs and ability to pay, residential relocation is an expensive and inefficient option, financially and in terms of wellbeing. A well-oiled rental sector may help, as it clearly does in Australia. However to the extent that more imaginative solutions exist (see, for example, Bao *et al.*, 2020; Shiller *et al.*, 2017), these findings add to the case for exploring them. Third, the mental stress of housing debt, notwithstanding the complex, and sometimes cushioning, effects of the flexibility conferred through equity borrowing, is all-pervasive. Yet, outside the owner occupied housing market, very few assets or enterprises are solely debt-funded. New businesses for example thrive on a mix of debt funding and equity investment. In housing markets, however, notwithstanding deposit requirements (usually, and necessarily, a small fraction of total asset values) home buyers are uniquely reliant on mortgage debt to fund home purchase. Scholars have long proposed equity finance as an alternative to debt funding for housing markets and there have been a few real-world experiments (Authors, 20xx). These findings add to the case for considering equity more seriously as a mainstream solution. Intuitively, sharing stakes in housing equity, and sharing both the risks and the rewards of that investment, has more appeal than carrying the interest rate risk on a loan whose value can quickly become detached from underlying asset prices.

In conclusion, the wellbeing premium traditionally associated with owner occupation may be alive and well, but our nuanced analysis shows it to be under threat at the edges of the sector in the three jurisdictions whose housing systems are most invested in the effectiveness of home ownership. That there is cross-national convergence is at once daunting and, equally, encouraging in offering scope to introduce policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems. We have proposed three promising avenues for further research: tackling health discrimination; instituting a suite of new policies to recognize size, structure and challenges of the edges of ownership, with particular emphasis on churning; and greater attention to the prospects and possibilities of equity finance for housing markets.

Notes

1. Equation (1) has also been estimated by fixed effects. Results are available from the authors on request. They add little to the narrative.

2. Refer to the Supplementary Table SI in the Online Appendix for the complete set of estimates including controls.

3. The reference group in both the mental and general health financial transaction models is then ongoing outright owners.

4. In Author (20xx), the mortgagor indicator is added as a separate variable.

5. Please refer to the Supplementary Table SII in the Online Appendix for the complete set of estimates including controls.

6. See Supplementary Table SII in the Online Appendix.

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Mental and general health at the edges of owner occupation

Purpose

One test of a well-functioning housing system is its impact on wellbeing. Addressing one indicator of this, we track changes in mental and general health across a mix of tenure transitions and financial transactions in three jurisdictions: Australia, the UK, and the USA.

Design/methodology/approach

Using matched variables from three national panel surveys (HILDA, BHPS/UKHLS and PSID) over 17 years (2000-2017), to capture the sweep of the most recent housing cycle, we adopt a difference-in-difference random-effects model specification to estimate the mental and general health effects of tenure change and borrowing behaviours.

Findings

There is an enduring health premium associated with unmortgaged owner-occupation. Mortgage debt detracts from this, as does the prospect of dropping out of ownership and into renting. A previously-observed post-exit recovery in mental health – a debt-relief effect – is not present in the longer run. In fact, in some circumstances both mental and general health deficits are amplified, even among those who eventually regain homeownership. Though there are cross-country differences, the similarities across these financialised housing systems are more striking.

Originality

The paper extends the duration of a previous analysis of the impact of tenure transitions and financial transactions on wellbeing at the edges of ownership in the UK and Australia. We now track households over nearly two decades from the start of the millennium into a lengthy post-GFC era of declining housing affordability. We add to the reach of the earlier study by adding a general health variable and a third jurisdiction, the USA.

Practical implications

The wellbeing premium traditionally associated with owner occupation is under threat at the edges of the sector in all three jurisdictions. In this there is cross-national convergence. There may therefore be scope to introduce policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems.

Key Words: Tenure transition, Panel surveys, Owner-occupation, Mortgage debt, Mental health, General health

1. Introduction

Well-functioning housing markets bring advantages to individuals, communities, and whole societies, securing quality, choice, affordability, stability and more in the residential environment. There are many criteria against which the successful functioning of housing markets can be bench-marked. One of them has traditionally been high rates of owner-occupation – a useful proxy for many things, that has, historically, been associated with a health and wellbeing premium (Authors, 20xx; Angel and Gregory, 2021; Foye *et al.*, 2018; Munford *et al.*, 2020; Zumbro, 2014).

There is a large literature exploring, sometimes questioning, the social and individual benefits of home ownership (Sodini et al. 2021), unpacking the mechanisms linking owner occupation to wellbeing outcomes (Baker et al. 2013), and indeed questioning whether it is home ownership or some cross-cutting factor (e.g. neighbourhood) that matters most (Lawder et al. 2013). There are also hard-to-resolve debates about causality in these literatures, which raise the possibility that health selection or discrimination, as much as the health impacts of housing transitions or outcomes, shape the health profile of owner occupation.

Criticially, however, ~~However,~~ the character of owner occupation has changed across~~is changing~~ the most recent housing cycle. There is growing evidence, especially in the English-speaking world – where some of the highest rates of owner-occupation have been observed – that the sector is becoming less accessible, more costly, and less sustainable (Arundel and Ronald, 2021; Perraton, 2019; Author, 20xx), and less able to extend access to opportunity in the way that it once did (Rohe *et al.,* 2002)~~.~~ So, other caveats aside, it is already possible that high rates of ownership are ~~already~~ less appealing as a measure of well-functioning housing systems than once was thought.

To test this claim, we ~~consider~~look across almost two decades – spanning the run into and recovery from a global financial crisis, and embracing practically an enture housing cycle – to consider -whether and to what extent the mix of financial transactions and tenure transitions required to sustain owner occupation may compromise the wellbeing of home occupiers. If positive health is a key measure of the impact of public policy, especially in the 'wellbeing' economies (Leppo *et al.,* 2013), a system that detracts systematically from that could hardly be thought of as "well-functioning."

Specifically, using panel survey data, we scrutinise three major ownership-centred housing systems – in the USA, Australia and the UK across the opening decades of the millennium. These English-speaking countries between them formed the leading edge of the expansion of owner-occupation through the late 20th century and into the ~~present millennium~~2000s. In all three countries, that sector is now contracting (Authors, 20xx), and as it does so, the edges of ownership are expanding (Authors, 20xx). These edges have come under growing scrutiny in recent years as it has become clear that the seemingly sharp tenure divide is not just a line between renting and owning that some are lucky enough to cross, but rather a precarious permeable zone in transition that some households never escape. They neither travel on into outright ownership, nor settle into longer term renting; rather they ~~; they form~~occupy an under-instituted, highly indebted, financially underserved mix of tenures which together ~~and increasingly precarious zone between owning and renting~~ contain some important signals about the functioning of the housing system as a whole (Haffner *et al.,* 2017). ~~Such margins~~The edges of ownership may soon accommodate more households than the mainstream and thus merit more attention.

These edges ~~of ownership~~ have, moreover, recently been~~are~~ characterised by a surprising degree of flux. Conventionally following a scramble to get into the sector, and gradually pay down debts, we expect households to enter the more secure mainstream of near or completely outright ownership. Increasingly however mortgagors add to their debts, perhaps to move upmarket, but often to raise funds (through equity borrowing) to meet other pressing needs – a process which, arguably, places them closer to the edges of ownership than they once were (Authors, 20xx; Authors, 20xx). Furthermore, while some households are vulnerable to dropping out altogether (lasting leavers), others shelter for a while in the rented sector before regaining ownership – a transition they might make more than once as these 'churners' bid to retain owner occupation (Author 20xx). Although 'churn' has been documented before for these jurisdictions, in this paper we cover a particularly long run of data – nearly two decades – to cast new light on the experiences of an important group, occupying a liminal space in the housing system that has been neglected in the literature and in policy circles, yet ~~that~~ has theoretical as well as practical import as housing takes centre stage in the asset economy (Adkins et al. ; Authors 2021).~~-~~

In short, we consider what happens to the health premium traditionally associated with owner-occupation when households engage in the mix of tenure transitions and financial transactions required to navigate the edges of ~~the sector~~ownership across almost an entire housing cycle. To explore this, we construct matched samples of owner-occupiers for all three jurisdictions and track them and their myriad characteristics over time as they move away from, towards or across the edges of ownership, adding to assets, adjusting debts and changing tenures. Wellbeing is of course much more than positive health, and there is a cluster of measures in the panel surveys that usefully tap into that. However, not all of the measures are comparable across jurisdictions and health is a common denominator.

We therefore rely on two measures of health, general and mental health, as proxies for wellbeing in this paper, and as indicators in their own right of the health impacts and implications of housing transtitions. These health measures are self-reported, which does have some limitations, though overall the literature finds reasonably close links between self-rated, or subjective, and objectively measured health indicators (Lorem et al. 2020; Wuorela et al. 2020), and accepts, though not uncritically, that self-rated health is a good indicator of both morbidity and mortality

First, we use a measure of mental health. Even though this measure is only available for the UK and Australia, it enables us to replicate, extend and test some of the findings from an earlier study (Authors 20xx). We are able to extend the study timeframe by seven years to capture both the impacts of the Global Financial Crisis (GFC) and a period of recovery. That post-GFC dimension is important because at the same time as property values recovered and equity positions were restored, an institutional leaning to "~~"~~business as usual" was coupled with underemployment, labour market precarity, and a new round of credit constraints. So, this longer run of observations offers a potentially important addition to our understanding of how wellbeing fares as housing systems adjust to external shifts and shocks.

Second, we extend the analyses of the previous work using the complementary general health indicator, which allows us to capture a different aspect of wellbeing, potentially shedding new light on the causal complexities of the housing/health nexus ~~and to broaden the geographical reach to include the USA.~~ . We also broaden the geographical reach of the earlier analysis to include a third jurisdication, the USA – ~~The USA introduces a new dimension: it was~~ the epicentre of the enormous disruption to housing markets triggered by the GFC, havings less complete mortgage markets than Australia or the UK, less regulated housing markets, and a

relatively weak welfare safety net. This is in stark~~In~~ contrast to~~,~~ the UK which has a relatively large, albeit shrinking, social housing system, ~~while~~ and Australia ~~has~~ where there are generous, if ~~albeit~~ means-tested, income support programmes and private sector delivery of key welfare benefits such as pensions and minimum wages. So it might be that such ontological security as near or outright homeownership implies is more keenly felt in the USA, and more easily damaged there than in countries with more developed welfare states.

We proceed by describing the data resources and specifying the models. Then we report in turn on the mental and general health effects of two styles of tenure transition and two financial transactions. We offer both conclusions and recommendations.

2. Data resources

In the paper, we employ the British Household Panel Survey (BHPS) together with its successor, Understanding Society (UKHLS), the Household, Income and Labour Dynamics in Australia (HILDA) Survey, and the Panel Study of Income Dynamics in the USA (PSID). In an earlier study, Naoi *et al.* (2018) applied a similar approach by using panel surveys for Australia, the UK and Japan to explore the role of institutions in mortgage demand behavior in these three countries.

Our sample timeframe commences in 2001, which coincides with the start year of the HILDA Survey and ~~.~~ captures the run up to the GFC. Waves prior to 2001 in BHPS and PSID were excluded to provide the same start year across all three countries. A slightly earlier start, in the mid- to late- 1990s would have tracked the very beginnings of the present housing cycle but that could only have been achieved in one country (the UK) for both health variables and would add little to the analysis. ~~–~~The latest wave available at the time of analysis was for the year 2017 capturing the period of post-GFC recovery. Thus the maximum timeframe is 17 years [1]. For those who died before 2017, the end year is the year of death. Those who formed independent households after 2001 enter the sample timeframe in the year they become independent and ends in 2017.

We employ a sample design that includes all independent adults who report one or more spells of owner-occupation (each spanning one or more years) between 2001 and 2017 (or the year of death if it occurs before 2017), commencing from the first wave in which an individual is observed to be independent and an owner occupier. 'Permanent' renters (those with no ownership spell in the study period) are excluded for the pragmatic reason that it is difficult to measure changes in their position relative to the edges~~d~~ of ownership and to track the differential mental health effects of the varied long term rental positions people may occupy - for example, aspiring to own and having a realistic anticipation of doing so in due course, aspiring to own and failing to buy, and not aspiring to own at all. This group does, nevertheless, merit more attention in its own right (Rolfe et al, 2020) [2].

An unbalanced panel for each respective country is used, and the unit of analysis is person-year observations. That is for each person in the sample, we included one count per year from the first year in which the person is observed as an owner. For example, suppose a person entered ownership for the first time in the data ~~timeframe~~ window in the year ~~2005~~2010, exited ownership in ~~2010~~2012, and remained in the rental sector until~~l~~ 2017 (a lasting leaver). We count ~~14~~ 8 person-year observations comprising episodes from ~~2005~~ 2010 to 2017. So, although each individual is assigned to one of three ownership types – ongoing owner, lasting leaver or churner – we measure their various characteristics (in a single year for a given person)

in all circumstances: when they are renting, when they are owning, when they are in debt, when their assets are unmortgaged and so on.

[Table I here]

Table I summarises the housing trajectories of the whole sample across the timeframe of the study. *Ongoing owners*, who have unbroken ownership spells from their first year of entry till the end of the timeframe, form the majority, accounting for three-quarters of the UK sample, two-thirds in the USA and just under sixty per cent in Australia. This is high, but not as high as in the previous study, which might be expected over the long-time frame, though it might also tap into a structural change over time in the sector. *Lasting leavers* have one ownership spell which ends before 2017 and is followed by a rental spell ongoing to the last observation. These form the minority, accounting for less than ten per cent of the sample in the UK and Australia and just over ten per cent in the USA. *Churners* have two or more ownership spells within the observation period: one third of Australians, one quarter of the USA sample, and ~~less than~~nearly one in five in the UK fall into this group.

The dominant impression, then, is that, for the majority, once owner occupation is attained, it is generally sustained notwithstanding the impact of the GFC. This is consistent with other findings (Authors, 20xx). However, two in five Australians, one in three Americans and one in four in the UK left the sector during the observation period: double the proportions of the earlier study. The fact that, among those who exit, most return to owner occupation at least once (four in five returns in Australia, just over 70% in the UK, and just under 70% in the USA) confirms that any apparent stability may be an illusion. These housing markets – or at least the zones that form the edges of ownersip – are equally characterised by flux.

[Table II here]

As well as tracking tenure transitions, we are interested in the financial transactions that position households relative to the edges of ownership and help prevent or precipitate movements out of, or back into, the sector. For these variables, key descriptives can be viewed in Table II, which mainly counts person-years. Among financial transactions, mortgage debt is the obvious and widely used measure, and most owner-occupied spells, and most of the person-years comprising them are accounted for by mortgagors. During their spells in ownership, 86% of US owner occupiers still had mortgages to pay in at least one year of their spells; this is true for 71% in Australia and 64% in the UK where outright ownership is more common than in the other jurisdictions.

A particular feature of our analysis is that it also measures the effects of equity borrowing, which occurs when home buyers add to their mortgage to raise funds for non-housing expenditure. This facility was, until recently, routinely built into mortgage contracts, and was commonly used, especially among borrowers with pressing spending needs and a narrow non-housing investment portfolio. In the short run, equity borrowing can help home buyers cling on to the edges of ownership longer than might otherwise have been the case (Authors, 20xx), but equally, for some at least, the practice is unsustainable in the long run (Authors, 20xx). Between 2001 and 2017, equity borrowing during spells of ownership was employed during three in every five (61%) person-years in Australia and the USA, and by nearly half (47%) in the UK. Although households with ongoing mortgage contracts sustained these rates through the GFC, the sharp credit constraints that followed generally reduced access to this facility, which nevertheless continues to play a significant role, especially for households with narrow wealth portfolios and pressing spending needs (Authors 20xx)

To capture the effect of a mix of housing transitions and financial transactions on wellbeing we use two dependent variables: mental health (in the UK and Australia) and general health (in all three jurisdictions). HILDA records the mental health component of the SF-36, on a scale of 0 (least healthy) to 100 (most healthy); BHPS and UKHLS use the GHQ12 on a scale of 0 (least distressed) to 36 (most distressed). For heuristic purposes, we follow Searle (2008) by using the inverse of the GHQ12 scale in our analysis so that, in the case of both countries, higher scores on the mental health variable denote less distress.

We measure general health using a five-point self-assessed general health measure. In HILDA, UKHLS and PSID, the general health measures are perfectly matched, with rankings of 1 to 5 representing excellent, very good, good, fair to poor health. In the BHPS, the rankings have slightly different labels, with rankings of 1 to 5 representing excellent, good, fair, poor and very poor health. However, we ignore this inconsistency, assuming that respondents simply rank their health outcomes from best to worst from 1 to 5. We also reverse-score the general health variables in the surveys, so that 1 represents worst health and 5 represents best health. This achieves some consistency in the treatment of all health measures – both mental and general – across all models in the paper. Note that because mental health is measured in different units in Australia and the UK, the means and medians shown in Table II are not comparable. With respect to self-assessed general health, however, we find that the health scores are much more skewed towards the best health score of 5 in the USA and UK than in Australia.

We complete the data resource by adding a variety of demographic and socio-economic control variables, whose descriptives are also shown in Table II. In summary, the USA sample presents the most youthful age profile with a median age of 51 years, compared to 54 years in Australia and 56 years in the UK, where we also record the most child-free cycles. The majority of person-years in all jurisdictions are spent in marriage, though this is markedly higher at 79% in the USA as compared to the other two countries. The USA also has the highest incidence of university education (36%), and of full-time employment, as well as the greatest disparity of incomes.

3. Analytical strategy

To capture the health effects of occupying the edges of owner occupation, we specify two models for each of the two measures of health. The first quantifies the effects on mental and general health of tenure transitions out of, and where applicable back into, owner-occupation. The second adds the effects of debt. Both are random effects models controlling for unobserved heterogeneity in the data by assuming that its important components are constant across the study period and uncorrelated with known, measurable and modelled variables. This unobserved heterogeneity could, for example, include tastes, preferences or innate pessimism or optimism that shape health outcomes but are unmeasured, as well as unknown, unmeasurable, idiosyncratic influences specific to an individual. An ~~irresolvable~~ limitation of this kind of approach is that the assumptions relating to unobserved heterogeneity may not be warranted; however, as Authors (20xx, p1086) explain these assumptions are more convincing given a sample design that excludes 'permanent renters'. Nevertheless, conclusions based on the results should ~~therefore~~ be treated cautiously.

In the models, we adopt a difference-in-difference model specification using a random effects estimator that is defined by:

$$Health_{it} = \alpha_0 + \alpha_1 Leaver_i + \alpha_2 Leaver_i * post_{it} + \alpha_3 Churner_i + \alpha_4 Churner_i * post_{it} +$$

$$a_i + u_{it} \quad (1)$$

where *i* and *t* subscript individuals and time period respectively, and $Health_{it}$ is a measure of mental health (or general health) for individual *i* at time *t*. Time-invariant indicator variables distinguish between ongoing owners ($Owner_i$~~,~~ ~~—~~), lasting leavers ($Leaver_i$) and churners ($Churner_i$). $Owner_i$ equals one if the person has retained ownership throughout the data timeframe, zero otherwise. $Leaver_i$ equals one if the person loses ownership and has not returned to owner-occupation by 2017, zero otherwise. $Churner_i$ equals one if the person loses ownership but returns to owner-occupation at least once by 2017, zero otherwise. These variables enter regression models separately, with ongoing owners being the omitted category. The included ownership pathway categories are interacted with a variable ($post_{it}$) identifying whether wave *t* belongs to an episode when leaver *i* (or churner *i*) has left homeownership andis renting. Hence, $Post_{it}$ equals one in wave t if individual i is renting in that wave, zero otherwise. The interaction terms ~~specifically~~ measure differences in wellbeing before and after an exit from homeownership has occurred. This difference-in-difference design is an established quasi-experimental method of detecting causality through ~~by enabling us to~~ measurement of the 'before' and 'after' effects of a phenomenon (Lechner 2010; Wing 2018).

With respect to mental health these models replicate an earlier two-country study using random effects regression models (Author 20xx) [~~1~~3]. In the model of general health, which brings in our third jurisdiction, random effects ordered logit estimates were obtained, with self-assessed general health ranked on a scale of 1 to 5, where 1 represents the worst health outcome and 5 represents the best health outcomes. A key assumption of the ordered logit model is the proportional odds assumption, which presumes that the relationship between each pair of outcome categories is the same. Hence, the coefficient attached to each predictor gives the log-odds of achieving a rank of $r+1$ relative to a rank of r as a result of a unit change in the predictor.

4. Results

4.1. The health impacts of tenure transitions

Table III presents the random effects estimates from the tenure transitions models. After taking account of a range of common controls (including gender and age), they indicate that, for mental health in the UK and Australia and for general health in all three countries, the prospect, risk and fact of dropping out of ownership for the long run (being a lasting leaver) is associated with a strong and significant wellbeing deficit compared to ongoing owners.

[Table III here]

All else equal, the mental health profile of leavers and churners in Australia and the UK before and after they exit owner-occupation lies well below that of ongoing owners. For lasting leavers these disparities are substantial and eclipsed in magnitude only by the mental stress of long-term disability or illness, unemployment, and separation. For churners, the effects are less marked but still on a par with, for example, divorce.

To the extent that this taps into the mental stress of households approaching the edges of ownership there are many reasons for returning lower scores than those accommodated in the mainstream, including affordability stress (Bentley *et al.,* 2022) and indebtedness (Keene *et al.,*2015), which we return to later. These financial stressors may interact with and exacerbate the stress associated with a range of other biographical disruptions known to put family homes

at risk, and the findings are consistent with a well-documented sustainability stress effect at the precarious edges of ownership experienced by households who are at risk of leaving the sector (Authors, 20xx).

In an earlier study, spanning most of the decade from 2001, as well as a stress effect among those who drop out of owner-occupation, we found evidence of a mental health rebound during rental spells, which might have reflected the immediate effects of shedding mortgage debt, and/or of finding a 'soft landing' in parts of the rented sector (Author, 20xx). However, the earlier study spanned less than a decade, so some rental spells would have been short – too short perhaps to explore a suggestion in the wider literature that the mental health gains of residential relocation can be short-lived (Foye, 2016; Stotz, 2019). The model estimates listed in Table III address this by analysing rebound impacts over a longer duration and presenting an interaction term that isolates the mental health effect of having left owner-occupation (ie offering a window at least on likely causalities). For leavers in both Australia and the UK, these terms are insignificant: that is, any rebound effect has all but disappeared. For churners in the UK, moreover, there is evidence of significantly more, not less, mental stress after exit, perhaps reflecting the pressure they feel to regain a housing position they have lost.

So, the extended time period is important. It appears that the rebound in wellbeing detected in the earlier study could be a short-lived response to the alleviation of financial pressures that most leavers experience. As spells in rental housing lengthen, so the rebound in wellbeing may be eroded too, perhaps, for example, as some are forced to move again when short leases are terminated. Alternatively, it may reflect adaptation to new housing situations that gradually lose their novel character as individuals tend to focus less attention on them (Stotz, 2019, p.100). It is also possible that the earlier study captured a sense of wellbeing among a group who *appeared* to be lasting leavers but who in fact returned to ownership after the cut-off in the previous study.

The measure of *general* health, available in all three jurisdictions, may represent a slightly different story. Lasting leavers in every country report worse general health than ongoing owners in all circumstances. This suggests that people in poor health may find it hard to sustain owner-occupation (perhaps reflecting the impact of health on earnings, job security, households' expenditures and so on); i.e. exit may be selective against those with depressed general health, for a variety of documented reasons (Authors, 20xx). The interaction term leaver x left homeownership shows a significant further dip in general health among lasting leavers following their loss of ownership. This could offer support for the selection effect idea if it is capturing the course of conditions that are anyway progressive. But it might also reflect a dip in general health that would not have happened if ownership had been sustained, and that has been exacerbated by life as a renter.

The general health of churners differs from that of lasting leavers, as might be expected; the churners after all are set to regain ownership in due course. It is only in the USA that their overall profile is depressed relative to ongoing owners, and this is true whether they are in an ownership or a rental spell; perhaps they are switching between owning and renting to manage the changing costs and needs of ongoing health conditions that keep them close to the margins of homeownership. Uniquely in the UK, ~~however,~~ where, during ownership spells, churners are more like ongoing owners in their overall general health profile, after leaving the sector, churners' health worsens.

To explore this further, we considered the possibility that the health effects of exiting ownership differ according to where people 'land'. This depends in part on the nature of the

rented sector, and on this we can expect some institutional variety between the three countries. Generally, leavers and churners departing owner occupation exit into a variably regulated largely private rental sector whose quality, cost and conditions cannot be assured. Some, however, move into secure and affordable settings such as social renting or into some other 'soft landing' such as rent-free accommodation with family. Such 'soft' landings may avoid the risk of private landlords terminating leases, increase the prospect of securing housing well matched to needs, and may offer – in the case of family accommodation – anm opportunity to rebuild assets in a welcoming environment. For those slipping out of ownership because of acute financial stress and poor health, into these settings, we might expect more rebound in mental health than, say, exiting into costly, possibly lonely, mixed-quality private rental.

To check whether a health-cushioning effect might be detected, and might indeed endure, conditional on entry into social (rent free) housing, we re-ran both models. The specifications differentiate between those who did, and did not, secure a 'soft landing' either by entering the social sector (which we can expect to cater to housing needs more effectively than private renting), or by securing rent free accommodation to help cushion debt overhang or other financial stress. The results are presented in Table IV [24].

[Table IV here]

In Australia, but not the UK, there is a strong and significant mental health rebound for the minority of lasting leavers who exit into social housing or rent-free living of some kind (the numbers are too small to differentiate). Churners, on the other hand, who we know often benefit financially from living rent free - it is indeed a factor that helps propel them back into owner occupation (Authors, 20xx) – do not experience any significant wellbeing gains from that fact. In the UK, where there is no lasting benefit from dropping out into the social sector compared to any other rental outcome, and churners exiting into social or rent-free housing not only fail to report any general health improvement (a tendency shared by lasting leavers) but also suffer a mental health penalty. While this may seem counter-intuitive, given the aims of the social sector, it could reflect the likelihood that, unlike lasting leavers, churners may have very strong ownership aspirations, and so find their time in social/rent free housing an uncomfortable one. It is not, however, clear why they should do worse than their Australian counterparts, except that British churners tend to hang on to their ownership status for longer and may find a 'soft landing' particularly difficult (especially if they end up living with family or friends which underlines all they have lost). They are also much slower to return to homeownership and so any frustration associated with their social/rent free housing experience is likely to be more persistent in Britain (Authors, 20xx).

We also looked at this within-renting differential for general health (see Table IV). There are no significant findings in the US model estimates where the institutional setting post-departure appears to be of no import. In Australia, the general health of churners shows little change post-exit, and it does not matter where in the rental sector they land. However, a post-exit dip in general health among lasting leavers characterizes both rental settings; if anything, Australian leavers fare worse with a soft landing – or viewed another way, access to the welfare role of housing may be conditional on deteriorating health, especially progressive health conditions that would worsen whatever the housing circumstances. This latter explanation is certainly relevant in the UK, where the general health profile of those who exit into private rental is much the same as it was in their ownership spell, whereas those who exit into the social sector are in poorer health, something that could have given them priority access to social housing. So, this extra piece of analysis confirms that there are different narratives for mental and

general health – stress effects and health selection, respectively – which is an important policy-relevant finding.

4.2 Financial transactions: Impacts on mental and general health

So far, we have shown that the transition from ownership to renting represents a major biographical shift that can be associated with an enduring dip in mental and/or general health in all three countries. There are many factors driving this but the most widely recognised causal mechanism cited in the literature is financial stress, particularly that arising from unsustainable debt, and especially from debt secured against homes. To explore the effects of debt, we re-estimate both the random and fixed effects models (as above, the latter add little so that only the former are presented in detail). To capture a "mortgagor effect" on wellbeing, we employ a time-invariant binary variable equal to one if an individual was a mortgagor at any point during the timeframe, zero otherwise. We interact this indicator variable with each ownership trajectory (ongoing owners, leavers, and churners) [~~3~~5].

We also add a binary measure of in situ equity borrowing which we interact with mortgage-holding to identify the independent health effects for mortgagors of increasing their outstanding mortgage debt without moving home (thus raising money to spend on other things.) This variable is equal to one if an individual adds *in situ* to their outstanding mortgage debt at any point during an ownership spell, zero otherwise. This model specification is more nuanced than that in Author (20xx) [46] because the interaction variables not only split each ownership trajectory into mortgaged and un-mortgaged pathways, but also signal, for mortgagors, whether they have engaged in equity borrowing or not. An outstanding mortgage burden inflated by equity borrowing may, on the one hand, help pressure the leaver to exit, while on the other hand, for the ongoing owner and churner, it may reduce binding budget constraints by funding discretionary spend. The longer time frame, and hence much larger number of observations, facilitates the more complex analysis of indebted ownership trajectories in this paper.

The results of this financial transactions specification are summarised in Table V [~~5~~7]. Note that although we initially ran a set of additional models to again capture exit into different rental settings (social/rent free on the one hand and private rental on the other), the findings add little to the points made above and the exercise is not, therefore, repeated in the results presented below.

[Table V here]

Table V confirms, with one caveat, that the previously observed substantial and significant mental health premium for ongoing outright ownership endures across the board in both Australia and the UK. The caveat is in the UK, where, among ongoing owners, mortgagors' mental health scores are in line with those of outright owners, *as long as* they avoid equity borrowing. For UK owner occupiers, whatever spending needs equity borrowing might meet, the net effect of adding to housing debt detracts from mental wellbeing. Among ongoing owners in Australia, in contrast, while all mortgagors report worse mental health than outright owners, equity borrowers fare slightly better than other mortgagors. Here the added funds have a cushioning effect on mental health.

Turning to leavers and churners we see that, in both countries, for the most part these groups report worse mental health outcomes than ongoing outright owners. In Australia, whether

renting or owning, leavers and churners fare worse than any ongoing owner (mortgaged or not), whereas in the UK, leavers and churners who were once outright owners retain the mental health premium attached to that (reflecting, perhaps, that they are unlikely to have been in financial stress before their exit). In part these results simply amplify the exit effect on mental health noted above, for all housing finance positions other than those who were once mortgage free owners in the UK. For the other leavers and churners - those carrying mortgage debt during their ownership spells - and, again, as compared to ongoing outright owners, a relatively large negative exit effect is detected. Its size, all else equal, is similar to that estimated for a biographical status such as divorce or bereavement that is known to have large negative effects [~~68~~]. More importantly what these results underline is the importance of financial stress associated with carrying mortgage debt on the edges of ownership across the board.

With the exception of lasting leavers in the UK these effects are slightly cushioned for those who, as owner occupiers, engaged in equity borrowing: that is, for churners in both countries, and for lasting leavers in Australia, equity borrowing during ownership eased their journey into renting, and may have helped position churners for return. Perhaps mental health benefits from having funds to draw down for discretionary spending, and is depressed among conventional mortgagors who pay down debts more quickly yet have less flexibility/liquidity. For UK leavers, however, this is not the case; they, like their mortgagor counterparts in ongoing ownership, find that equity borrowing exacerbates the debt effect on mental health. It may therefore ~~-~~ be that equity borrowing in ~~Australia and~~ the UK, where it is used more sparingly (see Table II), serves different purposes from those in Australia. For example, rather than using equity borrowing to meeting discretionary spending needs such as school fees, and home renovations, leavers and ongoing owners in the UK may use it to fund more acute spending needs – arising from unexpected adverse events such as redundancy – thus adding debt to the stress of other adverse shocks

Turning now to *general* health effects, and bringing the USA into ~~-~~ the panel of countries, the key finding for all three jurisdictions is that among ongoing owners, there is no debt effect on general health. Put another way, mortgagors have the same general health profile as outright owners provided ownership is enduring. That is also true for most churners. These groups report better general health than lasting leavers who, whether they were equity borrowers or not (though equity borrowing again amplifies the effect in the UK), report significantly worse general health than the rest. These findings seem most likely to testify to a selection effect - much as hinted at earlier - whereby those in poorer general health simply cannot sustain the costs and meet the conditions of sustaining owner occupation.

Outright owners who become lasting leavers in the USA underline this point: they show worse general health than their counterparts who do not drop out of ownership. It may be that with only limited public health safety nets, and credit constraints imposed by their incomes or employment options, those with serious health conditions have to sell up to finance medical treatments and manage the costs of living with ongoing, perhaps worsening, ill health. The outliers in the UK are outright owners who become churners: they also show worse health than those ongoing in the sector. The likelihood here is that they are trading on into accommodation better suited to health needs, and/or trading down to release funds to meet spending needs associated with, or exacerbated by, their health condition.

In the *general* health models, there is no evidence among lasting leavers of a cushioning effect from equity borrowing in the USA and Australia. In fact, in these countries equity borrowers who become lasting leavers report slightly worse general health than mortgagors who left ownership without adding to their loans Perhaps pressing medical treatment needs help

precipitate equity borrowing among lasting leavers. The same trend does not obtain in the UK, however, where there is a national health service that is paid for by taxation.

5. Discussion and conclusion

This paper explores the complex relationships between owner-occupation on the one hand and mental and general health on the other, as they are shaped at the edges of ownership. Specifically, we test for the mental and general health effects of tenure transitions between owning and renting, and of two financial transactions at the heart of modern housing markets: mortgage debt and equity borrowing. We track these indicators over the first 17 years of the millennium across three jurisdictions, during an unprecedented cycle of house price appreciation, through a global financial crisis and into an era of both recovery and austerity.

Regarding tenure transition, we found growing flux at the expanding edges of owner-occupation: between a quarter and nearly half of owners in the 17 year observation 'window'~~study~~ dropped out at some point before 2017. In Australia and the UK this carries a substantial mental health penalty, whether or not homeownership is later regained. Lasting leavers in all three jurisdictions also report worse *general* health than ongoing owners, both as owners, prior to exit, and subsequently as renters. This points not only to a stress effect on exit, but also to a degree of health selectivity in housing, both in precipitating exit from owner-occupation, and in stacking the odds against regaining the sector. We do not look, in this paper, at the mental or general health profile of 'permanent' renters, but that would be a helpful next step in developing this argument.

The financial transactions models underline the well-documented mental health premium attaching to outright ownership in all three jurisdictions, notwithstanding the upheavals the sector has endured in recent years. Mortgage borrowing, which most owner-occupiers have to engage in at some point, immediately, significantly and substantially detracts from that premium. The added impact of equity borrowing, so evident early in the millennium, is complex, though as a financial buffer it may play an important role for those seeking to maintain owner occupation through failing general health.

The experience of churners, documented here in unprecedented detail, is intriguing because, like the edges of ownership they occupy, they are neglected in the literature, under-serviced, and thought far rarer than they are. They report better mental health than lasting leavers, but fare worse than ongoing owners. On *general* health they do as well as ongoing owners in Australia, though not in the USA, nor, after leaving owner occupation, in the UK. It may be that the character of churning is distinctive in Australia, its health impacts eased by the size and diversity of the rental sector and cushioned by social policy.

If the test of housing systems anchored on owner-occupation is their capacity to support public health, this analysis, while documenting some institutional variety across jurisdictions, raises three key common concerns.

First, the mental and, importantly, general health premium attached to owner-occupation (in the case of general health, even mortgaged owner occupation) reflects a degree of health selectivity into and out of the sector that bears further scrutiny, as Hofmann *et al.* (2019)

suggest in relation to households' position in the socio-economic structure. If the costs, conditions and accessibility of owner occupation cannot be attained or sustained by those with poor or declining health, then housing systems anchored on owner occupation are unlikely to be inclusive or well-functioning overall.

Second, tenure change carries a substantial mental health cost. This is partly about the stress of exiting owner-occupation~~,~~ into a position of housing disadvantage, which was ~~is~~ well-documented for the last housing cycle, and is increasingly evident across recent years (Singh et al. 2019). However, there is a great deal more churn at the edges of ownership than policy makers acknowledge, and this has its own implications for wellbeing, the complexities of which have still to be fully unpacked (Popham *et al.*, 2015). Moreover, to the extent that churning is about adjusting costs to needs and ability to pay, residential relocation is an expensive and inefficient option, financially and in terms of wellbeing. A well-oiled rental sector may help, as it clearly does in Australia. However to the extent that more imaginative solutions exist (see, for example, Bao *et al.*, 2020; Shiller *et al.*, 2017), ~~–~~these findings add to the case for exploring them.

Third, the mental stress of housing debt, notwithstanding the complex, and sometimes cushioning, effects of the flexibility conferred through equity borrowing, is all-pervasive. Yet, outside the owner occupied housing market, very few assets or enterprises are solely debt-funded. New businesses for example thrive on a mix of debt funding and equity investment. In housing markets, however, notwithstanding deposit requirements (usually, and necessarily, a small fraction of total asset values) home buyers are uniquely reliant on mortgage debt to fund home purchase. Scholars have long proposed equity finance as an alternative to debt funding for housing markets and there have been a few real-world experiments (Authors, 20xx). These findings add to the case for considering equity more seriously as a mainstream solution. Intuitively, sharing stakes in housing equity, and sharing both the risks and the rewards of that investment, has more appeal than carrying the interest rate risk on a loan whose value can quickly become detached from underlying asset prices.

In conclusion, the wellbeing premium traditionally associated with owner occupation may be alive and well, but our nuanced analysis shows it to be under threat at the edges of the sector in the three jurisdictions whose housing systems are most invested in the effectiveness of home ownership. There are institutional dimensions to this which are explored elsewhere (Authors et al., 2023) ~~-~~However, that facts of such marked~~That there is~~ cross-national convergence are striking. They are~~is~~ ~~at once~~ daunting in pointing to common themes in the repositioning of housing, to the disabvantage of of homeoccupiers, in the asset economy (Authors 2022). ~~and,~~Yet, at the same time, this convergence e~~-e~~qually offers~~, encouraging in offering~~ scope to ~~introduce~~ develop policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems. We have proposed three promising avenues for further research and practice: tackling health discrimination; instituting a suite of new policies to recognize size, structure and challenges of the edges of ownership, with particular emphasis on churning; and greater attention to the prospects and possibilities of equity finance for housing markets.

Notes

1. The UKHLS was designed to ensure continuity with the BHPS data. However, fieldwork for wave 1 of the UKHLS began in January 2009, which coincided with the final wave interviews of the BHPS during September 2008 to April 2009. Because of this, the BHPS sample could not be included in wave 1 of the UKHLS. Instead, the BHPS sample was first interviewed in wave 2 of the UKHLS, with fieldwork conducted during the year 2010 (Laurie 2010). Thus, there is a gap of more than one year between their final BHPS interview in 2008 and BHPS respondents' first UKHLS interview in 2010. This is a data limitation of the UK sample.

2. Omission of 'permanent' renters also helps address selection effects that could falsely attribute health differences to tenure when in fact due to unobserved variables correlated with tenure (see Authors 201x, p1086).

~~1.~~3. Equation (1) has also been estimated by fixed effects. Results are available from the authors on request. They add little to the narrative.

~~2.~~4. Refer to the Supplementary Table SI in the Online Appendix for the complete set of estimates including controls.

~~3.~~5. The reference group in both the mental and general health financial transaction models is then ongoing outright owners.

~~4.~~6. In Author (20xx), the mortgagor indicator is added as a separate variable.

~~5.~~7. Please refer to the Supplementary Table SII in the Online Appendix for the complete set of estimates including controls.

~~6.~~8. See Supplementary Table SII in the Online Appendix.

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Note: Self-references have been removed and replaced with Author (20xx) or Authors (20xx) in the articles. Full references list will be provided upon request.

Mental and general health at the edges of owner occupation

Purpose

One test of a well-functioning housing system is its impact on wellbeing. Addressing one indicator of this, we track changes in mental and general health across a mix of tenure transitions and financial transactions in three jurisdictions: Australia, the UK, and the USA.

Design/methodology/approach

Using matched variables from three national panel surveys (HILDA, BHPS/UKHLS and PSID) over 17 years (2000-2017) to capture the sweep of the most recent housing cycle, we adopt a difference-in-difference random-effects model specification to estimate the mental and general health effects of tenure change and borrowing behaviours.

Findings

There is an enduring health premium associated with unmortgaged owner-occupation. Mortgage debt detracts from this, as does the prospect of dropping out of ownership and into renting. A previously-observed post-exit recovery in mental health – a debt-relief effect – is not present in the longer run. In fact, in some circumstances both mental and general health deficits are amplified, even among those who eventually regain homeownership. Though there are cross-country differences, the similarities across these financialised housing systems are more striking.

Originality

The paper extends the duration of a previous analysis of the impact of tenure transitions and financial transactions on wellbeing at the edges of ownership in the UK and Australia. We now track households over nearly two decades from the start of the millennium into a lengthy post-GFC era of declining housing affordability. We add to the reach of the earlier study by adding a general health variable and a third jurisdiction, the USA.

Practical implications

The wellbeing premium traditionally associated with owner occupation is under threat at the edges of the sector in all three jurisdictions. In this there is cross-national convergence. There may therefore be scope to introduce policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems.

Key Words: Tenure transition, Panel surveys, Owner-occupation, Mortgage debt, Mental health, General health

1. Introduction

Well-functioning housing markets bring advantages to individuals, communities, and whole societies, securing quality, choice, affordability, stability and more in the residential environment. There are many criteria against which the successful functioning of housing markets can be bench-marked. One of them has traditionally been high rates of owner-occupation – a useful proxy for many things, that has, historically, been associated with a health and wellbeing premium (Authors, 20xx; Angel and Gregory, 2021; Foye *et al.*, 2018; Munford *et al.*, 2020; Zumbro, 2014).

There is a large literature exploring, sometimes questioning, the social and individual benefits of home ownership (Sodini et al. 2021), unpacking the mechanisms linking owner occupation to wellbeing outcomes (Baker et al. 2013), and indeed questioning whether it is home ownership or some cross-cutting factor (e.g. neighbourhood) that matters most (Lawder et al. 2013). There are also hard-to-resolve debates about causality in these literatures, which raise the possibility that health selection or discrimination, as much as the health impacts of housing transitions or outcomes, shape the health profile of owner occupation.

Criticially, however, the character of owner occupation has changed across the most recent housing cycle. There is growing evidence, especially in the English-speaking world – where some of the highest rates of owner-occupation have been observed – that the sector is becoming less accessible, more costly, and less sustainable (Arundel and Ronald, 2021; Perraton, 2019; Author, 20xx), and less able to extend access to opportunity in the way that it once did (Rohe *et al.,* 2002). So, other caveats aside, it is already possible that high rates of ownership are less appealing as a measure of well-functioning housing systems than once was thought.

To test this claim, we look across almost two decades – spanning the run into and recovery from a global financial crisis, and embracing practically an enture housing cycle – to consider whether and to what extent the mix of financial transactions and tenure transitions required to sustain owner occupation may compromise the wellbeing of home occupiers. If positive health is a key measure of the impact of public policy, especially in the 'wellbeing' economies (Leppo *et al.,* 2013), a system that detracts systematically from that could hardly be thought of as "well-functioning."

Specifically, using panel survey data, we scrutinise three major ownership-centred housing systems – in the USA, Australia and the UK across the opening decades of the millennium. These English-speaking countries between them formed the leading edge of the expansion of owner-occupation through the late 20th century and into the 2000s. In all three countries, that sector is now contracting (Authors, 20xx), and as it does so, the edges of ownership are expanding (Authors, 20xx). These edges have come under growing scrutiny in recent years as it has become clear that the seemingly sharp tenure divide is not just a line between renting and owning that some are lucky enough to cross, but rather a precarious permeable zone in transition that some households never escape. They neither travel on into outright ownership, nor settle into longer term renting; rather they occupy an under-instituted, highly indebted, financially underserved mix of tenures which together contain some important signals about the functioning of the housing system as a whole (Haffner *et al.,* 2017). The edges of ownership may soon accommodate more households than the mainstream and thus merit more attention.

These edges have, moreover, recently been characterised by a surprising degree of flux. Conventionally following a scramble to get into the sector, and gradually pay down debts, we expect households to enter the more secure mainstream of near or completely outright

ownership. Increasingly however mortgagors add to their debts, perhaps to move upmarket, but often to raise funds (through equity borrowing) to meet other pressing needs – a process which, arguably, places them closer to the edges of ownership than they once were (Authors, 20xx; Authors, 20xx). Furthermore, while some households are vulnerable to dropping out altogether (lasting leavers), others shelter for a while in the rented sector before regaining ownership – a transition they might make more than once as these 'churners' bid to retain owner occupation (Author 20xx). Although 'churn' has been documented before for these jurisdictions, in this paper we cover a particularly long run of data – nearly two decades – to cast new light on the experiences of an important group, occupying a liminal space in the housing system that has been neglected in the literature and in policy circles, yet has theoretical as well as practical import as housing takes centre stage in the asset economy (Adkins et al. ; Authors 2021).

In short, we consider what happens to the health premium traditionally associated with owner-occupation when households engage in the mix of tenure transitions and financial transactions required to navigate the edges of ownership across almost an entire housing cycle. To explore this, we construct matched samples of owner-occupiers for all three jurisdictions and track them and their myriad characteristics over time as they move away from, towards or across the edges of ownership, adding to assets, adjusting debts and changing tenures. Wellbeing is of course much more than positive health, and there is a cluster of measures in the panel surveys that usefully tap into that. However, not all of the measures are comparable across jurisdictions and health is a common denominator.

We therefore rely on two measures of health, general and mental health, as proxies for wellbeing in this paper, and as indicators in their own right of the health impacts and implications of housing transtitions. These health measures are self-reported, which does have some limitations, though overall the literature finds reasonably close links between self-rated, or subjective, and objectively measured health indicators (Lorem et al. 2020; Wuorela et al. 2020), and accepts, though not uncritically, that self-rated health is a good indicator of both morbidity and mortality

First, we use a measure of mental health. Even though this measure is only available for the UK and Australia, it enables us to replicate, extend and test some of the findings from an earlier study (Authors 20xx). We are able to extend the study timeframe by seven years to capture both the impacts of the Global Financial Crisis (GFC) and a period of recovery. That post-GFC dimension is important because at the same time as property values recovered and equity positions were restored, an institutional leaning to "business as usual" was coupled with underemployment, labour market precarity, and a new round of credit constraints. So, this longer run of observations offers a potentially important addition to our understanding of how wellbeing fares as housing systems adjust to external shifts and shocks.

Second, we extend the analyses of the previous work using the complementary general health indicator, which allows us to capture a different aspect of wellbeing, potentially shedding new light on the causal complexities of the housing/health nexus. We also broaden the geographical reach of the earlier analysis to include a third jurisdication, the USA – the epicentre of the enormous disruption to housing markets triggered by the GFC, having less complete mortgage markets than Australia or the UK, less regulated housing markets, and a relatively weak welfare safety net. This is in stark contrast to the UK which has a relatively large, albeit shrinking, social housing system, and Australia where there are generous, if means-tested, income support programmes and private sector delivery of key welfare benefits such as pensions and minimum wages. So it might be that such ontological security as near or outright homeownership implies

is more keenly felt in the USA, and more easily damaged there than in countries with more developed welfare states.

We proceed by describing the data resources and specifying the models. Then we report in turn on the mental and general health effects of two styles of tenure transition and two financial transactions. We offer both conclusions and recommendations.

2. Data resources

In the paper, we employ the British Household Panel Survey (BHPS) together with its successor, Understanding Society (UKHLS), the Household, Income and Labour Dynamics in Australia (HILDA) Survey, and the Panel Study of Income Dynamics in the USA (PSID). In an earlier study, Naoi *et al.* (2018) applied a similar approach by using panel surveys for Australia, the UK and Japan to explore the role of institutions in mortgage demand behavior in these three countries.

Our sample timeframe commences in 2001, which coincides with the start year of the HILDA Survey and captures the run up to the GFC. Waves prior to 2001 in BHPS and PSID were excluded to provide the same start year across all three countries. A slightly earlier start, in the mid- to late- 1990s would have tracked the very beginnings of the present housing cycle but that could only have been achieved in one country (the UK) for both health variables and would add little to the analysis. The latest wave available at the time of analysis was for the year 2017 capturing the period of post-GFC recovery. Thus the maximum timeframe is 17 years [1]. For those who died before 2017, the end year is the year of death. Those who formed independent households after 2001 enter the sample timeframe in the year they become independent and ends in 2017.

We employ a sample design that includes all independent adults who report one or more spells of owner-occupation (each spanning one or more years) between 2001 and 2017 (or the year of death if it occurs before 2017), commencing from the first wave in which an individual is observed to be independent and an owner occupier. 'Permanent' renters (those with no ownership spell in the study period) are excluded for the pragmatic reason that it is difficult to measure changes in their position relative to the edges of ownership and to track the differential mental health effects of the varied long term rental positions people may occupy - for example, aspiring to own and having a realistic anticipation of doing so in due course, aspiring to own and failing to buy, and not aspiring to own at all. This group does, nevertheless, merit more attention in its own right (Rolfe et al, 2020) [2].

An unbalanced panel for each respective country is used, and the unit of analysis is person-year observations. That is for each person in the sample, we included one count per year from the first year in which the person is observed as an owner. For example, suppose a person entered ownership for the first time in the data window in the year 2010, exited ownership in 2012, and remained in the rental sector until 2017 (a lasting leaver). We count 8 person-year observations comprising episodes from 2010 to 2017. So, although each individual is assigned to one of three ownership types – ongoing owner, lasting leaver or churner – we measure their various characteristics (in a single year for a given person) in all circumstances: when they are renting, when they are owning, when they are in debt, when their assets are unmortgaged and so on.

[Table I here]

Table I summarises the housing trajectories of the whole sample across the timeframe of the study. *Ongoing owners*, who have unbroken ownership spells from their first year of entry till the end of the timeframe, form the majority, accounting for three-quarters of the UK sample, two-thirds in the USA and just under sixty per cent in Australia. This is high, but not as high as in the previous study, which might be expected over the long-time frame, though it might also tap into a structural change over time in the sector. *Lasting leavers* have one ownership spell which ends before 2017 and is followed by a rental spell ongoing to the last observation. These form the minority, accounting for less than ten per cent of the sample in the UK and Australia and just over ten per cent in the USA. *Churners* have two or more ownership spells within the observation period: one third of Australians, one quarter of the USA sample, and nearly one in five in the UK fall into this group.

The dominant impression, then, is that, for the majority, once owner occupation is attained, it is generally sustained notwithstanding the impact of the GFC. This is consistent with other findings (Authors, 20xx). However, two in five Australians, one in three Americans and one in four in the UK left the sector during the observation period: double the proportions of the earlier study. The fact that, among those who exit, most return to owner occupation at least once (four in five returns in Australia, just over 70% in the UK, and just under 70% in the USA) confirms that any apparent stability may be an illusion. These housing markets – or at least the zones that form the edges of ownersip – are equally characterised by flux.

[Table II here]

As well as tracking tenure transitions, we are interested in the financial transactions that position households relative to the edges of ownership and help prevent or precipitate movements out of, or back into, the sector. For these variables, key descriptives can be viewed in Table II, which mainly counts person-years. Among financial transactions, mortgage debt is the obvious and widely used measure, and most owner-occupied spells, and most of the person-years comprising them are accounted for by mortgagors. During their spells in ownership, 86% of US owner occupiers still had mortgages to pay in at least one year of their spells; this is true for 71% in Australia and 64% in the UK where outright ownership is more common than in the other jurisdictions.

A particular feature of our analysis is that it also measures the effects of equity borrowing, which occurs when home buyers add to their mortgage to raise funds for non-housing expenditure. This facility was, until recently, routinely built into mortgage contracts, and was commonly used, especially among borrowers with pressing spending needs and a narrow non-housing investment portfolio. In the short run, equity borrowing can help home buyers cling on to the edges of ownership longer than might otherwise have been the case (Authors, 20xx), but equally, for some at least, the practice is unsustainable in the long run (Authors, 20xx). Between 2001 and 2017, equity borrowing during spells of ownership was employed during three in every five (61%) person-years in Australia and the USA, and by nearly half (47%) in the UK. Although households with ongoing mortgage contracts sustained these rates through the GFC, the sharp credit constraints that followed generally reduced access to this facility, which nevertheless continues to play a significant role, especially for households with narrow wealth portfolios and pressing spending needs (Authors 20xx)

To capture the effect of a mix of housing transitions and financial transactions on wellbeing we use two dependent variables: mental health (in the UK and Australia) and general health (in all three jurisdictions). HILDA records the mental health component of the SF-36, on a scale of 0 (least healthy) to 100 (most healthy); BHPS and UKHLS use the GHQ12 on a scale

of 0 (least distressed) to 36 (most distressed). For heuristic purposes, we follow Searle (2008) by using the inverse of the GHQ12 scale in our analysis so that, in the case of both countries, higher scores on the mental health variable denote less distress.

We measure general health using a five-point self-assessed general health measure. In HILDA, UKHLS and PSID, the general health measures are perfectly matched, with rankings of 1 to 5 representing excellent, very good, good, fair to poor health. In the BHPS, the rankings have slightly different labels, with rankings of 1 to 5 representing excellent, good, fair, poor and very poor health. However, we ignore this inconsistency, assuming that respondents simply rank their health outcomes from best to worst from 1 to 5. We also reverse-score the general health variables in the surveys, so that 1 represents worst health and 5 represents best health. This achieves some consistency in the treatment of all health measures – both mental and general – across all models in the paper. Note that because mental health is measured in different units in Australia and the UK, the means and medians shown in Table II are not comparable. With respect to self-assessed general health, however, we find that the health scores are much more skewed towards the best health score of 5 in the USA and UK than in Australia.

We complete the data resource by adding a variety of demographic and socio-economic control variables, whose descriptives are also shown in Table II. In summary, the USA sample presents the most youthful age profile with a median age of 51 years, compared to 54 years in Australia and 56 years in the UK, where we also record the most child-free cycles. The majority of person-years in all jurisdictions are spent in marriage, though this is markedly higher at 79% in the USA as compared to the other two countries. The USA also has the highest incidence of university education (36%), and of full-time employment, as well as the greatest disparity of incomes.

3. Analytical strategy

To capture the health effects of occupying the edges of owner occupation, we specify two models for each of the two measures of health. The first quantifies the effects on mental and general health of tenure transitions out of, and where applicable back into, owner-occupation. The second adds the effects of debt. Both are random effects models controlling for unobserved heterogeneity in the data by assuming that its important components are constant across the study period and uncorrelated with known, measurable and modelled variables. This unobserved heterogeneity could, for example, include tastes, preferences or innate pessimism or optimism that shape health outcomes but are unmeasured, as well as unknown, unmeasurable, idiosyncratic influences specific to an individual. A limitation of this kind of approach is that the assumptions relating to unobserved heterogeneity may not be warranted; however, as Authors (20xx, p1086) explain these assumptions are more convincing given a sample design that excludes 'permanent renters'. Nevertheless, conclusions based on the results should be treated cautiously.

In the models, we adopt a difference-in-difference model specification using a random effects estimator that is defined by:

$$Health_{it} = \alpha_0 + \alpha_1 Leaver_i + \alpha_2 Leaver_i * post_{it} + \alpha_3 Churner_i + \alpha_4 Churner_i * post_{it} + a_i + u_{it} \quad (1)$$

where i and t subscript individuals and time period respectively, and $Health_{it}$ is a measure of mental health (or general health) for individual i at time t. Time-invariant indicator variables

distinguish between ongoing owners ($Owner_i$), lasting leavers ($Leaver_i$) and churners ($Churner_i$). $Owner_i$ equals one if the person has retained ownership throughout the data timeframe, zero otherwise. $Leaver_i$ equals one if the person loses ownership and has not returned to owner-occupation by 2017, zero otherwise. $Churner_i$ equals one if the person loses ownership but returns to owner-occupation at least once by 2017, zero otherwise. These variables enter regression models separately, with ongoing owners being the omitted category. The included ownership pathway categories are interacted with a variable ($post_{it}$) identifying whether wave t belongs to an episode when leaver i (or churner i) has left homeownership andis renting. Hence, $Post_{it}$ equals one in wave t if individual i is renting in that wave, zero otherwise. The interaction terms measure differences in wellbeing before and after an exit from homeownership has occurred. This difference-in-difference design is an established quasi-experimental method of detecting causality through measurement of the 'before' and 'after' effects of a phenomenon (Lechner 2010; Wing 2018).

With respect to mental health these models replicate an earlier two-country study using random effects regression models (Author 20xx) [3]. In the model of general health, which brings in our third jurisdiction, random effects ordered logit estimates were obtained, with self-assessed general health ranked on a scale of 1 to 5, where 1 represents the worst health outcome and 5 represents the best health outcomes. A key assumption of the ordered logit model is the proportional odds assumption, which presumes that the relationship between each pair of outcome categories is the same. Hence, the coefficient attached to each predictor gives the log-odds of achieving a rank of $r+1$ relative to a rank of r as a result of a unit change in the predictor.

4. Results

4.1. The health impacts of tenure transitions

Table III presents the random effects estimates from the tenure transitions models. After taking account of a range of common controls (including gender and age), they indicate that, for mental health in the UK and Australia and for general health in all three countries, the prospect, risk and fact of dropping out of ownership for the long run (being a lasting leaver) is associated with a strong and significant wellbeing deficit compared to ongoing owners.

[Table III here]

All else equal, the mental health profile of leavers and churners in Australia and the UK before and after they exit owner-occupation lies well below that of ongoing owners. For lasting leavers these disparities are substantial and eclipsed in magnitude only by the mental stress of long-term disability or illness, unemployment, and separation. For churners, the effects are less marked but still on a par with, for example, divorce.

To the extent that this taps into the mental stress of households approaching the edges of ownership there are many reasons for returning lower scores than those accommodated in the mainstream, including affordability stress (Bentley *et al.,* 2022) and indebtedness (Keene *et al.,*2015), which we return to later. These financial stressors may interact with and exacerbate the stress associated with a range of other biographical disruptions known to put family homes at risk, and the findings are consistent with a well-documented sustainability stress effect at the precarious edges of ownership experienced by households who are at risk of leaving the sector (Authors, 20xx).

In an earlier study, spanning most of the decade from 2001, as well as a stress effect among those who drop out of owner-occupation, we found evidence of a mental health rebound during rental spells, which might have reflected the immediate effects of shedding mortgage debt, and/or of finding a 'soft landing' in parts of the rented sector (Author, 20xx). However, the earlier study spanned less than a decade, so some rental spells would have been short – too short perhaps to explore a suggestion in the wider literature that the mental health gains of residential relocation can be short-lived (Foye, 2016; Stotz, 2019). The model estimates listed in Table III address this by analysing rebound impacts over a longer duration and presenting an interaction term that isolates the mental health effect of having left owner-occupation (ie offering a window at least on likely causalities). For leavers in both Australia and the UK, these terms are insignificant: that is, any rebound effect has all but disappeared. For churners in the UK, moreover, there is evidence of significantly more, not less, mental stress after exit, perhaps reflecting the pressure they feel to regain a housing position they have lost.

So, the extended time period is important. It appears that the rebound in wellbeing detected in the earlier study could be a short-lived response to the alleviation of financial pressures that most leavers experience. As spells in rental housing lengthen, so the rebound in wellbeing may be eroded too, perhaps, for example, as some are forced to move again when short leases are terminated. Alternatively, it may reflect adaptation to new housing situations that gradually lose their novel character as individuals tend to focus less attention on them (Stotz, 2019, p.100). It is also possible that the earlier study captured a sense of wellbeing among a group who *appeared* to be lasting leavers but who in fact returned to ownership after the cut-off in the previous study.

The measure of *general* health, available in all three jurisdictions, may represent a slightly different story. Lasting leavers in every country report worse general health than ongoing owners in all circumstances. This suggests that people in poor health may find it hard to sustain owner-occupation (perhaps reflecting the impact of health on earnings, job security, households' expenditures and so on); i.e. exit may be selective against those with depressed general health, for a variety of documented reasons (Authors, 20xx). The interaction term leaver x left homeownership shows a significant further dip in general health among lasting leavers following their loss of ownership. This could offer support for the selection effect idea if it is capturing the course of conditions that are anyway progressive. But it might also reflect a dip in general health that would not have happened if ownership had been sustained, and that has been exacerbated by life as a renter.

The general health of churners differs from that of lasting leavers, as might be expected; the churners after all are set to regain ownership in due course. It is only in the USA that their overall profile is depressed relative to ongoing owners, and this is true whether they are in an ownership or a rental spell; perhaps they are switching between owning and renting to manage the changing costs and needs of ongoing health conditions that keep them close to the margins of homeownership. Uniquely in the UK, where, during ownership spells, churners are more like ongoing owners in their overall general health profile, after leaving the sector, churners' health worsens.

To explore this further, we considered the possibility that the health effects of exiting ownership differ according to where people 'land'. This depends in part on the nature of the rented sector, and on this we can expect some institutional variety between the three countries. Generally, leavers and churners departing owner occupation exit into a variably regulated largely private rental sector whose quality, cost and conditions cannot be assured. Some, however, move into secure and affordable settings such as social renting or into some other

'soft landing' such as rent-free accommodation with family. Such 'soft' landings may avoid the risk of private landlords terminating leases, increase the prospect of securing housing well matched to needs, and may offer – in the case of family accommodation – an opportunity to rebuild assets in a welcoming environment. For those slipping out of ownership because of acute financial stress and poor health, into these settings, we might expect more rebound in mental health than, say, exiting into costly, possibly lonely, mixed-quality private rental.

To check whether a health-cushioning effect might be detected, and might indeed endure, conditional on entry into social (rent free) housing, we re-ran both models. The specifications differentiate between those who did, and did not, secure a 'soft landing' either by entering the social sector (which we can expect to cater to housing needs more effectively than private renting), or by securing rent free accommodation to help cushion debt overhang or other financial stress. The results are presented in Table IV [4].

[Table IV here]

In Australia, but not the UK, there is a strong and significant mental health rebound for the minority of lasting leavers who exit into social housing or rent-free living of some kind (the numbers are too small to differentiate). Churners, on the other hand, who we know often benefit financially from living rent free - it is indeed a factor that helps propel them back into owner occupation (Authors, 20xx) – do not experience any significant wellbeing gains from that fact. In the UK, where there is no lasting benefit from dropping out into the social sector compared to any other rental outcome, churners exiting into social or rent-free housing not only fail to report any general health improvement (a tendency shared by lasting leavers) but also suffer a mental health penalty. While this may seem counter-intuitive, given the aims of the social sector, it could reflect the likelihood that, unlike lasting leavers, churners may have very strong ownership aspirations, and so find their time in social/rent free housing an uncomfortable one. It is not, however, clear why they should do worse than their Australian counterparts, except that British churners tend to hang on to their ownership status for longer and may find a 'soft landing' particularly difficult (especially if they end up living with family or friends which underlines all they have lost). They are also much slower to return to homeownership and so any frustration associated with their social/rent free housing experience is likely to be more persistent in Britain (Authors, 20xx).

We also looked at this within-renting differential for general health (see Table IV). There are no significant findings in the US model estimates where the institutional setting post-departure appears to be of no import. In Australia, the general health of churners shows little change post-exit, and it does not matter where in the rental sector they land. However, a post-exit dip in general health among lasting leavers characterizes both rental settings; if anything, Australian leavers fare worse with a soft landing – or viewed another way, access to the welfare role of housing may be conditional on deteriorating health, especially progressive health conditions that would worsen whatever the housing circumstances. This latter explanation is certainly relevant in the UK, where the general health profile of those who exit into private rental is much the same as it was in their ownership spell, whereas those who exit into the social sector are in poorer health, something that could have given them priority access to social housing. So, this extra piece of analysis confirms that there are different narratives for mental and general health – stress effects and health selection, respectively – which is an important policy-relevant finding.

4.2 Financial transactions: Impacts on mental and general health

So far, we have shown that the transition from ownership to renting represents a major biographical shift that can be associated with an enduring dip in mental and/or general health in all three countries. There are many factors driving this but the most widely recognised causal mechanism cited in the literature is financial stress, particularly that arising from unsustainable debt, and especially from debt secured against homes. To explore the effects of debt, we re-estimate both the random and fixed effects models (as above, the latter add little so that only the former are presented in detail). To capture a "mortgagor effect" on wellbeing, we employ a time-invariant binary variable equal to one if an individual was a mortgagor at any point during the timeframe, zero otherwise. We interact this indicator variable with each ownership trajectory (ongoing owners, leavers, and churners) [5].

We also add a binary measure of in situ equity borrowing which we interact with mortgage-holding to identify the independent health effects for mortgagors of increasing their outstanding mortgage debt without moving home (thus raising money to spend on other things.) This variable is equal to one if an individual adds *in situ* to their outstanding mortgage debt at any point during an ownership spell, zero otherwise. This model specification is more nuanced than that in Author (20xx) [6] because the interaction variables not only split each ownership trajectory into mortgaged and un-mortgaged pathways, but also signal, for mortgagors, whether they have engaged in equity borrowing or not. An outstanding mortgage burden inflated by equity borrowing may, on the one hand, help pressure the leaver to exit, while on the other hand, for the ongoing owner and churner, it may reduce binding budget constraints by funding discretionary spend. The longer time frame, and hence much larger number of observations, facilitates the more complex analysis of indebted ownership trajectories in this paper.

The results of this financial transactions specification are summarised in Table V [7]. Note that although we initially ran a set of additional models to again capture exit into different rental settings (social/rent free on the one hand and private rental on the other), the findings add little to the points made above and the exercise is not, therefore, repeated in the results presented below.

[Table V here]

Table V confirms, with one caveat, that the previously observed substantial and significant mental health premium for ongoing outright ownership endures across the board in both Australia and the UK. The caveat is in the UK, where, among ongoing owners, mortgagors' mental health scores are in line with those of outright owners, *as long as* they avoid equity borrowing. For UK owner occupiers, whatever spending needs equity borrowing might meet, the net effect of adding to housing debt detracts from mental wellbeing. Among ongoing owners in Australia, in contrast, while all mortgagors report worse mental health than outright owners, equity borrowers fare slightly better than other mortgagors. Here the added funds have a cushioning effect on mental health.

Turning to leavers and churners we see that, in both countries, for the most part these groups report worse mental health outcomes than ongoing outright owners. In Australia, whether renting or owning, leavers and churners fare worse than any ongoing owner (mortgaged or not), whereas in the UK, leavers and churners who were once outright owners retain the mental health premium attached to that (reflecting, perhaps, that they are unlikely to have been in financial stress before their exit). In part these results simply amplify the exit effect on mental health noted above, for all housing finance positions other than those who were once mortgage

free owners in the UK. For the other leavers and churners - those carrying mortgage debt during their ownership spells - and, again, as compared to ongoing outright owners, a relatively large negative exit effect is detected. Its size, all else equal, is similar to that estimated for a biographical status such as divorce or bereavement that is known to have large negative effects [8]. More importantly what these results underline is the importance of financial stress associated with carrying mortgage debt on the edges of ownership across the board.

With the exception of lasting leavers in the UK these effects are slightly cushioned for those who, as owner occupiers, engaged in equity borrowing: that is, for churners in both countries, and for lasting leavers in Australia, equity borrowing during ownership eased their journey into renting, and may have helped position churners for return. Perhaps mental health benefits from having funds to draw down for discretionary spending, and is depressed among conventional mortgagors who pay down debts more quickly yet have less flexibility/liquidity. For UK leavers, however, this is not the case; they, like their mortgagor counterparts in ongoing ownership, find that equity borrowing exacerbates the debt effect on mental health. It may therefore be that equity borrowing in the UK, where it is used more sparingly (see Table II), serves different purposes from those in Australia. For example, rather than using equity borrowing to meeting discretionary spending needs such as school fees, and home renovations, leavers and ongoing owners in the UK may use it to fund more acute spending needs – arising from unexpected adverse events such as redundancy – thus adding debt to the stress of other adverse shocks

Turning now to *general* health effects, and bringing the USA into the panel of countries, the key finding for all three jurisdictions is that among ongoing owners, there is no debt effect on general health. Put another way, mortgagors have the same general health profile as outright owners provided ownership is enduring. That is also true for most churners. These groups report better general health than lasting leavers who, whether they were equity borrowers or not (though equity borrowing again amplifies the effect in the UK), report significantly worse general health than the rest. These findings seem most likely to testify to a selection effect - much as hinted at earlier - whereby those in poorer general health simply cannot sustain the costs and meet the conditions of sustaining owner occupation.

Outright owners who become lasting leavers in the USA underline this point: they show worse general health than their counterparts who do not drop out of ownership. It may be that with only limited public health safety nets, and credit constraints imposed by their incomes or employment options, those with serious health conditions have to sell up to finance medical treatments and manage the costs of living with ongoing, perhaps worsening, ill health. The outliers in the UK are outright owners who become churners: they also show worse health than those ongoing in the sector. The likelihood here is that they are trading on into accommodation better suited to health needs, and/or trading down to release funds to meet spending needs associated with, or exacerbated by, their health condition.

In the *general* health models, there is no evidence among lasting leavers of a cushioning effect from equity borrowing in the USA and Australia. In fact, in these countries equity borrowers who become lasting leavers report slightly worse general health than mortgagors who left ownership without adding to their loans Perhaps pressing medical treatment needs help precipitate equity borrowing among lasting leavers. The same trend does not obtain in the UK, however, where there is a national health service that is paid for by taxation.

5. Discussion and conclusion

This paper explores the complex relationships between owner-occupation on the one hand and mental and general health on the other, as they are shaped at the edges of ownership. Specifically, we test for the mental and general health effects of tenure transitions between owning and renting, and of two financial transactions at the heart of modern housing markets: mortgage debt and equity borrowing. We track these indicators over the first 17 years of the millennium across three jurisdictions, during an unprecedented cycle of house price appreciation, through a global financial crisis and into an era of both recovery and austerity.

Regarding tenure transition, we found growing flux at the expanding edges of owner-occupation: between a quarter and nearly half of owners in the 17 year observation 'window' dropped out at some point before 2017. In Australia and the UK this carries a substantial mental health penalty, whether or not homeownership is later regained. Lasting leavers in all three jurisdictions also report worse *general* health than ongoing owners, both as owners, prior to exit, and subsequently as renters. This points not only to a stress effect on exit, but also to a degree of health selectivity in housing, both in precipitating exit from owner-occupation, and in stacking the odds against regaining the sector. We do not look, in this paper, at the mental or general health profile of 'permanent' renters, but that would be a helpful next step in developing this argument.

The financial transactions models underline the well-documented mental health premium attaching to outright ownership in all three jurisdictions, notwithstanding the upheavals the sector has endured in recent years. Mortgage borrowing, which most owner-occupiers have to engage in at some point, immediately, significantly and substantially detracts from that premium. The added impact of equity borrowing, so evident early in the millennium, is complex, though as a financial buffer it may play an important role for those seeking to maintain owner occupation through failing general health.

The experience of churners, documented here in unprecedented detail, is intriguing because, like the edges of ownership they occupy, they are neglected in the literature, under-serviced, and thought far rarer than they are. They report better mental health than lasting leavers, but fare worse than ongoing owners. On *general* health they do as well as ongoing owners in Australia, though not in the USA, nor, after leaving owner occupation, in the UK. It may be that the character of churning is distinctive in Australia, its health impacts eased by the size and diversity of the rental sector and cushioned by social policy.

If the test of housing systems anchored on owner-occupation is their capacity to support public health, this analysis, while documenting some institutional variety across jurisdictions, raises three key common concerns.

First, the mental and, importantly, general health premium attached to owner-occupation (in the case of general health, even mortgaged owner occupation) reflects a degree of health selectivity into and out of the sector that bears further scrutiny, as Hofmann *et al.* (2019) suggest in relation to households' position in the socio-economic structure. If the costs, conditions and accessibility of owner occupation cannot be attained or sustained by those with poor or declining health, then housing systems anchored on owner occupation are unlikely to be inclusive or well-functioning overall.

Second, tenure change carries a substantial mental health cost. This is partly about the stress of exiting owner-occupation into a position of housing disadvantage, which was well-documented for the last housing cycle, and is increasingly evident across recent years (Singh et al. 2019). However, there is a great deal more churn at the edges of ownership than policy makers acknowledge, and this has its own implications for wellbeing, the complexities of which have still to be fully unpacked (Popham *et al.*, 2015). Moreover, to the extent that churning is about adjusting costs to needs and ability to pay, residential relocation is an expensive and inefficient option, financially and in terms of wellbeing. A well-oiled rental sector may help, as it clearly does in Australia. However to the extent that more imaginative solutions exist (see, for example, Bao *et al.*, 2020; Shiller *et al.*, 2017), these findings add to the case for exploring them.

Third, the mental stress of housing debt, notwithstanding the complex, and sometimes cushioning, effects of the flexibility conferred through equity borrowing, is all-pervasive. Yet, outside the owner occupied housing market, very few assets or enterprises are solely debt-funded. New businesses for example thrive on a mix of debt funding and equity investment. In housing markets, however, notwithstanding deposit requirements (usually, and necessarily, a small fraction of total asset values) home buyers are uniquely reliant on mortgage debt to fund home purchase. Scholars have long proposed equity finance as an alternative to debt funding for housing markets and there have been a few real-world experiments (Authors, 20xx). These findings add to the case for considering equity more seriously as a mainstream solution. Intuitively, sharing stakes in housing equity, and sharing both the risks and the rewards of that investment, has more appeal than carrying the interest rate risk on a loan whose value can quickly become detached from underlying asset prices.

In conclusion, the wellbeing premium traditionally associated with owner occupation may be alive and well, but our nuanced analysis shows it to be under threat at the edges of the sector in the three jurisdictions whose housing systems are most invested in the effectiveness of home ownership. There are institutional dimensions to this which are explored elsewhere (Authors et al., 2023) However, that facts of such marked cross-national convergence are striking. They are daunting in pointing to common themes in the repositioning of housing, to the disabvantage of of homeoccupiers, in the asset economy (Authors 2022). Yet, at the same time, this convergence equally offers scope to develop policies to better support households at the edges of ownership that work across the board for debt-funded ownership-centred housing systems. We have proposed three promising avenues for further research and practice: tackling health discrimination; instituting a suite of new policies to recognize size, structure and challenges of the edges of ownership, with particular emphasis on churning; and greater attention to the prospects and possibilities of equity finance for housing markets.

Notes

1. The UKHLS was designed to ensure continuity with the BHPS data. However, fieldwork for wave 1 of the UKHLS began in January 2009, which coincided with the final wave interviews of the BHPS during September 2008 to April 2009. Because of this, the BHPS sample could not be included in wave 1 of the UKHLS. Instead, the BHPS sample was first interviewed in wave 2 of the UKHLS, with fieldwork conducted during the year 2010 (Laurie 2010). Thus, there is a gap of more than one year between their final BHPS interview in 2008 and BHPS respondents' first UKHLS interview in 2010. This is a data limitation of the UK sample.

2. Omission of 'permanent' renters also helps address selection effects that could falsely attribute health differences to tenure when in fact due to unobserved variables correlated with tenure (see Authors 201x, p1086).

3. Equation (1) has also been estimated by fixed effects. Results are available from the authors on request. They add little to the narrative.

4. Refer to the Supplementary Table SI in the Online Appendix for the complete set of estimates including controls.

5. The reference group in both the mental and general health financial transaction models is then ongoing outright owners.

6. In Author (20xx), the mortgagor indicator is added as a separate variable.

7. Please refer to the Supplementary Table SII in the Online Appendix for the complete set of estimates including controls.

8. See Supplementary Table SII in the Online Appendix.

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Note: Self-references have been removed and replaced with Author (20xx) or Authors (20xx) in the articles. Full references list will be provided upon request.

Mental and General Health at the Edges of Owner Occupations

Tables

Table I. Owner-occupier housing trajectories, 2001-2017

	At least one ownership spell	Ongoing owner	Exited ownership		
			All	Lasting leaver	Churner
HILDA	**7093**	**4155**	**2938**	**499**	**2439**
Row %	100	58.6	41.4	7.0	34.4
BHPS/UKHLS	**4339**	**3283**	**1056**	**292**	**764**
Row %	100	75.7	24.3	6.7	17.6
PSID	**6301**	**4182**	**2119**	**666**	**1453**
Row %	100	66.4	33.6	10.6	23.1

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Note: The unit of analysis is the number of spells in ownership.

Table II. Descriptive statistics, 2001-2017

	Australia		UK		USA	
	Mean	SD	Mean	SD	Mean	SD
Mental health score (AUS 0-100; UK 0-36)						
Mean	76.51	16.37	24.67	5.36		
Median	80.00		26.00			
General health score						
1 (worst)	0.03	0.18	0.04	0.19	0.03	0.18
2	0.15	0.36	0.13	0.33	0.09	0.29
3	0.38	0.48	0.24	0.43	0.29	0.45
4	0.35	0.48	0.41	0.49	0.38	0.49
5 (best)	0.09	0.28	0.19	0.39	0.20	0.40
Mortgagors	0.71	0.45	0.64	0.48	0.86	0.35
Equity borrowing	0.61	0.49	0.47	0.50	0.60	0.49
Real equivalised household gross income in 0‘000s (AU$/£/US$)						
Mean	63.81	64.76	26.41	17.69	67.32	81.02
Median	52.83		22.70		51.87	
Saving habits						
Save regularly	0.25	0.43	0.37	0.48		
Save irregularly	0.53	0.50	0.10	0.31		
Do not Save	0.22	0.41	0.52	0.50		
Female	0.54	0.50	0.56	0.50	0.53	0.50
Age						
Mean	54.60	14.24	55.53	15.44	50.97	14.73
Median	54.00		56.00		51.00	
Marital Status						
Married	0.70	0.46	0.68	0.47	0.79	0.41
Defacto	0.08	0.27	0.07	0.26	0.04	0.20
Divorced	0.07	0.25	0.06	0.24	0.02	0.13
Separated	0.03	0.17	0.01	0.12	0.07	0.26
Widowed	0.07	0.25	0.10	0.30	0.03	0.18
Single/never married	0.05	0.22	0.07	0.26	0.04	0.21
Number of children						
No children	0.64	0.48	0.75	0.44	0.61	0.49
1 child	0.12	0.32	0.11	0.32	0.15	0.36
2 children	0.16	0.37	0.11	0.31	0.16	0.36
>2 children	0.08	0.27	0.03	0.17	0.08	0.27
Long-term disability/illness	0.31	0.46	0.74	0.44		
Education level						
University and above	0.26	0.44	0.18	0.38	0.36	0.48
Postsecondary below university	0.32	0.47	0.27	0.44	0.08	0.26
Secondary and below	0.42	0.49	0.56	0.50	0.56	0.50
Employment status						
Full-time	0.41	0.49	0.32	0.49	0.71	0.45
Part-time	0.20	0.40	0.23	0.42		
Unemployed	0.01	0.11	0.01	0.10	0.02	0.15
NILF	0.39	0.49	0.45	0.50	0.27	0.44
Underemployed	0.04	0.20				
Volunteer	0.27	0.45				
Community club participation	0.44	0.50				

Source: Authors’ calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Note: For the calculation of mean mortgagor status and equity borrowing, the person is the unit of analysis. For all other variables, the unit of analysis is the person-year observation. Variables reflecting underemployment, volunteering and community club participation are unavailable

in the UK and the USA. In the case of the UK, this is due to inconsistencies in data between BHPS and UKHLS. The savings behaviour and long-term disability indicator variables are not available in the case of the USA. For continuous variables, the table reports mean, medians and standard deviations. For categorical variables, the means represent the percentage of person-years in which the indicated characteristic is present.

Table III. Tenure transitions random effects models for Australia, the UK and USA, 2001-2017

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Self-assessed general health one year ago			3.305***	2.640***	2.734***
			(0.0820)	(0.0795)	(0.102)
Leaver	-2.502***	-0.775***	0.790**	0.755**	0.610***
	(0.694)	(0.258)	(0.0889)	(0.0854)	(0.0605)
Churner	-1.830***	-0.324*	0.949	0.877	0.744***
	(0.432)	(0.183)	(0.0661)	(0.0724)	(0.0602)
Leaver x left homeownership	0.240	-0.0245	0.768***	0.759**	0.844*
	(0.621)	(0.287)	(0.0767)	(0.0863)	(0.0838)
Churner x left homeownership	-0.299	-0.597**	1.020	0.801**	0.981
	(0.309)	(0.244)	(0.0568)	(0.0793)	(0.0674)
Log of real equivalised household gross income in 0'000s (AU$/£/US$)	0.309***	0.164***			
	(0.104)	(0.0636)			
Real equivalised household gross income in 0'000s (AU$/£/US$)			1.010***	1.026**	1.021***
			(0.0029)	(0.0131)	(0.0036)
Save irregularly	-0.600***	-0.202**	0.944**	1.014	
	(0.134)	(0.0881)	(0.0247)	(0.0442)	
Do not save	-2.315***	-0.274***	0.818***	0.885***	
	(0.196)	(0.0655)	(0.0293)	(0.0284)	
Female	-1.378***	-0.952***	1.285***	1.011	0.931
	(0.340)	(0.118)	(0.0724)	(0.0535)	(0.0482)
Log of age	3.547***	0.576**			
	(0.616)	(0.263)			
Age			0.961***	0.983***	0.968***
			(0.0022)	(0.0023)	(0.0022)
De facto	-0.346	0.289*	0.900*	0.935	0.820**
	(0.357)	(0.160)	(0.0529)	(0.0723)	(0.0800)
Separated	-4.551***	-1.522***	1.011	0.877	0.920
	(0.509)	(0.364)	(0.0826)	(0.120)	(0.107)
Divorced	-1.782***	-0.326	0.902	0.827**	1.032
	(0.488)	(0.226)	(0.0691)	(0.0719)	(0.0796)
Widowed	-2.031***	-0.535***	0.989	0.855**	1.127
	(0.519)	(0.172)	(0.0723)	(0.0619)	(0.117)
Single never married	-2.236***	-0.188	0.838*	0.882	0.771**
	(0.592)	(0.212)	(0.0808)	(0.0798)	(0.0868)
One dependent child	-0.711***	-0.195	0.934*	1.080	0.973
	(0.232)	(0.137)	(0.0373)	(0.0610)	(0.0432)
Two dependent children	-1.506***	-0.0320	0.968	0.982	1.012
	(0.249)	(0.162)	(0.0430)	(0.0677)	(0.0511)
Three dependent children	-1.452***	0.166	1.000	1.075	1.051
	(0.345)	(0.231)	(0.0600)	(0.107)	(0.0739)
Long-term disability/illness	-3.476***	-1.011***			
	(0.157)	(0.0746)			

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Other post-secondary qualification	0.108	0.452***	0.693***	0.806***	0.565***
	(0.414)	(0.172)	(0.0497)	(0.0580)	(0.0432)
Secondary qualification	-0.632	0.0595	0.560***	0.722***	0.484***
	(0.396)	(0.170)	(0.0385)	(0.0492)	(0.0252)
Employed part-time	0.440**	0.268**	0.916**	1.034	
	(0.208)	(0.113)	(0.0351)	(0.0513)	
Unemployed	-2.813***	-1.816***	0.834*	0.661***	0.854*
	(0.498)	(0.364)	(0.0775)	(0.0822)	(0.0744)
Not in labour force	-0.286	0.000690	0.642***	0.653***	0.630***
	(0.251)	(0.142)	(0.0267)	(0.0384)	(0.0261)
Underemployed	-0.655**		0.906*		
	(0.265)		(0.0492)		
Volunteer	0.740***		1.102***		
	(0.142)		(0.0305)		
Community group	1.314***		1.325***		
	(0.130)		(0.0341)		
Constant	64.58***	23.33***			
	(2.475)	(1.034)			
Number of observations	71,596	36,732	65,560	33,146	33,957
Number of individuals	5,815	4,084	5,729	4,024	5,259
Pseudo R^2	0.100	0.0456			
Chi^2			5076***	6631***	3362***

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Notes: Standard errors are in parentheses; * denotes coefficient statistically significant at 10%; ** at 5%; *** at 1%, all for two-tailed tests.

a. Mental health model: We closely follow the estimation model used in Author (20xx) for analysis of mental health but using a longer time frame (2001-2017). See also notes under table II on measurement.

b. General health model: We estimate a random effects ordered logit model. The long-term disability or illness (health condition) predictor is excluded as it is likely strongly correlated with self-assessed general health. Lagged self-assessed general health at t-1 is included to address the issue of reversion to the mean. Continuous predictors are not logged. See also notes under table II on measurement.

c. The omitted categories are ongoing owner, save regularly, married, no dependent children, tertiary qualification and employed full-time. Survey year dummy variables are also included in both these models, but coefficients are not displayed.

Table IV. Tenure transitions random effects models for mental and general health, Australia, and the UK, 2001-2017

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Self-assessed general health one year ago			3.312***	2.664***	2.734***
			(0.0823)	(0.0814)	(0.102)
Leaver	-2.552***	-0.765***	0.785**	0.768**	0.610***
	(0.695)	(0.258)	(0.0878)	(0.0866)	(0.0605)
Churner	-1.827***	-0.328*	0.971	0.873*	0.744***
	(0.432)	(0.184)	(0.0671)	(0.0718)	(0.0602)
Leaver x left homeownership into private renting	-0.0446	-0.112	0.808*	0.800	0.863
	(0.731)	(0.386)	(0.0915)	(0.132)	(0.0895)
Churner x left homeownership into private renting	-0.365	-0.490	1.005	0.663**	0.986
	(0.359)	(0.395)	(0.0669)	(0.113)	(0.0729)
Leaver x left homeownership into social housing or rent-free	1.614**	-0.119	0.719**	0.718**	0.764
	(0.819)	(0.373)	(0.0997)	(0.100)	(0.126)
Churner x left homeownership into social housing or rent-free	-0.198	-0.953**	1.024	0.800	0.960
	(0.517)	(0.436)	(0.0920)	(0.144)	(0.131)
Number of observations	71,510	36,418	65,474	32,836	33,957
Number of individuals	5,815	4,082	5,729	4,019	5,259
Pseudo R^2	0.100	0.046			
Chi^2			5,079***	6,626***	3,364***

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Notes: Standard errors are in parentheses; * denotes coefficient statistically significant at 10%; ** at 5%; *** at 1%, all for two-tailed tests. See also notes a, b, and c under Table III. See table SI in the online supplementary tables for full set of results.

Table V. Financial transactions random effects models for Australia, the UK and USA, 2001-2017

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Self-assessed general health one year ago			3.306***	2.642***	2.768***
			(0.0820)	(0.0795)	(0.107)
Ongoing owner, mortgagor with no equity borrowing	-1.642**	-0.326	0.862	0.949	1.067
	(0.813)	(0.214)	(0.127)	(0.0897)	(0.121)
Ongoing owner, mortgagor with equity borrowing	-1.336***	-0.599***	0.927	0.965	1.165
	(0.503)	(0.186)	(0.0778)	(0.0775)	(0.112)
Leaver, unmortgaged	-2.545**	-0.640	0.767	0.777	0.431***
	(1.159)	(0.407)	(0.137)	(0.129)	(0.0970)
Leaver, mortgagor with no equity borrowing	-4.144***	-1.308**	0.628**	0.570***	0.749*
	(1.517)	(0.508)	(0.133)	(0.111)	(0.118)
Leaver, mortgagor with equity borrowing	-3.533***	-1.476***	0.616***	0.626***	0.634***
	(1.001)	(0.405)	(0.100)	(0.110)	(0.0932)
Churner, unmortgaged	-2.089*	-0.566	0.794	0.768*	0.623
	(1.204)	(0.374)	(0.129)	(0.121)	(0.185)
Churner, mortgagor with no equity borrowing)	-3.465***	-1.157***	0.842	0.832	0.891
	(0.686)	(0.328)	(0.0948)	(0.119)	(0.113)
Churner, mortgagor with equity borrowing	-2.971***	-0.707***	0.951	0.841	0.818
	(0.623)	(0.274)	(0.0976)	(0.101)	(0.107)
Observations	71,596	36,732	65,560	33,146	32,597
Number of individuals	5,815	4,084	5,729	4,024	5,045
Pseudo R^2	0.101	0.0465			
Chi^2			5,075***	6,614***	3,267***

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Notes: Standard errors are in parentheses; * denotes coefficient statistically significant at 10%; ** at 5%; *** at 1%, all for two-tailed tests. The reference group is an ongoing owner carrying no mortgage debt at any point in their ownership spell(s). They are, therefore, outright owners in all waves of spells of ownership that are ongoing at the end of the study timeframe. While not reported here, the models in this table contain the same range of control predictors as the mental health models in Table III. Please refer to notes a, b, and c under Table III.

Mental and General Health at the Edges of Owner Occupations

Supplementary Tables

Supplementary Table SI. Tenure transitions random effects models for mental and general health, Australia, and the UK, 2001-2017

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Self-assessed general health one year ago			3.312***	2.664***	2.734***
			(0.0823)	(0.0814)	(0.102)
Leaver	-2.552***	-0.765***	0.785**	0.768**	0.610***
	(0.695)	(0.258)	(0.0878)	(0.0866)	(0.0605)
Churner	-1.827***	-0.328*	0.971	0.873*	0.744***
	(0.432)	(0.184)	(0.0671)	(0.0718)	(0.0602)
Leaver x left homeownership into private renting	-0.0446	-0.112	0.808*	0.800	0.863
	(0.731)	(0.386)	(0.0915)	(0.132)	(0.0895)
Churner x left homeownership into private renting	-0.365	-0.490	1.005	0.663**	0.986
	(0.359)	(0.395)	(0.0669)	(0.113)	(0.0729)
Leaver x left homeownership into social housing or rent-free	1.614**	-0.119	0.719**	0.718**	0.764
	(0.819)	(0.373)	(0.0997)	(0.100)	(0.126)
Churner x left homeownership into social housing or rent-free	-0.198	-0.953**	1.024	0.800	0.960
	(0.517)	(0.436)	(0.0920)	(0.144)	(0.131)
Log of real equivalised household gross income in 0'000s (AU$/£/US$)	0.308***	0.167***			
	(0.104)	(0.0638)			
Real equivalised household gross income in 0'000s (AU$/£/US$)			1.010***	1.028**	1.021***
			(0.0029)	(0.0133)	(0.00358)
Save irregularly	-0.604***	-0.197**	0.944**	1.016	
	(0.135)	(0.0883)	(0.0247)	(0.0444)	
Do not save	-2.321***	-0.281***	0.818***	0.888***	
	(0.197)	(0.0659)	(0.0293)	(0.0286)	
Female	-1.393***	-0.960***	1.287***	1.011	0.931
	(0.339)	(0.118)	(0.0725)	(0.0533)	(0.0482)
Log of age	3.511***	0.561**			
	(0.616)	(0.263)			
Age			0.961***	0.983***	0.968***
			(0.0022)	(0.00232)	(0.00223)
De facto	-0.354	0.287*	0.900*	0.937	0.818**
	(0.358)	(0.160)	(0.0529)	(0.0721)	(0.0798)
Separated	-4.552***	-1.526***	1.011	0.888	0.922
	(0.508)	(0.367)	(0.0827)	(0.123)	(0.107)
Divorced	-1.796***	-0.332	0.900	0.842**	1.034
	(0.489)	(0.226)	(0.0692)	(0.0729)	(0.0799)
Widowed	-2.012***	-0.518***	0.984	0.863**	1.129
	(0.517)	(0.173)	(0.0724)	(0.0625)	(0.117)

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Single never married	-2.253***	-0.188	0.837*	0.882	0.773**
	(0.593)	(0.214)	(0.0809)	(0.0794)	(0.0870)
One dependent child	-0.709***	-0.196	0.936*	1.089	0.972
	(0.232)	(0.135)	(0.0373)	(0.0614)	(0.0432)
Two dependent children	-1.522***	-0.0379	0.971	0.992	1.012
	(0.248)	(0.161)	(0.0432)	(0.0685)	(0.0511)
Three dependent children	-1.477***	0.162	1.002	1.083	1.051
	(0.345)	(0.231)	(0.0601)	(0.107)	(0.0739)
Long-term disability/illness	-3.464***	-1.013***			
	(0.157)	(0.0751)			
Other post-secondary qualification	0.0971	0.471***	0.694***	0.807***	0.565***
	(0.414)	(0.174)	(0.0498)	(0.0577)	(0.0432)
Secondary qualification	-0.630	0.0812	0.561***	0.721***	0.484***
	(0.396)	(0.172)	(0.0385)	(0.0490)	(0.0252)
Employed part-time	0.443**	0.279**	0.915**	1.035	
	(0.208)	(0.113)	(0.0351)	(0.0514)	
Unemployed	-2.847***	-1.775***	0.837*	0.654***	0.856*
	(0.497)	(0.365)	(0.0779)	(0.0818)	(0.0747)
Not in labour force	-0.289	0.0161	0.641***	0.653***	0.631***
	(0.251)	(0.142)	(0.0267)	(0.0385)	(0.0261)
Underemployed	-0.620**		0.905*		
	(0.265)		(0.0492)		
Volunteer	0.732***		1.101***		
	(0.142)		(0.0305)		
Community group	1.307***		1.324***		
	(0.130)		(0.0341)		
Constant	64.74***	23.36***			
	(2.472)	(1.033)			
Number of observations	71,510	36,418	65,474	32,836	33,957
Number of individuals	5,815	4,082	5,729	4,019	5,259
Pseudo R^2	0.100	0.046			
Chi^2			5,079***	6,626***	3,364***

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Notes: Standard errors are in parentheses; * denotes coefficient statistically significant at 10%; ** at 5%; *** at 1%, all for two-tailed tests.

a. Mental health model: We closely follow the estimation model used in Author (20xx) for analysis of mental health but using a longer time frame (2001-2017). See also notes under Table II on measurement.

b. General health model: We estimate a random effects ordered logit model. The long-term disability or illness (health condition) predictor is excluded as it is likely strongly correlated with self-assessed general health. Lagged self-assessed general health at t-1 is included to address the issue of reversion to the mean. Continuous predictors are not logged. See also notes under Table II on measurement.

c. The omitted categories are ongoing owner, save regularly, married, no dependent children, tertiary qualification and employed full-time. Survey year dummy variables are also included in both these models, but coefficients are not displayed.

Supplementary Table SII. Financial transactions random effects models for Australia, the UK and USA, 2001-2017

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Self-assessed general health one year ago			3.306***	2.642***	2.768***
			(0.0820)	(0.0795)	(0.107)
Ongoing owner, mortgagor with no equity borrowing	-1.642**	-0.326	0.862	0.949	1.067
	(0.813)	(0.214)	(0.127)	(0.0897)	(0.121)
Ongoing owner, mortgagor with equity borrowing	-1.336***	-0.599***	0.927	0.965	1.165
	(0.503)	(0.186)	(0.0778)	(0.0775)	(0.112)
Leaver, unmortgaged	-2.545**	-0.640	0.767	0.777	0.431***
	(1.159)	(0.407)	(0.137)	(0.129)	(0.0970)
Leaver, mortgagor with no equity borrowing	-4.144***	-1.308**	0.628**	0.570***	0.749*
	(1.517)	(0.508)	(0.133)	(0.111)	(0.118)
Leaver, mortgagor with equity borrowing	-3.533***	-1.476***	0.616***	0.626***	0.634***
	(1.001)	(0.405)	(0.100)	(0.110)	(0.0932)
Churner, unmortgaged	-2.089*	-0.566	0.794	0.768*	0.623
	(1.204)	(0.374)	(0.129)	(0.121)	(0.185)
Churner, mortgagor with no equity borrowing)	-3.465***	-1.157***	0.842	0.832	0.891
	(0.686)	(0.328)	(0.0948)	(0.119)	(0.113)
Churner, mortgagor with equity borrowing	-2.971***	-0.707***	0.951	0.841	0.818
	(0.623)	(0.274)	(0.0976)	(0.101)	(0.107)
Log of real equivalised household gross income in 0‘000s (AU$/£/US$)	0.320***	0.170***			
	(0.104)	(0.0638)			
Real equivalised household gross income in 0‘000s (AU$/£/US$)			1.010***	1.026**	1.022***
			(0.00286)	(0.0132)	(0.00363)
Save irregularly	-0.595***	-0.204**	0.944**	1.014	
	(0.134)	(0.0882)	(0.0247)	(0.0443)	
Do not save	-2.299***	-0.274***	0.817***	0.886***	
	(0.196)	(0.0656)	(0.0293)	(0.0285)	
Female	-1.392***	-0.956***	1.287***	1.011	0.932
	(0.340)	(0.118)	(0.0727)	(0.0535)	(0.0491)
Log of age	2.538***	0.0961			
	(0.706)	(0.288)			
Age			0.959***	0.983***	0.969***
			(0.00247)	(0.00262)	(0.00237)
De facto	-0.342	0.273*	0.895*	0.933	0.822*
	(0.358)	(0.160)	(0.0524)	(0.0724)	(0.0827)
Separated	-4.543***	-1.573***	0.998	0.848	0.923
	(0.507)	(0.361)	(0.0816)	(0.116)	(0.107)

	Mental health model[a] Coefficient (SE)		General health ordered logit[b] Odds ratio (SE)		
Explanatory variables[c]	**AUS**	**UK**	**AUS**	**UK**	**USA**
Divorced	-1.751***	-0.357	0.890	0.806**	0.997
	(0.488)	(0.226)	(0.0679)	(0.0695)	(0.0777)
Widowed	-2.096***	-0.598***	0.984	0.841**	1.141
	(0.519)	(0.173)	(0.0720)	(0.0611)	(0.121)
Single never married	-2.279***	-0.270	0.830*	0.863	0.774**
	(0.595)	(0.212)	(0.0803)	(0.0784)	(0.0892)
One dependent child	-0.689***	-0.184	0.932*	1.078	0.986
	(0.233)	(0.137)	(0.0372)	(0.0611)	(0.0445)
Two dependent children	-1.478***	-0.0129	0.964	0.981	1.003
	(0.250)	(0.163)	(0.0430)	(0.0678)	(0.0518)
Three dependent children	-1.409***	0.180	0.994	1.069	1.022
	(0.346)	(0.232)	(0.0597)	(0.107)	(0.0730)
Long-term disability/illness	-3.482***	-1.009***			
	(0.157)	(0.0747)			
Other post-secondary qualification	0.0645	0.450***	0.692***	0.809***	0.565***
	(0.414)	(0.171)	(0.0496)	(0.0582)	(0.0440)
Secondary qualification	-0.714*	0.0516	0.559***	0.724***	0.486***
	(0.397)	(0.169)	(0.0384)	(0.0494)	(0.0258)
Employed part-time	0.426**	0.250**	0.916**	1.033	
	(0.209)	(0.113)	(0.0352)	(0.0515)	
Unemployed	-2.823***	-1.841***	0.831**	0.659***	0.861*
	(0.499)	(0.364)	(0.0771)	(0.0819)	(0.0778)
Not in labour force	-0.335	-0.0503	0.641***	0.649***	0.645***
	(0.255)	(0.144)	(0.0270)	(0.0387)	(0.0273)
Underemployed	-0.652**		0.904*		
	(0.265)		(0.0491)		
Volunteer	0.743***		1.103***		
	(0.142)		(0.0305)		
Community group	1.312***		1.325***		
	(0.130)		(0.0341)		
Constant	69.39***	25.55***			
	(2.959)	(1.169)			
Observations	71,596	36,732	65,560	33,146	32,597
Number of individuals	5,815	4,084	5,729	4,024	5,045
Pseudo R^2	0.101	0.0465			
Chi^2			5,075***	6,614***	3,267***

Source: Authors' calculations using 2001-2017 HILDA, 2001-2008 BHPS and 2010-2017 UKHLS, and 2001-2017 PSID.

Notes: Standard errors are in parentheses; * denotes coefficient statistically significant at 10%; ** at 5%; *** at 1%, all for two-tailed tests.

a. Mental health model: We closely follow the estimation model used in Author (20xx) for analysis of mental health but using a longer time frame (2001-2017). See also notes under Table II on measurement.

b. General health model: We estimate a random effects ordered logit model. The long-term disability or illness (health condition) predictor is excluded as it is likely strongly correlated with self-assessed general health. Lagged self-assessed general health at t-1 is included to address the issue of reversion to the mean. Continuous predictors are not logged. See also notes under Table II on measurement.

c. The omitted categories are ongoing owner, save regularly, married, no dependent children, tertiary qualification and employed full-time. Survey year dummy variables are also included in both these models, but coefficients are not displayed.