The pursuit of happiness? Subjective wellbeing and internal migration in Great Britain.

William Whittaker

University of Manchester

Contact: william.whittaker@manchester.ac.uk

Abstract:

In 2011 the UK government announced future plans to use subjective wellbeing as a measure of economic success. Understanding both the individual and geographic determinants of subjective wellbeing is important for future policy makers. Internal migration has important impacts on the geographic composition of populations, and if found to impact on individual wellbeing; could have significant effects on geographical variations in wellbeing.

The effect of internal migration on individuals has largely been focussed in the labour literature, assessing employment and earnings changes with migration. This paper is the first study to assess the effects of internal migration on subjective wellbeing in Great Britain. We use nationally representative data from the first eighteen waves (1991-2008) of the British Household Panel Survey. The data contains a wide range of personal, labour market, and health characteristics. Migration is measured as movements in residence of 10km or more. Wellbeing is measured as a binary indicator for poor wellbeing, 'caseness', using the 12-point version of the General Health Questionnaire with scores of three or more used as indicators for poor subjective wellbeing. The effects of migration on the probability of caseness are measured in the year following a move. Migrants are modelled by motive for moving, and past caseness state.

The methodology controls for the potential endogeneity of the migration decision and potential correlation between unobserved heterogeneity and the covariates. The results suggest the effects of migration do not differ by motive, but do differ by past health status.

Keywords:

Caseness, internal migration, geographic health inequalities, subjective wellbeing

Classification codes:

C23, C36, C41 I10, J24, R23

Research Highlights:

1. Those with poor subjective wellbeing scores have higher rates of internal migration
2. Internal migration has important impacts on subjective wellbeing
3. Healthy internal migrants suffer wellbeing losses following a move, unhealthy migrants appear to experience wellbeing gains from internal migration
4. Flows of migrants could have serious implications on geographic inequalities in subjective wellbeing

I. Introduction

Recent government initiatives in Great Britain to formulate a subjective wellbeing yardstick as a measure of economic prosperity (ONS, 2011) mean understanding the determinants and structure of subjective wellbeing in the population is a prime concern for future policy initiatives.

There is a growing literature on the economics of happiness (herein subjective wellbeing), where it is assumed that changes in wellbeing reflect changes in utility borne out of individual behaviour and circumstance. Such measures are typically self reported and it is the subjective element that is thought to better capture revealed preference than more objective measures such as wage or income.

At the individual level subjective wellbeing has been found to correlate with income, age, gender, ethnicity, education, health, work, and community involvement (Dolan et al. (2008) provides a comprehensive review). Recent applications have analysed the dynamic process of subjective wellbeing (Hauck and Rice (2004) using the General Health Questionnaire (GHQ) and British Household Panel Survey (BHPS) data, and Contoyannis, Jones and Rice (2004) for self assessed health using the BHPS), finding while mobility exists, there is strong persistence in wellbeing over time.

The understanding of geographical variations in health is also a key concern, for example, National Health Service health care budgets are distributed by geography in the UK, and include a health inequalities adjustment in addition to a weighted capitation formula for need (Department of Health, 2011). If geographical variations in wellbeing exist then policy aimed at reducing these require a full understanding on the impacts of composition (the make-up of the population) or contextual (amenities and geographic specific traits) factors on geographic variations.

Several studies using longitudinal data on individuals and self reported subjective wellbeing measures find little geographic variation in wellbeing. Weich et al. (2005) found small geographic variations using the GHQ-12 with a score of 3 as a cut-off (‘caseness’), and the BHPS to model maintenance and the onset of caseness, Propper et al. (2005) found little evidence of significant geographic variations in GHQ-12 (also using the BHPS) after controlling for individual and household effects, while McCulloch (2001) using GHQ with 3 as a cut off and the BHPS found some evidence of geographic variation unexplained by individual and household characteristics. The general consensus being that it is the composition, rather than the contextual features of a region that matters to geographical wellbeing variations.

The composition of geographic populations is dependent on several dynamics: births, deaths, and international and internal migration. In this paper we assess how subjective wellbeing appears to correlate with internal migration, to assess the importance of the role internal migration may play on geographic wellbeing variations and individual wellbeing.

The movement of individuals between geography is not accounted for in standard geographic comparisons in health and has been cited as a main criticism in the modelling of health inequalities (Connolly et al., 2007). Of particular concern is the health of migrants, the flow of healthy migrants out of deprived areas and into less deprived areas could have potentially serious distorting effects on cross-sectional comparisons of health inequalities.

Though there have been no studies assessing the effects of internal migration on geographic inequalities in subjective wellbeing, several studies have investigated the impact of internal migration on health inequalities in physical health and the results here have been mixed. Verheij et al. (1998) find no selection effects between migrants moving to rural or urban areas in the Netherlands, while in Britain Brimblecombe et al. (1999) find migration had little impact on regional mortality ratios but did impact on Local Authority District (LAD) mortality ratios. Popham et al. (2010) found selective migration played a small part in the widening of mortality rates for migrants moving within Greater Glasgow (using the Scottish Longitudinal Study 1991/2001), while Norman et al. (2005) using limiting long-term illness found young migrants tend to be healthier than non-migrants at the origin, and healthier than those migrating from the destination, while old migrants tend to be less healthy than non-migrants at origin and less healthier than those migrating from the destination. Connolly et al. (2007) using the 1991 and 2001 England and Wales Census and standardised mortality rates found selective migration between electoral wards accounted for 50% of the increase in inequalities over the period for those less than 75; for older age groups, selective migration narrowed inequalities.

The literature on health inequalities and migration has been limited by data availability, typically looking at the health of migrants post-movement. Changes in inequalities are measured by placing migrants back into their origin and comparing how this changes inequalities in health (see for example, Connolly et al., (2007);

Norman et al., (2005); and Brimblecombe et al., (1999)). None of these studies have assessed how migration impacts on the health of the migrant. If migration has an impact on migrant health then placing migrants back into their origin may under- or over-state the influence they have on health inequalities. This is of particular concern with subjective wellbeing. There may be reason to believe there will be changes in the health of migrants, migration will, for example, result in movements away/to social and familial networks and neighbourhood structures, different local labour markets and perhaps employment, and the act of moving itself will likely cause much stress.

The justification for migration works on the premise that migrants weigh up the decision to migrate as they would do an investment (Sjaastad, 1962), by weighing up the (expected) costs and benefits of doing so. In this context one may expect migrants to experience a net gain to their utility having moved.

The gains to migration have been assessed in the literature from a labour market perspective, and have generally found negative employment effects and mixed earnings changes. For employment probabilities, Taylor (2007) found losses for both sexes in a study of residential moving couples using the British Household Panel Survey (BHPS), while Rabe (2010) found losses only for females in dual-earner couples moving between LADs using the BHPS, Boyle et al. (2009) in a study of women in couples found losses for previously employed women and slight gains for previously unemployed women for moves of long distance (>=30km) and for those moving for job related reasons; and Andrews et al. (2007) found losses for females at the Government Office Region level of migration using the BHPS. Studies analysing the effects of migration on earnings have found immediate (two year) gains for males migrating between LADs using the BHPS (Boheim and Taylor, 2007), and long-run gains for males and females migrating between regions for job related reasons using the BHPS (Andrews et al., 2007). In a study of migrating couples, Blackburn (2009) found little change in male earnings and a short-term decline in female earnings, this was largely robust across regional and long-distance moves.

The costs of migration are on the whole immeasurable, though studies on the determinants of migration have found migrants tend to be those most likely to face higher opportunity costs of not moving, for example, an unemployed individual is more likely to migrate as too are those who are single, have no children, and are better educated – in each case one can argue such individuals are less tied to their residence and migration would be less costly (Hughes and McCormick, 1985, 1991; McCormick, 1997; Pissarides and Wadsworth, 1989; Andrews et al., 2011).

This paper aims to analyse changes in the probability of caseness (defined for those scoring three or more in the GHQ) over time for individuals moving around Great Britain using the first 18 waves (1991-2008) of the BHPS (University of Essex, 2010a). We use a measure of mental health to capture what we believe to be an overarching measure of utility, correlated with both earnings and employment (Blanchflower and Oswald, 2004; Clark and Oswald, 1994, 1996, 2007; Layard, 2005), while also measuring potential costs and benefits that labour market measures alone would not.

The contributions of this paper are twofold. First the results will go some way in helping us understand the dynamic effects of internal migration on individual subjective wellbeing and whether gains to wellbeing are made following a move, second this may shed some light on how internal migration may impact on geographical variations in wellbeing.

The paper is structured as follows, section II describes the data used, section III details the models used in estimation with the results of these models given in section IV; section V concludes the paper with suggestions for further research.

II. Data

We use the first eighteen waves (1991-2008) of the BHPS (University of Essex, 2010a). The BHPS is an annual survey which began in 1991 (Taylor et al. 2010). The first wave surveyed approximately 10,000 individuals (across 5,000 households). Respondents are surveyed annually and new respondents enter when children of original sample members reach 16, and when new relationships are formed with original sample members, as such, the household panel should remain broadly representative of households in Britain through time (Taylor et al. 2010).

The key benefit of using the BHPS is the ability to observe changes in residence with changes in an individuals' personal and labour market characteristics. The BHPS contains rich data on moves, including distance moved, reason for a move, moving preferences, and several region of residence identifiers. In addition, the survey includes a number of self reported health measures including Self Assessed Health, the GHQ, Life Satisfaction scores, and questions on a number of health problems. There is also a wide range of personal characteristics measured including age, gender, marital status, and an extensive job history section.

For the purpose of this study, we wish to model changes in wellbeing with changes in migration. We observe all ages and gender, but exclude those living in Northern Ireland.

The variable DISTMOV in the BHPS allows us to observe the distance an individual has moved. We define a migration as a change in residence in the last year with a distance moved of 10km or more.

We differentiate between four different motives for moving: job, push, area, and other. Job-related migrants moved for their own employment reason. Push-related migrants moved because they either, split from their partner, moved to be away from their family, moved for the job reasons of another, were evicted or repossessed, or moved for health reasons. Area-related migrants moved because they disliked the isolation, to go to or from a rural environment, moved due to traffic, noise, or because the area was felt to be unsafe, unfriendly, or generally disliked, and those moving to a specific place. This breakdown was done using the variable MOVY in the BHPS which asks respondents what the main reason for moving was. We do this to measure any differences in the effect of migration on wellbeing between motives.

To model wellbeing changes we use the GHQ (Goldberg et al., 1997) which is asked in the BHPS at each wave. The GHQ asks respondents twelve questions related to their health, feelings, and self perceptions and explicitly asks respondents to compare recent weeks to usual, the twelve questions include:

Have you recently…

Been able to concentrate on whatever you are doing?

Lost much sleep over worry?

Felt that you are playing a useful part in things?

Felt capable about making decisions about things?

Felt constantly under strain?

Felt you could overcome your difficulties?

Been able to enjoy your day-to-day activities?

Been able to face up to your problems?

Been feeling unhappy and depressed?

Been losing confidence in yourself?

Been thinking of yourself as a worthless person?

Been feeling reasonably happy, all things considered?

From the four possible answers, “Not at all”, “No more than usual”, “Rather more than usual”, and “Much more than usual”; the BHPS records a 12 point score (GHQ-12) comprising of each question transformed into a binary indicator for positive (good) responses, and negative (bad) responses, and summed with those with higher scores being of worse health; this is commonly referred to as the “caseness score”. We generate a binary indicator for ‘caseness’ which identifies those achieving scores of three or more.

The GHQ-12 has been reported as a valid measure of mental illness. Goldberg et al. (1997) find median sensitivity (correctly identifying individuals as cases) and specificity (the proportion of individual cases correctly identified) rates of 83.7 and 79.0 percent respectively across the several studies spanning nine countries. Best thresholds for the Clinical Interview Schedule and Present State Evaluation were 3.13 and 3.17 respectively.

Using data from a World Health Organisation study across 15 countries, Goldberg et al. (1997) assess the validity of GHQ-12 as an indicator of current depression, dysthymia, agoraphobia, panic disorder, generalized anxiety disorder, somatisation disorder, neurasthenia and hypchondriasis. These were measured using the ICD-10 (International Classification of Disease, 10th edition), and DSM-IV (Diagnostic and Statistical Manual of the American Psychiatric Association, 4th edition), with and without anxiety, and with and without alcohol dependence. The mean area under the Receiver Operating Characteristic (ROC) curves was 0.88, overall sensitivity was 83.4% and specificity 76.3%. The average threshold across all centres was 2/3. Factor analysis of the items in the GHQ have found depression and anxiety to be the most dominant factors of the GHQ (Shevalin and Adamson., 2005; Kalliath et al., 2004; Martin, 1999; Schmidt et al., 1999; Graetz, 1991).

The GHQ -12 has also been found to be robust to retest effects in the BHPS (Pevalin, 2000).

Goldberg et al. (1997) find evidence to support the binary (GHQ-12) measurement over other (Likert score) measures. This has also been found in Italian studies (Piccinelli et al., 1993; Politi et al., 1994).

The logic for choosing caseness above the GHQ-12 and 36 point scores, and the Life Satisfaction and Self Assessed Health measures is both empirically and practically driven. Caseness as a binary measure has been used in past studies assessing geographic variation (Weich et al, 2005, McCulloch, 2001; Propper et al, 2005), and as mentioned above, has been validated as an indicator for a range of psycho-social mental health measures. Modelling caseness as a binary variable also permits much more flexibility in the estimation procedures allowing us to control for a wide range of endogeneity issues that ordinal measures cannot.

It is important to note here that though caseness will be correlated with physical health, the mental health measure was chosen over more physical health measures as any effect of migration will likely reveal itself through mental changes rather than physical. To control for any physical health effect on the wellbeing estimate, we generated and included a binary indicator for physical health problems. This equals one if the respondent self-reports problems with: arms/legs, sight, hearing, skin, chest, heart/blood, liver, diabetes, epilepsy, and migraine.

III. Methodology

To model subjective wellbeing we need to control for several potential sources of endogeneity. First, subjective wellbeing is likely to prompt intra-person comparisons on health, the individual answering the questions that form caseness are explicitly asked to compare their circumstance to ‘usual’. Second, the individual heterogeneity inferred to above is likely to be correlated with controls we have in the model, for example, if some individuals are perhaps more pessimistic in their attitudes towards health this may also reflect in a general (observed) pessimism towards work and family life. Third, health is likely to by persistent, correlated by past health status.

To control for these sources of endogeneity we employ the dynamic probit with unobserved effects model by Wooldridge (2005). To begin with, equation (1) below models caseness (y_{it}) against lagged caseness (y_{it-1}), and a range of covariates, z_{it} . c_i is an individual specific time invariant error term.

$$y_{it} = \beta_0 + \beta_1 z_{it} + \beta_2 y_{it-1} + c_i + u_{it} \quad (1)$$

z_{it} contains a dummy for having moved in the past year. z_{it} also contains information on age, marital status, ethnicity, social class (the Registrar Generals definition with status inferred from the individuals current job, last job, fathers status, mothers status, and head of household status in order where missing data is provided), education, number of children, physical health problems, and whether the individual likes their current neighbourhood.

To control for the three potential sources of endogeneity detailed above, we include an initial condition, y_{i0} which is a binary variable indicating whether individual i has caseness in their first observation, time averages of the covariates, $\bar{z}_i$, and individual random-effects, a_i :

$$c_i \mid y_{i0}, \bar{z}_i \sim Normal\left(\alpha_0 + \alpha_1 y_{i0} + \bar{z}_i \alpha_2, \sigma_a^2\right) \quad (2)$$

with $c_i = \alpha_0 + \alpha_1 y_{i0} + \bar{z}_i \alpha_2 + a_i$ where $a_i \mid (y_{i0}, \bar{z}_i) \sim Normal\left(0, \sigma_a^2\right)$.

y_{i0} is used to control for the fact our sample is left-truncated, meaning we have little/no information on an individuals' caseness history before they enter the survey. y_{i0} is included since the first observation may hold some indication for any unobserved tendency for an individual to have caseness. Our second additional term is

$\bar{z}_i$, here we assume that any heterogeneity among individuals that is correlated with the covariates in the model works only through the time averages of the (time varying) covariates in z_{it}, $\bar{z}_i$; thus removing any correlation between the heterogeneity term and z_{it}. The third additional term, a_i, assumes a time-invariant individual-specific random-effects specification. Substituting (2) into (1) gives:

$$y_{it} = \beta_0 + \beta_1 z_{it} + \beta_2 y_{i0} + \beta_3 y_{t-1} + \beta_4 \bar{z}_i + a_i + u_{it} \qquad (3)$$

Equation (3) assumes that (i) having conditioned on the covariates and unobserved heterogeneity: z_{it} and c_i, the dynamics are correctly specified as first order, (ii) c_i is additive in the standard normal cumulative distribution function, and (iii) the z_{it} are strictly exogenous. The models are estimated using *xtprobit, re* in STATA v11.0.

There is another potential enogeneity issue, migrants are selective in health, tending to be the healthy young and ill old (Norman et al. (2005) using the England and Wales Longitudinal Survey for 1971-1999 and limiting long-term illness; Verheij et al. (1998) using the 1991-1995 waves of the Dutch Longitudinal Study on Socio-Economic Health Differences and self-reported health status; Bentham (1988) using the 1971/81 Great Britain Census and self-reported work incapacity,). The health of migrants is also found to vary by distance moved, with long distance movers reporting lower limiting long-term illness (Boyle et al. (2002) using the 1991 Great Britain Census and lower rates of work incapacity reporting; Bentham (1988) using the 1971/81 Great Britain Census). If healthy people migrate, then the estimates of the migration dummy will be biased upwards. The inclusion of lagged caseness however, mitigates this endogeneity, we are in effect controlling for caseness at the time of migration by the inclusion of lagged caseness (stripping the bias caused by positive or negative associations between migration and caseness from the migration estimate).

Average marginal effects (AME) are calculated using STATA's *margins* command, with standard errors estimated using the delta-method. AMEs give the average effect of switching the migration dummy on for everyone in the sample.

We model three specifications for migration. The first is where we model the effects of migration across all migrants, in the second specification we split the migration dummy into two - those with and without caseness prior to the move, and in the third specification we split the migration dummy by motive for moving.

For comparisons with the labour economic literature on the effects of migration on employment and earnings, later we restrict the sample to those aged 21-49 and exclude students and the retired.

IV. Results

From the full BHPS sample of 224,840 person-year observations, excluding those in Northern Ireland and the first wave each individual is observed (since migration is undefined here), and those with no caseness and/or lagged caseness data results in a sample of 161,130 person-years (20,852 individuals, of which 9,711 are male and 11,141 female). Excluding data with no manual status, ethnicity, education, marital status, child data, physical health data, or data on whether the respondent likes their neighbourhood gives our final sample size of 130,147 person-years (16,043 individuals, of which 7,468 are male and 8,575 female).

Table 1 gives the rates of moving, and distance moved for residential (all) moves, LAD moves, and Government Office Region moves. 9.16% of the sample move residence at some point over the survey, the rates for migrating between LADs is 3.33%, and regions 1.34%. Unsurprisingly distance moved is higher for regions than LAD moves, and LAD moves are longer distance than residential moves. The migration rate for our preferred migration definition - those moving 10km or more – is 2.90%, with an average distance moved of 98.35km. Rather than model all residential moves, we chose a distance cut-off to ensure the migration effects estimated were not driven by local small-distance moves. Although the average distance moved for all moves was approximately 33km, the results are robust to distance moved and 10km increases our already small migrating sample size.

[Table 1 here]

Rates of caseness for the different types of move are provided in Table 2. Migrants in general have higher rates of caseness before they move than the general population (31.82% compared to 24.87% for non-migrants), this persists post-migration though the difference is reduced. Table 2 also breaks down the migrant group into several separate groups based on migrant motives. For all motives caseness is higher pre- and post-migration, and for all motives is the difference with the general sample reduced following a move.

[Table 2 here]

Table 2 highlights the need to control for selection into migration, migrants have higher rates of caseness prior to moving, and while these rates decline after a move, they remain, on the whole, larger than non-migrants. A cross-sectional analysis of migration would infer migration increases the probability of caseness while our (crude) two-period assessment reveals migration reduces caseness.

Univariate analysis

Table 3 gives the raw, unconditional effects of migration, where only the dummies for moving are included in a probit model for caseness. Estimates are given as average marginal effects, the estimate of 0.038 in the first set of results is hence interpreted as those who moved residence in the past year (one year ago) have on average 3.8% higher rates of caseness than those who do not move.

[Table 3 here]

When we separate movers into their health state before the move, we find significant competing effects. Those who had caseness before a move have significantly higher rates of caseness post-migration. Those who did not have caseness prior to the move noticed reductions in the probability of caseness post-migration. The third set of results in Table 3 are where we break migration into four motives, here we find significant increases in caseness for those who have been pushed into migration, or are moving for other (non- job, -push, or -area) reasons.

Multivariate analysis

In the model of residential moves with a single dummy for migration (the first panel in Table 3), including the other covariates drives the effect of a residential move down from 3.8% to 3.4% (not reported, p<0.001), which suggests part of the effect of migration can be explained by the types of individuals that move. Including lagged caseness and the first observed caseness (initial condition) drives the estimate down to 1.3% (p=0.005); the drop in the effect of moving may signify the selective nature of migrants – they positively select (in terms of caseness) into migration. The initial condition and lagged caseness terms are both individually significant (p<0.001 for each) and suggest caseness is persistent. Persistence in health using the BHPS (and the GHQ score) has also been found by Contoyannis, Jones and Rice (2004). When we include the time averages of the (time varying) additional covariates (jointly significant, p<0.001) and estimate random-effects (rho significant, p<0.001) the estimate reduces further to 0.5% (p=0.498) suggesting the effects of migration was largely due to individuals that migrate being unobservably more likely to report caseness than non-migrants. The effects of including other covariates, lagged caseness, the initial condition, time averages and random-effects are consistent across each specification for migration (residential moves, residential moves greater or equal to 20km, residential moves greater or equal to 30km, LAD moves and moves between Government Office Regions). We focus on the final model specification that controls for all sources of endogeneity (Equation (3)). The results are given in Table 4.

[Table 4 here]

The first set of results in Table 4 are where migration is separated by lagged caseness state. There are different effects of migration dependent upon whether the migrant had caseness the year prior to moving. For those with caseness there is a reduction in the probability of caseness of 6.3% ($p<0.001$), while those without caseness experience an increase in the probability of caseness of 4.8% ($p<0.001$).

The second set of results are where we restrict the sample to those aged between 21-49, not in education, and not retired. This was for comparability with the labour economics literature, and also to check the results were not being driven by the ill-old moving to better familial and social structures. The key results are substantively the same.

The third and fourth sets of results are where we split migrants into either job- push-, area-, or other- related motives for the move for the unrestricted, and restricted samples. We find no effect for either motive for migration for both the unrestricted and restricted samples.

The effects of the additional covariates are largely robust, caseness is lower for males, higher for those who become widowed and those single, is lower for those who like their current area of residence, and higher for those with physical health problems. For each of the time-varying covariates, there is also a time-averaged counterpart, this may explain why standard covariates as manual status and age, found highly significant in the literature, appear insignificant here. Effectively the covariates represent changes, with the time-averages a more long-term effect, however, because by assumption the time-averaged covariates are meant to pick up any unobserved heterogeneity correlated with the covariates (see Equation (2)), the interpretation of the time-averaged covariate estimates are somewhat problematic, representing associations of the covariates with the unobserved heterogeneity term.

The analysis of migrant success has typically involved the measurement of earnings and employment. Our wellbeing measure was used with the aim of encapsulating a more meaningful measure of return, one that would likely capture wage and employment effects and go beyond this to account for other factors which more fully capture the migration impact on the utility function. For this reason we have omitted income and job measures in the models, since we want to capture the most complete effect of migration.

We find caseness to be weakly concave in age, while there is a great deal of studies finding subjective wellbeing to be U-shaped with age (Oswald, 1997; Blanchflower and Oswald, 2004; Clark and Oswald, 2007; Ferrer-i-Carbonell & Gowdy, 2007). Our negative male effect complies with previous work on the GHQ (Clark & Oswald, 1994).

V. Discussion

There are several issues with the modelling of both subjective wellbeing and migration. First being which measures of subjective wellbeing and migration to use, second the methods used to model wellbeing and migration, and third how to deal with attrition for both subjective wellbeing and migration.

Caseness as a measure of health

We modelled subjective wellbeing as a binary variable, this has been proven to be a good indicator for mental illness (Goldberg et al. 1997) and has been used in the literature looking at geographical variation in mental health (Weich et al. 2005; McCulloch, 2001). An alternative approach is to model the GHQ on a 12 point, or 36 point scale, this would capture a gradient in the effects of migration and more variation within the GHQ than the binary measure chosen. We modelled the 12 point score both as an ordered probit, and using Ordinary Least Squares with Fixed-Effects, the results were qualitatively the same, those in 'good' health (scores around 1 or 2) had positive estimates (of varying statistical significance) and those in 'poor' health (greater than 2 or 3) had negative estimates. The binary specification makes interpreting the results much simpler, and resolves the issue of whether to treat the GHQ score as cardinal or ordinal. Given the results give similar qualitative answers, we believe a binary approach had significant benefits above Likert measures. Additional robustness checks were also made to the cut-off score for caseness, our results were robust to whether cut-offs of 3 or 4 were used.

Modelling migration

Each model was robust to the definition of migration, however, as average migrating distance increased, so too did the gains of migration, and losses too declined with distance. This suggests longer distance moves are met with stronger gains, this is consistent in the human capital model given longer distance moves are likely to be more costly.

The approach we have taken may capture an immediate effect of migration, but there may be good reason to believe the effects of migration on health vary with time. While migration may result in the breakdown of familial and friendship networks, individuals could take some years to fully assimilate to the new residence, building social networks and local knowledge. In this instance it seems plausible to expect long-run effects on health.

The longitudinal structure of the data permits the time since a migration to be observed. Modelling an assimilation effect is, however, problematic. While we can allow for associations with the lagged dependent variable and our migration dummy for migration in the past year, there would be no such control for the following years since a move, these estimates will likely be endogeneous. Nonetheless we replicated our models with additional time since migration dummies. We found migration effects declined over the first three years following a move for both those with and without caseness prior to the move (no significant effects for migrant motives were found over time). We cannot be certain that this result is a true reflection of migration and assimilation, or the result of high correlation between the time dummies and/or additional endogeneity concerns with caseness.

In the data we observe multiple migrations by an individual. This could generate bias if multiple movers have differing rates of caseness than single movers. We could have restricted the analysis to model only the first migration observed in the data, however, from the BHPS we can only capture the first move of individuals if they have lived in their previous residence all their life until some point in the sample period. This would be a highly selected sample of migrants, likely to be heavily skewed towards younger age groups.

Attrition

Attrition is a key concern in longitudinal studies, this is particularly important when assessing health and migration, since attrition may be higher amongst the ill and those that migrate. We replicated our analysis under two settings, first we modelled only the balanced panel, to see whether the results changed when using only this group; second we used weights taken from the BHPS (variable LRWGHT) that adjust for variations in attrition with moving residence, age, sex, employment status, income, ethnicity, education, region, tenure, car and consumables ownership (Taylor et al., 2010). Our results were robust to either/both of these sensitivity checks (only for the migration motive specification with those aged 21-49 and not in education or retired (the fourth panel of results in Table 4) where we model the balanced panel with the BHPS weights did we find a difference, here those pushed into migration had a 9.1% higher rate of caseness following a move), results from these checks are available from the author upon request.

VI. Conclusion

We use longitudinal data containing rich information on moving, motives for moving, health, personal, and labour market characteristics. We find gains and losses in caseness probability for different groups of migrants. The effects of migration on caseness vary by past caseness state, but not by motive.

The results of this paper have important implications for the measurement of migration and health inequalities. Given studies have found individual effects largely explain away geographic variations in wellbeing (Propper et al. 2005), the results here suggest migration may have important impacts on geographical variations in wellbeing should migrant flows be concentrated amongst certain groups to certain areas (were those with caseness having higher propensities to move to populations with higher than average rates of caseness, for example). An analysis of migrant flows by prior health state would prove insightful.

Caseness is a psychosocial/mental health measure, this measure differs from the physical measures used to explore health inequalities (limiting long-term illness, self assessed health, and work incapacity). Although each may be correlated with one another, it is important to note that other health measures may give different results. This may be particularly true when looking at mental health and the determinants of migration, Table 2 suggests migrants tend to have higher rates of caseness prior to a move; this is in stark contrast to the literature that finds migrants tend to have lower limiting long-term illness, higher self assessed health, and lower work incapacity. Further research into the effects of migration on different health measures would prove fruitful.

Past studies looking at physical health measures have removed migrants from their destination and placed them back into their origin to ascertain how important migration is on the distortion of widening health inequalities. The results here suggest health (albeit mental health) changes for some groups with migration. For example, if migrants move into areas with higher health, for those with worse health having moved, the aforementioned approach may exert upwards bias on the impact of migration, and those with better health a downwards bias. Future studies on the effects of internal migration on geographic health inequalities may benefit from an analysis of how migration may impact on the measure of health used in the analysis.

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Tables

Table 1 Rates and distance of migration in BHPS 1991-2008[a]

	Number	*%sample*	*Mean distance moved (km)*	*Median distance moved (km)*	*Min. distance moved (km)*	*Max. distance moved (km)*
Residential	11,915	9.16	32.98	3.66	0.01	747.22
LAD[b]	4,818	3.33	85.34	30.66	0.26	747.22
Residential>=10km	3,778	2.90	98.35	44.40	10.0	747.22
Region	2,110	1.34	168.72	144.54	0.60	747.22

[a]Sample size 130,147
[b]There are 408 LADs in Great Britain using the BHPS LAD identifier, LAD (University of Essex, 2010b), and while this measure of geography has been used in both the literature on health inequalities and the labour literature on migration, we wanted to observe movements away from the local neighbourhood, geographic barrier crossing such as LAD migrations in our data would include those moving less than 1km.

Table 2 Rates of caseness pre- and post-migration[c,d]

	Sample size	*Caseness*	*%*	*lag Caseness*	*%*
Non-migrants	126,369	31,686	25.07	31,431	24.87
Migrant	3,778	1,095	28.98	31,202	31.82
job reason	909	232	25.52	267	29.37
push reason	858	264	30.77	300	34.97
area reason	301	77	25.58	90	29.90
other reason	1,710	522	30.53	545	31.87

[c]Migration defined as a residential move of a distance of 10km or more
[d]Lag caseness gives the pre-migration rate of caseness, caseness gives the post-migration rate of caseness

Table 3 Probit estimates for raw effects of migration on caseness[e]

	All		*Caseness type*		*Motive type*	
All migrants	0.038**	(0.007)				
Caseness state prior to move:						
Caseness prior to move			0.203**	(0.012)		
No caseness prior to move			-0.056**	(0.009)		
Migrant motive:						
Job reasons					0.004	(0.014)
Push reasons					0.051**	(0.014)
Area reasons					0.005	(0.025)
Other reasons					0.052**	(0.010)
Observations	130,147		130,147		130,147	

[e]Average marginal effects; Standard errors (delta method) in parentheses

* $p < 0.05$, ** $p < 0.01$

Table 4 Dynamic probit estimates for model of caseness with unobserved heterogeneity[f]

	Past health state		*Past health state restricted age*[g]		*Motive*		*Motive restricted age*[g]	
Migrant caseness state								
had caseness	-0.063**	(0.011)	-0.056**	(0.014)				
no caseness	0.048**	(0.009)	0.054**	(0.011)				
Migrant motive								
job reasons					-0.009	(0.014)	0.000	(0.017)
push reasons					0.009	(0.014)	0.034	(0.020)
area reasons					-0.009	(0.024)	-0.015	(0.029)
other reasons					0.012	(0.010)	0.017	(0.013)
Caseness lag	0.112**	(0.003)	0.107**	(0.004)	0.108**	(0.003)	0.103**	(0.004)
Caseness first observation	0.162**	(0.004)	0.138**	(0.005)	0.173**	(0.004)	0.150**	(0.005)
Physical health problems	0.034**	(0.003)	0.033**	(0.005)	0.034**	(0.003)	0.033**	(0.005)
Male	-0.051**	(0.004)	-0.047**	(0.005)	-0.052**	(0.004)	-0.049**	(0.005)
Manual social class	-0.004	(0.004)	-0.012	(0.006)	-0.004	(0.005)	-0.012	(0.006)
Age	0.001	(0.001)	0.005	(0.003)	0.001	(0.001)	0.005	(0.003)
Age Squared	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Ethnic Minority	-0.002	(0.004)	-0.003	(0.005)	-0.002	(0.004)	-0.003	(0.006)
Education (base: none)								
Degree or higher	0.011	(0.024)	-0.015	(0.034)	0.011	(0.024)	-0.012	(0.034)
Some qual.	-0.012	(0.021)	-0.022	(0.030)	-0.012	(0.022)	-0.021	(0.030)
Children (base: none)								
One	0.008	(0.004)	0.009	(0.006)	0.008	(0.004)	0.009	(0.006)
Two	-0.001	(0.005)	-0.007	(0.007)	-0.001	(0.005)	-0.007	(0.007)
Three or more	0.000	(0.008)	-0.003	(0.010)	0.000	(0.008)	-0.002	(0.010)
Marital status (base: married)								
Couple	0.000	(0.006)	-0.002	(0.007)	0.000	(0.006)	-0.002	(0.008)
Widowed	0.100**	(0.013)	0.070**	(0.031)	0.100**	(0.013)	0.069**	(0.031)
Divorced	-0.010	(0.009)	-0.020	(0.012)	-0.010	(0.009)	-0.019	(0.012)
Single	0.032**	(0.007)	0.044**	(0.009)	0.032**	(0.007)	0.044**	(0.009)
Like neighborhood	-0.036**	(0.005)	-0.039**	(0.007)	-0.037**	(0.005)	-0.040**	(0.007)
Rho	0.283**	(0.006)	0.244**	(0.008)	0.297**	(0.006)	0.259**	(0.008)
Observations	137,031		73,163		137,031		73,163	

[f]Random effects probit models, average marginal effects; Standard errors (delta method) in parentheses. Averages of time varying covariates (jointly significant, p-value<0.001 for all models), and year estimates not reported but available by author on request
[g]Estimates for caseness for those age 21-49 and not in education or retired
* $p < 0.05$, ** $p < 0.01$