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Determinants of staff turnover and vacancies in the social care sector in England

Florin Vadean and Eirini Saloniki

Personal Social Services Research Unit

University of Kent

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www.pssru.ac.uk



Economics of
Social and Health Care
Research Unit

University of Kent

University of Kent
Cornwallis Central
Canterbury
Kent
CT2 7NF
Tel: 01227 823963
pssru@kent.ac.uk

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Abstract

Staff recruitment and retention are generally known to be influenced by low pay, low job satisfaction and lack of opportunities for career advancement in people's current jobs, and better job opportunities offered by other employers (or industries). Yet, little is known about the determinants of the current substantial turnover and vacancy rates among social care staff in England. Recent statistics show that turnover in the social care industry in England reached over 30 per cent, and is highest among frontline staff. At the same time, about 8 per cent of social care jobs in England are vacant, with employers having difficulties particularly in recruiting and retaining younger people.

We use data from the Adult Social Care Workforce Data Set (ASC-WDS) and a range of econometric methods to assess whether individual, organisational and work environment factors are affecting turnover and vacancy rates of adult social care staff in England.

While turnover and vacancy rates are related to factors that are out of the control of social care providers (and commissioners), e.g. local labour market (i.e. unemployment rates), the type of service provided (i.e. domiciliary care) or higher job mobility among younger employees, our results also show that employment related aspects may be used to improve recruitment and retention, such as employing staff on contracts with guaranteed hours, instead of zero-hours contracts, and fostering a healthy and safe work environment.

1. Introduction

The main input in the delivery of long-term care services is labour, with the adult social care sector in England employing about 1.6 million staff and staff costs accounting on average for about half of total running costs (Competition and Markets Authority 2017). Therefore, the increasing demand for social care services due to population aging has an important bearing on the demand for social care staff. Forecasting models predict that in order to keep up with the increasing demand for social care services, the social care workforce would need to increase by between 580,000 and 800,000 new jobs by 2035 (Skills for Care 2019a).

However, the adult social care sector in England faces important challenges. Care providers are dealing with declining operating margins due both to stagnant fee income from local authority commissioned places caused by austerity, and increasing staff costs caused by increasing minimum wage levels (Charlesworth, Johnson 2018, The Health Foundation, Nuffield Trust et al. 2018, Quilter-Pinner, Snelling 2017). In order to keep running costs low, they are paying more and more of their staff just the statutory minimum wage, seldom fully pay travel time (in the case of domiciliary care workers) and often employ staff on casual contracts (i.e. without guaranteed working hours), with negative implications on recruitment, retention and potentially the quality of care delivered (National Audit Office 2018, Vadean, Allan 2017, Hussein, Ismail et al. 2016).

The relative high levels of staff turnover and job vacancies in the adult social care sector have been a source of concern for some time (Donoghue 2010, Cangiano, Shutes et al. 2009, Colombo, Llena-Nozal et al. 2011, Skills for Care 2011). Recent statistics show that over 30 per cent of staff working in the adult social care sector in England left their job in 2018/19, although the majority (66 per cent) remained within the sector (Skills for Care 2019b). The turnover varied also considerably by job role, with the highest rates among care workers (40 per cent) and registered nurses (34 per cent).¹ The vacancy rate in the sector also reached 8 per cent and, as a result, it is not uncommon that employers resort to alternatives such as temporary and agency staff (National Audit Office 2018, Heywood, Siebert et al. 2011).

The determinants of turnover and vacancies have received substantial attention in the labour economics, industrial relations and human resources literature, with various studies at the individual (Kronenberg, Carree 2012, Delfgaauw 2007, Booth, Francesconi et al. 1999, Klein, Spady et al. 1991,

¹ These turnover figures are not as high as those reported for equivalent job roles in the US (e.g. of 56 per cent among nurse aides and 75 per cent among certified nursing assistants), but they are still more than twice the average level across UK industries (Donoghue 2010, Castle, Engberg 2005).

Bartel 1982), industry (Burgess, Nickell 1990, Burgess 1989, Wickens 1978), and firm/establishment level (Davis, Faberman et al. 2013, Dickerson 2003, Martin 2003, Barth, Dalc-Olsen 1999, Gautier, van den Berg et al. 1999, Green, Machin et al. 1998, Holzer 1994). The majority of existing studies on long-term care staff are from the United States (US) and focus mainly on turnover and/or vacancies of nursing home staff. Some highlight the role of job satisfaction and job related well-being in predicting turnover. In particular, lack of opportunity for career progression, inadequate supervision, and poor communication with management were found to be related to lower satisfaction and higher turnover (Rosen, Stiehl et al. 2011, Parsons, Simmons et al. 2003). Further, organisational characteristics associated with staff turnover were staffing levels, quality (e.g. deficiency citations), organisation size (i.e. no. of beds), type of ownership (i.e. public, private, not-for-profit), and manager style and tenure (Donoghue 2010, Donoghue, Castle 2009, Donoghue, Castle 2007, Castle 2008, Castle, Engberg 2006). Moreover, local environment factors, like urban/rural location, local unemployment and competition have been found to affect significantly the variation between nursing homes (Castle 2008, Donoghue, Castle 2007).

Despite the recognised importance of staff recruitment and retention both for meeting demand for social care services and delivering good quality services through adequate staffing and continuity of care, there is little empirical evidence to show what drives staff turnover and job vacancies in the social care sector in England (National Audit Office 2018). Recruitment and retention problems are often attributed to poor terms and conditions offered to care workers and lack of opportunities for career advancement, combined with the lack of status (i.e. care workers not being recognised as a profession) (National Audit Office 2018, Charlesworth, Johnson 2018, The Health Foundation, Nuffield Trust et al. 2018, NHS, Public Health England 2017, Gershlick, Roberts et al. 2017).

Our work intends to contribute to closing this gap by assessing the individual, organisational and local environment factors affecting turnover and vacancy rates in the social care sector in England. We use data from the Adult Social Care Workforce Data Set (ADC-WDS) – the main dataset on adult social care workforce in England, formerly known as the National Minimum Data Set for Social Care (NMDS-SC) – and multivariate econometric analysis to assess what factors under the control of care providers and/or policymakers are related to recruitment and retention. The findings should help care providers, commissioners and policymakers to engage in a meaningful dialogue aimed at finding solutions to promote a sustainable care workforce.

The remainder of the paper is organised as follows. Section 2 provides a description of the data, including definitions for the main variables, and outlines the empirical model. Section 3 presents the estimation results, and Section 4 provides the conclusion.

2. Data

For this analysis, we use data from the Adult Social Care Workforce Data Set (ASC-WDS), an online data collection service managed by Skills for Care, and the leading source of workforce information for the adult social care sector in England. It holds information on over 20,000 care providing establishments and over 700,000 workers across England, therefore covering about 50 per cent of the social care market. It includes rich information at both establishment (e.g. type of service provided, sector, establishment size, count of employees and job roles, starters, leavers and vacancies, etc.) and individual worker level (e.g. age, gender, nationality, qualifications, pay, working hours, job role and job type). The dataset is updated regularly by employers: while public employers update data on a mandatory basis in September each year, independent employers submit data on a voluntary basis, but are incentivised by access to workforce development grants. All data in the ASC-WDS has been updated or confirmed to be up to date within the last two years and about 90 per cent of employers have updated their data in the past 12 months. Although the dataset does not cover all independent sector establishments, it does have a large enough sample to provide a solid basis for reliable workforce estimates at both national and local level. All ASC-WDS data was validated at source and has undergone rigorous data quality checks (Skills for Care 2019a, Skills for Care 2019b).

We used pooled data from three cuts of the ASC-WDS: October 2016, October 2017, and October 2018, matched at establishment level, with some variables generated from the worker data set.

Consistent with the definitions used by Skills for Care, we calculated the turnover rate as the total number of all job roles ceased working in the past twelve months over the total number of employees in all job roles in the same period. Similarly, the vacancy rate in each establishment was defined as the total number of vacancies for all job roles in the past twelve months divided by the total number of employees and vacancies in all job roles in the same period. To smooth out the distributions of both turnover and vacancy rates – as they were strongly right-skewed – we capped high values to the 99th percentile.

We further excluded establishments with duplicate worker entries, establishments with no live questionnaires, worker or establishment records that were not updated for more than twelve months, establishments offering different types of care between the study periods, and establishments with no direct care staff. On the other hand, we included establishments in statutory local authority, private, voluntary or third sector and establishments that provide care home services with or without nursing or domiciliary care services. We only considered establishments with adults service users (including those with dementia or detained under the Mental Health Act (MHA)). The sample for this analysis included just over 10,000 establishments for each of the three years.

3. Empirical model

As shown by the Kernel density distributions in Figure 1, turnover and vacancy rates are highly right-skewed, with a large number of establishments having a zero rate. Also, turnover and vacancy rates cannot take negative values. Thus, a simple linear regression model to estimate the impact of different factors would not be appropriate in this case. We estimated a two-part model suggested by (Cragg 1971), which has also been used in other studies in the vacancies literature (Holzer 1994, Dickerson 2003):

$$P(Y_i > 0) = \Phi \left(\sum_j X_{ij} \beta_{1j} \right) \quad (1)$$

$$E(Y_i | Y_i > 0) = \sum_j X_{ij} \beta_{2j} \quad (2)$$

where Y_i denotes either the staff turnover or job vacancy rate in establishment i ; X_{ij} is the vector of explanatory variables in establishment i ; Φ is the cumulative density function (CDF) of the standard normal distribution. The first equation represents the probability of an establishment having a positive turnover/vacancy rate, and we estimate this using a probit model. The second equation models the conditional turnover/vacancy rate in each establishment providing that the turnover/vacancy rate is positive, which we estimate using a truncated regression model. If $\beta_{1j} = \beta_{2j}/\sigma$ – where σ is the standard deviation – the model reduces to a Tobit model (Greene 2018).

The effects of any characteristic X_{ij} on the overall staff turnover rate or the overall job vacancy rate can occur either through the incidence (i.e. equation 1) or the propensity channel (equation 2). The joint (partial) effect of X_{ij} is computed as follows:

$$\begin{aligned} \frac{\partial Y}{\partial X_j} &= \frac{\partial(P(Y > 0) \times E(Y|Y > 0))}{\partial X_j} \\ &= \beta_{1j} \phi \left(\sum_j X_j \beta_{1j} \right) \times E(Y|Y > 0) + \beta_{2j} P(Y > 0) \end{aligned} \quad (3)$$

where ϕ represents the normal density function (Holzer 1994, Dickerson 2003). In Tables 3 and 4 we present both the marginal effects after the probit and truncated regression estimations as well as the overall effects. The overall effects are computed as marginal effects following the *twopm* Stata module (Belotti, Deb et al. 2015).

Since the majority of explanatory variables have been shown in the literature to have an effect on either turnover or vacancy rate, our controls overlap across the different estimations. Specifically, in both turnover and vacancy models, worker characteristics in X_{ij} – generated at the establishment

level using information from the worker dataset – include the share of female staff, share of staff aged under 35, share of British nationals, share of staff with a social care qualification, average years of experience in the sector (and its square), the average number of sick days per employee, average hourly wage, and share of staff on zero-hours contract. Vector X_{ij} also includes other establishment characteristics such as type of service provided, sector, user type, establishment size, Investor in People (IIP) status, share of permanent staff, worker per service user ratio, direct care worker per total staff ratio, and the CQC rating on how ‘well led’ establishments are. Finally, we include the share of Job Seeker Allowance claimants (JSA) reported by the Department for Work and Pensions aggregated at postcode district level (as a control for local labour supply) as well as year and region controls.

As staff turnover and job vacancy effects are usually observed with a delay, all independent variables are introduced in the estimation with a one year lag. Moreover, in order to control for serial correlation in either turnover or vacancy we also estimate specifications of equations (1) and (2) in which we include the one year lag of the dependent variable as a covariate.

For staff characteristics generated in the worker dataset, we had a high number of observations with missing values (over 40 per cent). The strategy to deal with these missing values depends on whether they are missing completely at random (MCAR), missing at random (MAR) or missing not at random (MNAR) (Carpenter, Kenward 2013). Whether data is MCAR can be statistically tested by either performing a t-test comparing care establishments with missing and non-missing data for characteristics that are observed for both, running a logistic regression of the probability of a care establishment having variables with missing values or performing Little’s test (Little 1988, Li 2013, Carpenter, Kenward 2013). When data is MCAR, complete case analysis is unbiased. The majority of covariates included in the logistic regression significantly predicted the probability of a care establishment having variables with missing values, thus showing that missing data was not MCAR. This result was confirmed by Little’s MCAR test, giving a χ^2 distance of 8,603.09 and p-value <0.001. Therefore, complete case analysis would lead to biased results.

MAR assumes that missingness may be related to observed data, but is independent of the unobserved data. When the missing-data mechanism depends on the unobserved data, data is MNAR. Assessing whether missing data is MAR or MNAR is in general impossible because it requires unavailable information about the missing data (Li 2013, Carpenter, Kenward 2013). Due to the rich complete information available in the ASC-WDS at the establishment level as well as matched local area information, we assume that the missingness can be explained by the observed data. We,

therefore, ran a multiple imputation analysis with 50 imputations generated.² A chain imputation method was used in Stata 16.0, with a logit specification for binary variables and predictive mean matching for continuous variables.

4. Descriptive statistics

Descriptive statistics of the main variables of interest are reported in Table 1. As already mentioned, a large number of social care establishments had zero turnover or vacancy rates; more specifically only about 78 per cent of establishments in our sample had a positive turnover rate and only about 39 per cent had job vacancies. The mean turnover and vacancy rates for our sample was 27 per cent and 5 per cent respectively. There is, however, high variance between establishments. Among establishments with a positive turnover – even after removing outliers by capping the distribution at the 99th percentile – one per cent of establishments had a turnover rate above unity,³ while the highest vacancy rate was 48 per cent.

The staff and organisational characteristics of the establishment in our sample are rather similar to those reported elsewhere (Skills for Care 2018a, Skills for Care 2018b). The average share of female staff across the establishments in our sample was over 80 per cent, with about 34 per cent of staff aged under 35, and about 83 per cent on average being British nationals. In addition, staff had on average 8.8 years of experience, and on average half of them held a social care qualification. With over 90 per cent, the majority of care staff were employed on permanent contracts, and 12 per cent of those were on zero-hours contracts. The care staff mean hourly wage (in 2018 prices) was on average £8.78, with about 75 per cent of the staff per establishment working in direct care roles, and each worker being on average responsible for 1.6 service users.

The majority of establishments in the sample were private (78 per cent), with over half providing residential care without nursing (53 per cent), and about a quarter providing domiciliary care (26 per cent). More than half of the establishments offered services to users with dementia (52 per cent) and a further 5 per cent to users under the Mental Health Act (MHA). Furthermore, most establishments in the sample (64 per cent) were small (i.e. employing 10 to 49 workers). Only less than half were committed or had a recognised Investor in People (IIP) accreditation. However almost 80 per cent

² As a rule of thumb the number of imputations should equal or exceed the fraction of missing information (White, Royston et al. 2011).

³ A turnover rate above unity can occur in establishments where job roles are vacated and filled more than once during 12 months.

were rated by the health and social care regulator (i.e. CQC) as having ‘good’ or ‘outstanding’ management (i.e. well-led).

When looking at time trends (see Figure 2), we notice that both turnover and vacancy rates increased in the last three years: turnover rates from about 25 per cent in 2016 to about 29 per cent in 2018, while vacancy rates from about 4 per cent in 2016 to over 5 per cent in 2018.

Table 2 presents staff turnover and job vacancy rates by sector, service and user type, and establishment size as of October 2018. We first observe that staff turnover rates are higher for direct care staff (e.g. care workers, senior care workers, activities co-ordinators, rehabilitation workers, and advocacy workers; column 2) than for all staff (i.e. including managers, professional and other support roles; and column 1) as well as higher for private (i.e. for-profit) establishments (0.35 for direct care staff and 0.31 for all staff) compared to statutory LA (0.16 and 0.15 respectively) and voluntary (i.e. not-for-profit) establishments (0.28 and 0.26 respectively).⁴ We also observe significantly higher turnover (0.40) and vacancy rates (0.08) for direct care staff in domiciliary care compared to establishments offering residential care with or without nursing (about 0.30 staff turnover rate and 0.04 to 0.05 vacancy rate). This might be due mainly to the difference in working conditions, with about 40 per cent of domiciliary care workers being employed on zero-hours contracts (Vadean, Allan 2017). When differentiating by type of service users, we notice that, unsurprisingly, establishments looking after people with more challenging conditions had higher staff turnover and job vacancy rates: establishments with services for people with dementia had a care staff turnover rate of about 0.35, while establishments caring for people under the MHA had a turnover rate of 0.38 compared to only 0.29 in establishments not catering for people with dementia or MHA.

5. Estimation results

Table 3 presents marginal effects from Multiple Imputation (MI) two-part models of turnover rates of direct care workers (i.e. frontline staff). We focused on frontline staff as they represent the majority of staff employed in social care (about 75 per cent) and are a more homogenous group.⁵ We present two specifications of the MI two-part estimation. In the first, all independent variables are included with a one year lag in order to take into account that the turnover effect is not observed immediately, but with a delay. The second includes the lagged dependent variable as covariate, in order to control for the potential serial correlation of turnover (i.e. high turnover in a certain year might be related to

⁴ These figures are slightly lower than those reported by Skills for Care (Skills for Care 2017, Skills for Care 2016, Skills for Care 2018b), most likely due to the slightly different sample size used.

⁵ For brevity, we do not present here the results of the case-wise deletion analysis, as they are likely to be biased (see Section 3), but are available from the authors upon request.

the high turnover in the previous year(s)). Controlling for the past turnover rate is important, as quits might affect negatively the morale of the remaining employees or even increase in the short-term their workload, consequently increasing their own propensity to leave. Moreover, past turnover rates might capture effects of unobserved characteristics that could bias the coefficients (and marginal effects) of the other independent variables.

We indeed find a quite strong relationship between the past turnover rate and both the incidence and propensity of current year turnover rate. We also notice that in the specification controlling for past turnover effects the marginal effects of the other independent variables are significantly smaller, and discuss the results based on this second (preferred) specification.

As found by previous studies, our estimation results show that the local unemployment rate (proxied by the share of Job Seeker Allowance claimants) is the strongest predictor and negatively related to both the probability of turnover and its size (Donoghue, Castle 2007, Harrington, Swan 2003). Other results confirming previous findings are the establishment size being positively related to the probability of positive turnover and negatively related to the size of turnover (if positive), the positive effect of being a private (for-profit) establishment, and the positive effect of providing domiciliary care (Hussein, Ismail et al. 2016). Everything else equal, compared to micro establishments (less than 10 staff), being a small establishment (10 to 49 staff) increased the overall turnover rate by 0.030, while being a large establishment (with over 50 staff) increased the overall turnover rate by 0.055. For-profit establishments had a higher overall turnover rate by 0.065 compared to statutory LA establishments and by 0.04 compared to voluntary (i.e. not-for-profit) establishments. Even after controlling for observable staff characteristics and employment conditions, domiciliary care establishments had a higher overall turnover rate by 0.053, thus potentially capturing unobserved factors that increase staff dissatisfaction and quits, like for example unpaid travel and too short care visits (Hussein 2011).

We also find turnover rates are positively associated – significant overall effect of 0.082 – with the employment share of younger staff (aged 35 or less), which is not surprising, as younger people are more likely to move due both to family reasons (e.g. marriage) and work (e.g. pursue a better job or career change). Turnover also seems to be significantly lower in establishments with a higher share of staff holding a relevant qualification – significant overall effect of -0.032 – most probably due to the fact that staff who invest in a relevant qualification are more likely to be committed to a job in the social care sector.

In terms of employment conditions, we find that after controlling for all other observables, turnover rates are positively correlated with the share of staff on zero-hours contracts – overall effect of 0.03

– but we do not find any effect of wages on turnover.⁶ The difficulty in identifying (aggregated) establishment level wage effects is not particularly surprising (Martin 2003), and is consistent with findings of a recent study on job-related wellbeing and organisational commitment using data from the British Skills and Employment Survey (SES) series (Vadean 2018). We also find that sick days per employee are positively related to the incidence of turnover – a one per cent increase in average number of sick days per employee translating into an overall effect of 0.004 higher turnover. This shows that taking sick days off and job quits seem to be complementary strategies to deal with potentially difficult working conditions and/or low wellbeing at work.

Marginal effects after two-part models of job vacancy rates are presented in Table 4. Similar to the results from turnover rate estimations, we found that everything else being equal, the establishment size is positively related to the probability of positive vacancies and negatively to the vacancy rate (if positive). The two effects however cancelled each other out, i.e. the overall effect was zero. Everything else being equal, domiciliary care providers have significantly higher vacancy rates – overall effect of 0.01 – compared to residential care with or without nursing. We also find that a one per cent increase in sick-days per employee is associated with an about one per cent higher probability of having job vacancies and an overall 0.002 higher vacancy rate, probably showing that challenging working environments also make it more difficult for the employers to fill vacated job roles.

Finally, our findings also show that care providers offering less favourable contractual conditions, such as zero-hours contracts, seem to have more difficulties with filling vacant jobs: a 0.01 increase in the share of staff on zero-hour contracts is related to a 3 per cent higher probability of having job vacancies and an overall 0.006 higher vacancy rate, showing that care providers might have the possibility to improve recruitment if they succeed to improve employment conditions.

6. Discussion

Social care providers deliver vital personal care services to an increasing population of older people and adults with long term conditions, with care staff being the main input factor in the production of care services. It is therefore important to understand the recruitment and retention dynamics of social care workforce. Despite the challenges experienced in the last decade through reduced financing due to austerity measures combined with higher costs through minimum wage policy, the successes of many care providers to maintain good levels of recruitment and retention should be acknowledged:

⁶ Besides the log of mean hourly wage (reported in Table 3), we tried also specifications including the relative wage and the share of staff paid at minimum wage. The wage effect was insignificant in both of these specifications too.

about 25 per cent of care establishments in the analysed sample had zero turnover of direct care staff, while about 70 per cent had zero vacancies for direct care staff roles.

We find that turnover and vacancy rates are related to some factors that are out of the control of social care providers (and commissioners), e.g. local economy (i.e. local unemployment rates), the type of services provided (i.e. domiciliary care) or higher job mobility among younger employees. This raises, however, questions on potential strategies to be employed by care providers to retain young people who show an interest in care work: how can social care jobs be made more attractive for younger labour market entrants?

Our findings also show that there are employment related aspects that may be used to improve recruitment and retention, like for example employing staff on contracts with guaranteed hours instead of zero-hours contracts. The relation is rather strong: a one percentage point lower share of staff employed on zero-hours contracts (from a mean value of 0.12) is associated with a 0.03 (or 10 per cent) lower turnover rate (relative to a mean of 0.30); similarly, a one percentage point lower share of staff employed on zero-hours contracts is associated with a 0.006 (or 13 per cent) lower job vacancy rate (relative to a mean 0.046).

This is one of the first studies to provide quantitative evidence on the fact that better employment conditions could improve recruitment and retention of staff in the adult social care sector in England. The analysis attempts to reduce the likelihood of reverse causality as well as to remove serial correlation by introducing independent variables with a one year lag and the one year lagged dependent variable. There are, however, limitations to identifying causal effects as longitudinal fixed effects estimations were not feasible due to the short panel and the rather low variance in turnover and vacancies rates within establishments. Some of the independent variables might be endogenous, as both turnover/vacancies and contractual conditions could be determined by unobserved factors (e.g. the fees a care establishment can charge). Future research in this area might aim to apply instrumental variable techniques to establish causality; a rather important challenge to that approach is, however, to find observed exogenous factors that make suitable instruments.

References

- BARTEL, A.P., 1982. Wages, Nonwage Job Characteristics, and Labor Mobility. *Industrial and Labor Relations Review*, **35**(4), pp. 578-589.
- BARTH, E. and DALC-OISEN, H., 1999. The Employer's Wage Policy and Worker Turnover. In: J.C. HALTIWANGER, J.I. LANE, J.R. SPLETZER, J.J.M. THEEUWES and K.R. TROSKE, eds, *The Creation and Analysis of Employer-Employee Matched Data (Contributions to Economic Analysis, Volume 241)*. Bingley UK: Emerald Group Publishing Limited, pp. 285-312.
- BELOTTI, F., DEB, P., MANNING, W.G. and NORTON, E.C., 2015. Twopm: Two-Part Models. *The Stata Journal*, **15**(1), pp. 3-20.
- BOOTH, A.L., FRANCESCONI, M. and GARCIA-SERRANO, C., 1999. Job Tenure and Job Mobility in Britain. *Industrial and Labor Relations Review*, **53**(1), pp. 43-70.
- BURGESS, S.M., 1989. Employment and Turnover in UK Manufacturing Industries, 1963–82. *Oxford Bulletin of Economics and Statistics*, **51**(2), pp. 163-192.
- BURGESS, S.M. and NICKELL, S., 1990. Labour Turnover in UK Manufacturing. *Economica*, **57**(227), pp. 295-317.
- CANGIANO, A., SHUTES, I., SPENCER, S. and LEESON, G., 2009. *Migrant Care Workers in Ageing Societies: Research Findings in the United Kingdom*. University of Oxford: ESRC Centre on Migration, Policy and Society (COMPAS).
- CARPENTER, J.R. and KENWARD, M.G., 2013. *Multiple Imputation and its Application*. Chichester UK: John Wiley & Sons Ltd.
- CASTLE, N.G., 2008. State Differences and Facility Differences in Nursing Home Staff Turnover. *J Appl Gerontol*, **27**(5), pp. 609-630.
- CASTLE, N.G. and ENGBERG, J., 2006. Organizational Characteristics Associated With Staff Turnover in Nursing Homes. *The Gerontologist*, **46**(1), pp. 62-73.
- CASTLE, N.G. and ENGBERG, J., 2005. Staff Turnover and Quality of Care in Nursing Homes. *Medical care*, **43**(6), pp. 616-626.
- CHARLESWORTH, A. and JOHNSON, P., eds, 2018. *Securing the future: funding health and social care to the 2030s*. London: The Institute for Fiscal Studies.
- COLOMBO, F., LLENA-NOZAL, A., MERCIER, J. and TJADENS, F., 2011. *Help Wanted? Providing and Paying for Long-Term Care*. Paris: OECD Publishing.
- COMPETITION AND MARKETS AUTHORITY, 2017. *Care homes market study: Financial analysis working paper*. London: Competition and Markets Authority.
- CRAGG, J.G., 1971. Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods. *Econometrica*, **39**(5), pp. 829-844.

- DAVIS, S.J., FABERMAN, J.R. and HALTIWANGER, J.C., 2013. The Establishment-Level Behavior of Vacancies and Hiring. *The Quarterly Journal of Economics*, **128**(2), pp. 581-622.
- DELFGAAUW, J., 2007. Where to go? Workers' reasons to quit and intra- vs. interindustry job mobility. *Applied Economics*, **39**(16), pp. 2057-2067.
- DICKERSON, A., 2003. *The Distribution and Determinants of Job Vacancies: Evidence From the 2001 Employers Skill Survey*. Royal Economic Society Annual Conference No. 63.
- DONOGHUE, C., 2010. Nursing home staff turnover and retention: An analysis of national level data. *Journal of Applied Gerontology*, **29**(1), pp. 89-106.
- DONOGHUE, C. and CASTLE, N.G., 2009. Leadership styles of nursing home administrators and their association with staff turnover. *Gerontologist*, **49**(2), pp. 166-174.
- DONOGHUE, C. and CASTLE, N.G., 2007. Organizational and environmental effects on voluntary and involuntary turnover. *Health Care Management Review*, **32**(4), pp. 360-369.
- GAUTIER, P.A., VAN DEN BERG, G.J., VAN OURS, J.C. and RIDDER, G., 1999. Separations at the Firm Level. In: J.C. HALTIWANGER, J.I. LANE, J.R. SPLETZER, J.J.M. THEEUWES and K.R. TROSKE, eds, *The Creation and Analysis of Employer-Employee Matched Data (Contributions to Economic Analysis, Volume 241)*. Bingley UK: Emerald Group Publishing Limited, pp. 313-327.
- GERSHLICK, B., ROBERTS, A., CHARLESWORTH, A., THORLBY, R. and JONES, H., 2017. *Election briefing: A sustainable workforce – the lifeblood of the NHS and social care*. London: The Health Foundation.
- GREEN, F., MACHIN, S. and WILKINSON, D., 1998. The Meaning and Determinants of Skills Shortages. *Oxford Bulletin of Economics and Statistics*, **60**(2), pp. 165-187.
- GREENE, W.H., 2018. *Econometric analysis*. 8th edition edn. New York, NY: Pearson.
- HARRINGTON, C. and SWAN, J.H., 2003. Nursing Home Staffing, Turnover, and Case Mix. *Medical Care Research and Review*, **60**(3), pp. 366-392.
- HEYWOOD, J.S., SIEBERT, W.S. and WEI, X., 2011. Estimating the Use of Agency Workers: Can Family-Friendly Practices Reduce Their Use? *Industrial Relations: A Journal of Economy and Society*, **50**(3), pp. 535-564.
- HOLZER, H.J., 1994. Job Vacancy Rates in the Firm: An Empirical Analysis. *Economica*, **61**(241), pp. 17-36.
- HUSSEIN, S., 2011. Estimating probabilities and numbers of direct care workers paid under the National Minimum Wage in the UK: A Bayesian approach. *Social Care Workforce Periodical*, **12**(16),.
- HUSSEIN, S., ISMAIL, M. and MANTHORPE, J., 2016. Changes in turnover and vacancy rates of care workers in England from 2008 to 2010: panel analysis of national workforce data. *Health & Social Care in the Community*, **24**(5), pp. 547-556.
- KLEIN, R., SPADY, R. and WEISS, A., 1991. Factors Affecting the Output and Quit Propensities of Production Workers. *The Review of Economic Studies*, **58**(5), pp. 929-953.

KRONENBERG, K. and CARREE, M., 2012. On the Move: Determinants of Job and Residential Mobility in Different Sectors. *Urban Studies*, **49**(16), pp. 3679-3698.

LI, C., 2013. Little's Test of Missing Completely at Random. *The Stata Journal*, **13**(4), pp. 795-809.

LITTLE, R., 1988. A Test of Missing Completely at Random for Multivariate Data with Missing Values. *Journal of the American Statistical Association*, **83**(404), pp. 1198-1202.

MARTIN, C., 2003. Explaining Labour Turnover: Empirical Evidence from UK Establishments. *LABOUR*, **17**(3), pp. 391-412.

NATIONAL AUDIT OFFICE, 2018. *The adult social care workforce in England*. London: National Audit Office.

NHS and PUBLIC HEALTH ENGLAND, 2017. *Facing the Facts, Shaping the Future. A health and care workforce strategy for England to 2027*. Leeds: Health Education England.

PARSONS, S.K., SIMMONS, W.P., PENN, K. and FURLOUGH, M., 2003. Determinants of satisfaction and turnover among nursing assistants: The results of a statewide survey. *J Gerontol Nurs*, **29**(3), pp. 51-58.

QUILTER-PINNER, H. and SNELLING, C., 2017. *Saving social care: A fair funding settlement for the future*. London: Institute for Public Policy Research.

ROSEN, J., STIEHL, E.M., MITTAL, V. and LEANA, C.R., 2011. Stayers, Leavers, and Switchers Among Certified Nursing Assistants in Nursing Homes: A Longitudinal Investigation of Turnover Intent, Staff Retention, and Turnover. *The Gerontologist*, **51**(5), pp. 597-609.

SKILLS FOR CARE, 2019a. *The size and structure of the adult social care sector and workforce in England*. Leeds: Skills for Care.

SKILLS FOR CARE, 2019b. *The state of the adult social care sector and workforce in England*. Leeds: Skills for Care.

SKILLS FOR CARE, 2018a. *The size and structure of the adult social care sector and workforce in England*. Leeds: Skills for Care.

SKILLS FOR CARE, 2018b. *The state of the adult social care sector and workforce in England*. Leeds: Skills for Care.

SKILLS FOR CARE, 2011. *Adult social care workforce: recruitment and retention strategy*. Leeds: Skills for Care.

THE HEALTH FOUNDATION, NUFFIELD TRUST and THE KING'S FUND, 2018. *The health care workforce in England: Make or break?* London: The Health Foundation, Nuffield Trust, The King's Fund.

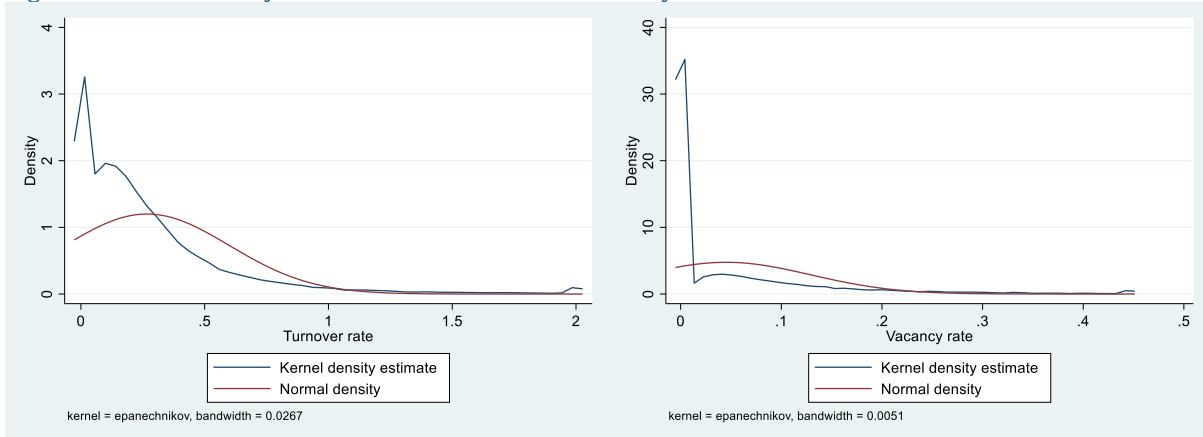
VADDEAN, F., 2018. *Job-related wellbeing and organisational commitment among social care and (non-medical) health care employees*. PSSRU DP 2950. Canterbury: PSSRU at University of Kent and London School of Economics and Political Science.

VADEAN, F. and ALLAN, S., 2017. *The effects of minimum wage policy on the long-term care sector*. PSSRU DP 2932. Canterbury: PSSRU at University of Kent and London School of Economics and Political Science.

WHITE, I.R., ROYSTON, P. and WOOD, A.M., 2011. Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, **30**(4), pp. 377-399.

WICKENS, M.R., 1978. An Econometric Model of Labour Turnover in U.K. Manufacturing Industries 1956-73. *The Review of Economic Studies*, **45**(3), pp. 469-477.

Figure 1: Kernel density estimates of turnover and vacancy rates



Source: ASC-WDS; own estimations.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Turnover rate (all staff) >0	31,113	0.779	0.415	0.000	1.000
Turnover rate (all staff)	31,113	0.267	0.332	0.000	2.000
Vacancy rate (all staff) >0	31,113	0.388	0.487	0.000	1.000
Vacancy rate (all staff)	31,113	0.045	0.084	0.000	0.446
Turnover rate (direct care staff) >0	31,113	0.753	0.431	0.000	1.000
Turnover rate (direct care staff)	31,113	0.301	0.384	0.000	2.164
Vacancy rate (direct care staff) >0	31,113	0.314	0.464	0.000	1.000
Vacancy rate (direct care staff)	31,113	0.046	0.094	0.000	0.500
Share of females staff	21,959	0.833	0.146	0.000	1.000
Share of staff aged <35	22,091	0.338	0.165	0.000	1.000
Share of staff with British nationality	17,793	0.833	0.202	0.000	1.000
Share of staff holding SC qualification	21,594	0.492	0.293	0.000	1.000
Staff average experience	17,786	8.809	4.272	0.000	52.000
Sick days per employee	21,822	2.626	4.947	0.000	182.500
Main service: res. care w/ nursing	31,113	0.202	0.401	0.000	1.000
Main service: res. care w/o nursing	31,113	0.535	0.499	0.000	1.000
Main service: domiciliary care	31,113	0.264	0.441	0.000	1.000
User type: excl. dementia/MHA	31,113	0.425	0.494	0.000	1.000
User type: dementia	31,113	0.521	0.500	0.000	1.000
User type: MHA	31,113	0.054	0.225	0.000	1.000
Sector: statutory LA	31,113	0.071	0.256	0.000	1.000
Sector: private	31,113	0.779	0.415	0.000	1.000
Sector: voluntary	31,113	0.151	0.358	0.000	1.000
Establishment size: micro (1-9 staff)	31,113	0.091	0.287	0.000	1.000
Establishment size: small (10-49 staff)	31,113	0.642	0.479	0.000	1.000
Establishment size: large (50+ staff)	31,113	0.267	0.443	0.000	1.000
IIP status: recognised/committed	30,449	0.398	0.489	0.000	1.000
Share of permanent staff	31,113	0.927	0.144	0.000	1.000
Share of staff on ZH contract	17,482	0.120	0.269	0.000	1.000
Mean hourly wage (2018 prices)	19,543	8.777	1.214	2.626	32.189
Workers per service user ratio	31,113	1.637	3.935	0.009	120.000
Direct care in total staff ratio	31,113	0.750	0.152	0.016	1.000
CQC rating: Well led	27,490	0.779	0.415	0.000	1.000
Share of JSA claimants (postcode district)	31,113	0.010	0.008	0.000	0.070
Year: 2016	31,113	0.330	0.470	0.000	1.000
Year: 2017	31,113	0.334	0.472	0.000	1.000
Year: 2018	31,113	0.336	0.472	0.000	1.000
Region: Eastern	31,113	0.117	0.322	0.000	1.000
Region: East Midlands	31,113	0.092	0.290	0.000	1.000
Region: London	31,113	0.086	0.280	0.000	1.000
Region: North East	31,113	0.053	0.224	0.000	1.000
Region: North West	31,113	0.128	0.334	0.000	1.000
Region: South East	31,113	0.170	0.376	0.000	1.000
Region: South West	31,113	0.126	0.331	0.000	1.000
Region: West Midlands	31,113	0.120	0.324	0.000	1.000
Region: Yorkshire and the Humber	31,113	0.108	0.310	0.000	1.000

Table 2: Staff turnover and job vacancies by sector, service type and user type; Oct 2018

	Staff turnover		Job vacancies	
	All staff	Direct care staff	All staff	Direct care staff
<i>Sector</i>				
Statutory LA	0.146	0.162	0.059	0.057
Private	0.308	0.349	0.052	0.054
Voluntary	0.256	0.278	0.048	0.049
<i>Main service</i>				
Residential care w/ nursing	0.266	0.301	0.052	0.053
Residential care w/o nursing	0.260	0.297	0.040	0.041
Domiciliary care	0.364	0.402	0.075	0.079
<i>User type</i>				
Excl. dementia/MHA	0.261	0.291	0.044	0.042
Dementia	0.306	0.347	0.057	0.061
Mental Health Act (MHA)	0.339	0.380	0.068	0.074
<i>Establishment size</i>				
Micro (1-9 workers)	0.281	0.342	0.074	0.073
Small (10-49 workers)	0.289	0.327	0.049	0.051
Medium&Large (50+ workers)	0.293	0.321	0.053	0.054

Source: ASC-WDS; own calculations.

Table 3: Multiple Imputation (MI) two-part estimation of staff turnover rates - marginal effects

VARIABLES	(1)			(2)		
	Probit	Truncreg	Combined	Probit	Truncreg	Combined
	Pr(y>0)	E(y y>0)		Pr(y>0)	E(y y>0)	
Turnover incidence/rate (lag)				0.347*** (0.003)	0.439*** (0.010)	0.730*** (0.011)
Share of female staff	0.059** (0.029)	-0.005 (0.033)	0.016 (0.028)	0.023 (0.020)	-0.014 (0.024)	0.016 (0.019)
Share of staff aged <35	0.098*** (0.029)	0.257*** (0.032)	0.252*** (0.029)	0.045** (0.019)	0.127*** (0.024)	0.082*** (0.020)
Share of staff with British nationality	0.002 (0.024)	0.035 (0.027)	0.026 (0.023)	0.007 (0.016)	0.011 (0.019)	0.004 (0.015)
Share of staff holding qualification	0.009 (0.017)	-0.093*** (0.019)	-0.063*** (0.017)	-0.028** (0.011)	-0.048*** (0.015)	-0.038*** (0.011)
Staff average experience	0.006** (0.003)	0.004 (0.004)	0.002 (0.003)	0.004* (0.002)	0.002 (0.003)	0.003 (0.002)
Staff average experience (square)	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)
Sick days per employee (log)	0.038*** (0.005)	-0.005 (0.005)	0.014*** (0.004)	0.009*** (0.003)	-0.002 (0.004)	0.004 (0.003)
Main service: res. care w/o nursing	0.004 (0.013)	0.030** (0.012)	0.031*** (0.011)	-0.012* (0.007)	0.033*** (0.009)	0.025*** (0.007)
Main service: domiciliary care	0.009 (0.016)	0.148*** (0.019)	0.123*** (0.016)	0.005 (0.010)	0.067*** (0.013)	0.053*** (0.010)
User type: dementia	-0.015* (0.009)	0.039*** (0.010)	0.025*** (0.008)	-0.012** (0.006)	0.011 (0.007)	0.003 (0.005)
User type: MHA	-0.075*** (0.021)	0.099*** (0.024)	0.044** (0.021)	-0.035*** (0.012)	0.049*** (0.016)	0.019 (0.013)
Sector: private	0.026 (0.018)	0.229*** (0.012)	0.158*** (0.014)	0.006 (0.012)	0.165*** (0.013)	0.065*** (0.010)
Sector: voluntary	-0.071*** (0.020)	0.171*** (0.014)	0.076*** (0.014)	-0.059*** (0.013)	0.140*** (0.013)	0.025*** (0.010)
Establishment size: small (10-49 staff)	0.215*** (0.017)	-0.191*** (0.027)	-0.008 (0.016)	0.063*** (0.010)	-0.043*** (0.015)	0.030*** (0.010)
Establishment size: large (50+ staff)	0.254*** (0.018)	-0.206*** (0.029)	-0.010 (0.018)	0.071*** (0.011)	-0.023 (0.016)	0.055*** (0.011)
IIP status: recognised/committed	0.012 (0.008)	0.029*** (0.009)	0.027*** (0.008)	0.000 (0.005)	0.016*** (0.006)	0.016*** (0.005)
Share of permanent staff	-0.059** (0.030)	-0.146*** (0.030)	-0.171*** (0.039)	-0.011 (0.017)	0.031 (0.025)	0.005 (0.022)
Share of staff on ZH contract	0.037** (0.019)	0.072*** (0.018)	0.091*** (0.020)	0.010 (0.013)	0.038** (0.015)	0.030** (0.013)
Mean hourly wage (log)	0.025 (0.041)	-0.045 (0.052)	0.003 (0.041)	0.011 (0.029)	-0.001 (0.039)	0.027 (0.028)
Workers per service user ratio	-0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.002*** (0.000)	0.000 (0.000)	-0.001 (0.000)
Direct care in total staff ratio	0.042 (0.031)	-0.264*** (0.035)	-0.185*** (0.031)	0.092*** (0.020)	-0.064** (0.027)	0.039* (0.021)
CQC rating: Well led	0.017* (0.009)	-0.023** (0.010)	-0.011 (0.009)	0.005 (0.006)	-0.010 (0.007)	-0.004 (0.006)
Share of JSA claimants (PCD district)	-1.844*** (0.520)	-2.695*** (0.730)	-2.583*** (0.526)	-0.678** (0.324)	-1.283*** (0.440)	-0.925*** (0.321)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,874	13,298		16,874	13,298	
Imputations	50	50		50	50	
Average RVI	0.089	0.073		0.096	0.080	
Largest FMI	0.317	0.247		0.320	0.301	

*** p<0.01, ** p<0.05, * p<0.1; robust standard errors in parentheses (clustered at establishment level)

The second specification (2) includes the dependent variable with one year lag.

Table 4: Multiple Imputation (MI) two-part estimation of job vacancy rates – marginal effects

VARIABLES	(1)			(2)		
	Probit	Truncreg		Probit	Truncreg	
	Pr(y>0)	E(y y>0)	Combined	Pr(y>0)	E(y y>0)	Combined
Vacancy incidence/rate (lag)				0.442***	0.380***	0.445***
				(0.003)	(0.012)	(0.008)
Share of female staff	-0.020	-0.030**	-0.016**	0.001	-0.019*	-0.005
	(0.037)	(0.013)	(0.007)	(0.025)	(0.011)	(0.005)
Share of staff aged <35	0.038	0.016	0.010	0.009	0.008	0.003
	(0.034)	(0.012)	(0.006)	(0.023)	(0.010)	(0.005)
Share of staff with British nationality	-0.018	-0.025***	-0.010**	-0.004	-0.012	-0.002
	(0.028)	(0.009)	(0.005)	(0.018)	(0.008)	(0.004)
Share of staff holding qualification	0.015	0.007	0.004	-0.010	0.004	0.000
	(0.019)	(0.007)	(0.003)	(0.013)	(0.006)	(0.003)
Staff average experience	0.004	-0.004***	-0.001	0.002	-0.002***	-0.001
	(0.004)	(0.001)	(0.001)	(0.003)	(0.001)	(0.000)
Staff average experience (square)	-0.000	0.000***	0.000	-0.000	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sick days per employee (log)	0.040***	0.000	0.005***	0.010***	-0.001	0.002**
	(0.005)	(0.002)	(0.001)	(0.004)	(0.002)	(0.001)
Main service: res. care w/o nursing	-0.061***	0.017***	-0.002	-0.037***	0.014***	-0.000
	(0.014)	(0.005)	(0.002)	(0.009)	(0.004)	(0.002)
Main service: domiciliary care	0.051***	0.064***	0.032***	0.013	0.033***	0.010***
	(0.019)	(0.007)	(0.004)	(0.012)	(0.005)	(0.002)
User type: dementia	0.014	0.001	0.003	-0.005	-0.003	-0.001
	(0.011)	(0.004)	(0.002)	(0.006)	(0.003)	(0.001)
User type: MHA	0.037*	0.023**	0.015***	-0.001	0.009	0.003
	(0.022)	(0.009)	(0.005)	(0.013)	(0.006)	(0.003)
Sector: private	-0.074***	-0.014*	-0.017***	-0.023	-0.012*	-0.006*
	(0.022)	(0.008)	(0.005)	(0.014)	(0.007)	(0.003)
Sector: voluntary	-0.086***	-0.011	-0.018***	-0.030**	-0.005	-0.005
	(0.023)	(0.009)	(0.005)	(0.014)	(0.007)	(0.003)
Establishment size: small (10-49 staff)	0.091***	-0.104***	-0.011***	0.050***	-0.049***	0.004
	(0.015)	(0.009)	(0.004)	(0.010)	(0.007)	(0.002)
Establishment size: large (50+ staff)	0.145***	-0.143***	-0.019***	0.079***	-0.072***	0.004
	(0.018)	(0.009)	(0.004)	(0.012)	(0.008)	(0.003)
IIP status: recognised/committed	-0.010	0.011***	0.002	-0.012**	0.005*	-0.001
	(0.010)	(0.004)	(0.002)	(0.006)	(0.003)	(0.001)
Share of permanent staff	-0.044	-0.031***	-0.022***	0.020	0.016*	0.010**
	(0.032)	(0.012)	(0.007)	(0.020)	(0.009)	(0.005)
Share of staff on ZH contract	0.093***	0.024***	0.022***	0.030**	0.011**	0.006**
	(0.021)	(0.007)	(0.004)	(0.013)	(0.005)	(0.003)
Mean hourly wage (log)	-0.066	-0.010	-0.013	-0.022	0.004	-0.001
	(0.046)	(0.018)	(0.009)	(0.033)	(0.015)	(0.006)
Workers per service user ratio	-0.009***	0.000	-0.001***	-0.004***	0.000	-0.001**
	(0.002)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Direct care in total staff ratio	-0.102***	-0.093***	-0.050***	-0.004	-0.033***	-0.008*
	(0.036)	(0.014)	(0.007)	(0.023)	(0.011)	(0.005)
CQC rating: Well led	-0.017*	-0.003	-0.004**	-0.008	-0.000	-0.001
	(0.010)	(0.004)	(0.002)	(0.007)	(0.003)	(0.001)
Share of JSA claimants (PCD district)	-2.704***	-0.496*	-0.507***	-0.956**	-0.400**	-0.189**
	(0.653)	(0.262)	(0.120)	(0.394)	(0.181)	(0.076)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,874	5,651		16,874	5,651	
Imputations	50	50		50	50	
Average RVI	0.0775	0.0810		0.0820	0.0801	
Largest FMI	0.267	0.263		0.279	0.280	

*** p<0.01, ** p<0.05, * p<0.1; robust standard errors in parentheses (clustered at establishment level)

The second specification (2) includes the dependent variable with one year lag.