

Chapter IV Do Commuting Women Have Fewer Children?

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Abstract Commuting is linked to fertility through demographic, social, and economic mechanisms. Average differences in first-birth rates of young, working women are estimated by a bivariate model with endogenous commuting. Empirical evidence based on administrative data (Sweden) reveals that commuting women have a lower probability of a first birth between 21-28 years of age and a higher probability between 29-32 years. Therefore, commuting women likely postpone their first child. Additional direct and spillover effects of commuting on fertility appear in income cross-municipal flows, diffusion of fertility norms across space, and changes in gender structure of the population of fertile age. A positive effect on relative income and social norms and a negative sex ratio effect are found significant both for commuting women and those who work in the municipality of their residence. Marginal effects for commuters are greater in magnitude.

Keywords commuting; demand for children; effect of earnings; daytime population; subjective wellbeing

JEL J11, J13, J61

Introduction

Daily labour mobility is a part of working life for each third person in Sweden (Statistics Sweden 2016; scb.se¹). Over the past few decades, there has been an increase in the proportion of commuters in the labour force (Eliasson et al. 2007; Mattisson 2016). The effect of increased female labour force participation on fertility has been studied in a number of papers (e.g. Bloom and Pebley 1982; Caldwell 1982 1; Coale and Watkins 1986; Daly 2000; Duvander and Andersson 2006; Freedman 1979; Heckman and Walker 1990; Stier et al. 2001). However, the effect of commuting on fertility is not empirically well established. Camstra (1996) finds that women are more likely to quit a job in response to increased commuting distances than men, as women value time higher. Commuting and family life mutually affect one another through the timing of marriage and childbearing among others (ibid). Kotyrlo (2016) theoretically develops this topic, suggesting that the link exists and is implemented through several mechanisms: social interactions, earnings flows, and changes in the proportion of men and women. This chapter continues the study.

There are expected direct and indirect effects of commuting on fertility. An indirect response to labour mobility is assumed to affect both commuters and non-commuters. It is caused by the changes in the gender structure in the

¹ Gainfully employed commuters, 16+ years or age, by region, sex, observations, and year.
http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START_AM_AM0207_AM0207L/PendlingK/table/tab1eViewLayout1/?rxid=fc109428-2cb8-437a-b4f9-c534ba5b965a.

marriage market, by a spatial distribution of welfare, and by a spatial diffusion of family norms, in particular, the demand for children. Commuting women experience both direct and indirect changes in their preferences and attitudes towards children. They are hypothetically able to compare lifestyles and values in places of residence and work. In addition, daily transportation costs affect a commuter's budget constraint, which, in turn, affects the demand for children. Therefore, the relationship between commuting and fertility is measured by a set of parameters that facilitate separation and isolation of the effects. As commuting and family life are expected to affect one another mutually, a bivariate probit model is applied to account for the endogeneity of commuting.

Empirical evidence of the effect of commuting on fertility is based on age-specific regressions and testing the influence of commuting on first-birth rates (FBR) of women 21-32 years old residing in the Stockholm area in Sweden during 1993-2006. It is shown that commuting generates both positive and negative externalities for the demand for children.

A contribution of the paper is in the study of the link between commuting and fertility using microdata. The mechanisms through which the demographic process and aspect of working life could be related have been described in Kotyrlo (2016). However, the empirical evidence based on aggregate data does not allow capturing the influence of commuting at an individual level. The estimates on repeated cross-sectional data support and clarify the results

published earlier (Kotyrlo 2016). The parameter estimates exhibit similar estimated effects over various estimation approaches (bivariate model, linear probability model with endogenous commuting decisions, and probit model).

Using aggregate data, Kotyrlo (2015) finds that fertility is a process with positive spatial autocorrelation. The present study suggests that commuters' rates of their first birth are affected by fertility norms in both places of residence and work. Therefore, the hypothesis of spatial autocorrelation finds its support in the microdata and reveals details of this mechanism. Another link that has been revealed in Kotyrlo (2016) and supported in the microdata is the negative link between the proportion of commuters in the population and fertility. This link also advocates a social interaction effect as the social role of commuters likely promotes a working lifestyle rather than a family one.

The results suggest that commuting plays a role in the decision and timing of the first birth. Namely, women who have chosen commuting are likely to postpone their first childbearing. Their first-birth rates are lower at the age 21-28 years old and higher at the age 29-32 years old compared to non-commuting women.

The rest of the chapter is structured as follows. The next section presents the literature review. This is followed by the research strategy and the presentation of the data. Further, empirical results are discussed, ending with a summary of the results and discussion.

Literature Review

We consider changes in fertility due to commuting through three mechanisms. The first mechanism is the diffusion of fertility norms because of social interactions. On the one hand, birth rates are determined by family values passed down from generation to generation and by the evolution of social and gender roles. On the other hand, according to Caldwell (1982 2), the demand for children as a "situational advantage in the family relations of production" depends on social interactions that promote or delay childbearing. Such influence can be implicitly or clearly aggravated by the parental position of peers (e.g. Balbo and Barban 2012) or, conversely, can be discouraged by the presence of alternative and competing social roles. The impact of social interactions on fertility occurs through learning from others (Montgomery and Casterline 1996) or from aspirations to share interests with friends and acquaintances (Balbo and Barban 2012) and to access important sources of advice and support (Bongaarts and Watkins 1996; Keim et al. 2009; Rindfuss and Bumpas 1976). Studies of spatial dynamics of fertility in developed countries (de Castro 2007; Kotyrlo 2015; Kotyrlo 2016; McNicoll 1980; Waldorf and Franklin 2002) suggest spatial diffusion of fertility in response to economic development and the growth of female labour force participation. Commuters are affected by social norms promotion both in the place of residence and in the place of work. Therefore, through social interactions, commuting may affect the attitude towards children and childbearing decisions.

The second mechanism is in the link between the labour and marriage markets. As a demographic process, fertility is mainly determined by the age and sex structure of the population. Daily labour mobility may affect success in searching for a partner. For the marriage market with non-assortative matching, the propensity to succeed is equal to the sex ratio (the ratio of the number of men to women of fertile ages) (Browning et al. 2003; Burdett and Coles 1998; Burdett and Coles 1999; Edlund 2005). Commuting is linked to searching for a partner through the changes in the structure of the daytime population, as the sum of the living population and people coming to the municipality daily compared to the night-time population. An increase in the proportion of newcomers (commuters) in the residential population can also be related to the propensity of matching. This is adopted for the marriage market with incoming commuters as newcomers from the model suggested by Coles and Smith (1998) for a market of goods with increasing returns to scale in the number of new buyers and sellers. However, the effect can be of any sign since a greater variety of potential partners may accelerate or delay marital choice. Moreover, commuters implicitly behave like workers, and their family roles are realized in their home municipalities. Because of social interactions with single people, young women can plan family life and childbearing later in their life.

The third driving force linking daily mobility and fertility is the flow of earnings at municipal and inter-municipal levels. The impact of earnings on the

demand for children can be positive or negative (Becker and Barro 1988; Becker and Lewis 1974). In particular, the positive effect can result from the increase in the utility of parents with the number of children (altruism towards children) (Becker and Barro 1988). The negative effect of incomes on fertility appears with the growth of social security and transfer payments to the elderly (ibid). The negative effect is also explained by the tendency to make more investment in children by wealthy people (Becker and Lewis 1974). The demand for children depends not only on individual earnings but also on their perception or subjective wellbeing. Subjective wellbeing that arises from the relative income hypothesis proposed by Duesenberry (1949) has the value of an individual level of desired income relative to others (Diener et al. 1993; Easterlin 1974) or the level of comfort and security among others, approaching the level of their neighbours. Luttmer (2005) finds a negative impact of increasing neighbours' incomes on self-esteem and happiness. Hypothetically, childbearing in relatively rich places can be associated with greater costs. Commuting can play a role not only in creating earnings flows but also in the perception of the relative size of earnings and costs of fertility.

The link between fertility and labour can be alleviated by national policy. In Sweden, the protection of parents in the labour market and generous income support for parenthood play an important role in the reconciliation of work and family life. Researchers link a positive impact of income on the demand for

children to the national policies (Andersson 1999; Andersson et al. 2014; Duvander and Andersson 2006; Duvander et al. 2010; Hoem 2000). However, the problem of causality in the impact of social policy on the improvement of fertility levels is emphasized by Andersson (2004), Duvander et al. (2010), and Hoem (2005). Andersson (2004) and Hoem (2005) find a positive impact of policy intervention on fertility in Sweden based on a cross-country comparison.

Commuting, therefore, can be related to fertility through changes in the attitude towards children, propensity of family formation, and through flows of earnings. However, this link is not well established. Kotyrlo (2016) studies the link between commuting and fertility on aggregate data and proposes the three mentioned mechanisms. A positive influence of fertility norms diffusion and income flows across space, and a negative effect of the proportion of commuters in the residing population are found. However, aggregate data do not allow for distinguishing the effect of the choice of commuting on childbearing. Therefore, the current study is focused on the estimation of the latter and the verification of the previous results on individual data.

Research Strategy

Endogeneity of Commuting

Camstra (1996) has suggested that commuting and family life may affect each other. Therefore, commuting is considered an endogenous variable in the

explanation of fertility. Family life decisions, such as childbearing, and working life decisions, such as a career and making a choice of where to work, can happen in close relation with each other. Childbearing can be delayed when career achievements are prioritized and otherwise be planned to reconcile with graduation and to start a career. Decisions to commute or not can be caused by choices in family life; therefore, the simultaneity of choices of childbearing and commuting cannot be rejected.

Identification of the Average Treatment Effect

Estimation of the direct effect of commuting on fertility is based on three types of models: a probit model, assuming an exogenous commuting decision, and linear probability and bivariate models with an endogenous commuting decision. Then, the estimates are compared. The first-birth event (FB_{it}) is considered the fertility outcome. It is modelled as a decision in period t related to the choice of commuting made in period $t-1$ (C_{it-1}). Both variables are binary. Following the estimation of bivariate models with endogenous treatments approach (Heckman 1978: 948), the model can be composed, as in Eq. (1).

$$\left\{ \begin{array}{l} FB_{it}^* = \mathbf{X}_{1i,t-1}'\pi_1 + \pi_3 C_{i,t-1} + u_{1it} \\ C_{i,t-1}^* = \mathbf{X}_{2i,t-1}'\pi_2 + u_{2it} \\ C_{i,t-1} = 1 \text{ iif } C_{i,t-1}^* \geq 0 \\ C_{i,t-1} = 0 \text{ otherwise} \\ FB_{it} = 1 \text{ iif } FB_{it}^* \geq 0 \\ FB_{it} = 0 \text{ otherwise.} \end{array} \right. \quad (1)$$

Here, π_1 and π_2 are sets of parameters for explanatory variables for commuting and childbearing, respectively; π_3 is the parameter of the interest. u_{1it} and u_{2it} are errors in the explanation of latent variables C_{it-1}^* and FB_{it}^* corresponding to choices to commute and have a child. These variables are assumed to have a bivariate normal distribution. The joint distribution is assumed to be fully characterized by their means, variances, and the covariance:

$$E(u_{ji}) = 0, E(u_{2i}^2) = 1, E(u_{1i}^2) = 1, E(u_{1i}, u_{2i}) = \rho, j = 1, 2.$$

According to Heckman (1978: 952), the average treatment effect (ATE), or the average change in the probability of the first birth of commuters relative to non-commuters, as if non-commuters were commuters, can be expressed as

$$\begin{aligned} ATE = \Delta P(FB_{it} = 1) = & \sum_{C_{i,t-1}=0,1} ([F(\mathbf{X}_{1i,t-1}'\pi_1 + \pi_3, \mathbf{X}_{2i,t-1}'\pi_2, \rho)]^{C_{i,t-1}} \cdot \\ & \cdot [F(\mathbf{X}_{1i,t-1}'\pi_1 + \pi_3, -(\mathbf{X}_{2i,t-1}'\pi_2), -\rho)]^{1-C_{i,t-1}}) - \\ & - \sum_{C_{i,t-1}=0,1} ([F(\mathbf{X}_{1i,t-1}'\pi_1 + \pi_3 C_{i,t-1}, \mathbf{X}_{2i,t-1}'\pi_2, \rho)]^{C_{i,t-1}} \cdot \\ & \cdot [F(\mathbf{X}_{1i,t-1}'\pi_1 + \pi_3 C_{i,t-1}, -(\mathbf{X}_{2i,t-1}'\pi_2), -\rho)]^{1-C_{i,t-1}}). \end{aligned} \quad (2)$$

Here, F is the normal cumulative distribution function, and the rest of the notation is as in (1). The average treatment effect on the treated (ATT), which measures how first-birth rates change, on average, for commuters with their observed characteristics is computed as suggested by Angrist and Pischke (2009: 150):

$$\begin{aligned}
ATT &= E(FB_{lit} - FB_{0it} \mid C_{i,t-1} = 1) = \\
&= E\left\{ \frac{[F(\mathbf{X}'_{1i,t-1}\pi_1 + \pi_3, \mathbf{X}'_{2i,t-1}\pi_2, \rho)] - [F(\mathbf{X}'_{1i,t-1}\pi_1, \mathbf{X}'_{2i,t-1}\pi_2, \rho)]}{\Phi(\mathbf{X}'_{2i,t-1}\pi_2)} \right\}. \quad (3)
\end{aligned}$$

The direct (commuting women) and indirect (all women) effects of commuting in response to social interactions, earnings' flows, and changes in the proportion of men and women are reflected in a set of variables discussed in Kotyrló (2016) and briefly described in Section Data below. Index i relates to an individual, t is a period, indices j and k relate to the places of residence and work, respectively. The three types of sex ratios, as strongly correlated, are tested in an empirical estimation separately. The definition of the variables is provided in Appendix 2 Table 5.

Normality Assumption

The normality assumption of the disturbances is essential for the application of bivariate probit models (Angrist and Pischke 2009: 150). Angrist and Pischke (2009: 151) suggest other approaches for the estimation of a binary endogenous treatment, where the normality assumption can be relaxed, such as linear probability and instrumental variables estimations. IV estimators applied to a linear probability model (LPM) is found to provide robust, consistent estimates of the ATT (Angrist and Pischke 2009: 152) in deviation of the normality assumption.

In the deviation of normality assumption, a bivariate probit estimation is found to provide robust estimates that do not differ from the true parameters substantially (Bhattacharya et al. 2006: 407). Bhattacharya et al. (2006) conduct a Monte Carlo experiment to compare two-stage probit, linear instrumental variable (IV), and bivariate probit estimators. The results suggest that the bivariate probit is robust and consistent despite the deviation of the normality assumption. However, Chiburis et al. (2011:3) note that the bivariate probit estimator performs better than IV when the sample is small (less than 5000), and the probabilities of the treatment are close to zero. The results are mixed on larger samples (ibid). The authors also show that the bivariate probit is not robust to misspecification of the model. In these cases, the true null hypothesis can be over-rejected. They propose two additional steps to improve the estimates, bootstrapping and the application of Murphy's score test (2007) to check the goodness-of-fit of the model.

To relax the normality assumption, Wilde (2000) suggests a simple criterion for the identification of the bivariate probit with an endogenous regressor. It is based on the restriction that at least one exogenous regressor has sufficient variation in the data (large support). However, the approach is criticized by Mourfié and Meango (2014) who show that multiple solutions are possible because the likelihood function is not necessarily monotonic. In a recent paper, Han and Vytlacil (2017) follow Wilde's approach and confirm that

parameters of a generalized bivariate probit model with endogenous regressors are locally and globally identified. As a generalized bivariate probit, they consider a model with arbitrary but known marginal distributions of the latent errors. They suggest that a parametric estimator can be based on ML or GMM estimators developed in Freedman and Sekhon (2010). The condition of large support of one of the exogenous regressors is also developed by Dong and Lewbel (2015). They show that a large support regressor for binary choice models with binary endogenous regressors allows for consistent estimates of the treatment effects, even if the distribution for latent errors is unknown.

The methods of estimation presented above suggest that the model can be estimated as a bivariate probit with an endogenous regressor (Heckman 1978). A linear probability model with an endogenous treatment and a probability model (probit) with the assumption of exogenous treatment are estimated to verify the robustness of the results, as suggested in Angrist and Pischke (2009). A bivariate model (1) is estimated² and ATE (2) and ATT (3) are calculated, considering the endogeneity of commuting. Estimates are performed as repeated age-specific cross-sections. Instruments for commuting decisions, tested in linear IV regressions by Bassman and Sargan tests, support the validity of the instruments (App. 7 Table 21).

² This approach is implemented by seemingly unrelated regressions – biprobit (Stata 13).

Data

The empirical analysis is based on aggregate data (Statistics Sweden, scb.se) and individual register data collected by Statistics Sweden and compiled into the longitudinal database of Sweden on Health Insurance and Labour Market Research (Longitudinell Integrationsdatabas för Sjukförsäkrings-och Arbetsmarknads-studier, LISA)³. Data contain 9,000-14,000 annual observations from 1993 to 2006 for young women born in 1974 and residing near Stockholm (App. 1) who were employed during the specified period. A commuter is defined in Sweden (SCB) as a person over 15 years of age, working in one, but residing in another municipality.

Based on the literature review, the model includes variables that reflect education, earnings, marriage market, and social interactions.

Total fertility rates (TFR_{jt}) and differences between the places of residence and work ($\Delta_{tkj}TFR$) are incorporated in the model to account for the diffusion of fertility norms. The sex ratio of the night-time population ($R_{night,jt}$), the sex ratio of the daytime population with daily mobility are taken into account ($R_{day,jt}$), and the proportion of commuters in the residing population ($R_{adj,jt}$) are included in the model to capture the marriage market effect. Relative income is the ratio of individual earnings to the average taxable income in the municipality.

³ The data were obtained through the Demographic Data Base, Umeå University.

Variables are listed in Table 5 in Appendix 2. Instruments for commuting are chosen among characteristics of the local labour markets that affect commuting decisions but are not related to family life. Namely, they determine the availability and diversity of jobs. The instruments do not change over time and can be considered strictly exogenous. The size of local labour markets is considered an explanatory variable for commuting that does not affect childbearing. The presence of a university providing jobs for university graduates is an important labour market characteristic. The proportion of unemployed is assumed to push people to other local labour markets; however, it does not affect childbearing as only working women are selected in the sample. Differences in the labour force and average earnings between the place of work and residence and their interactions are included in the number of instruments. Greater differences are expected to be positively related to the number of commuters attracted by greater earnings levels and wider job opportunities. Fixed effects for counties also serve as exogenous instruments.

Descriptive statistics are given in Tables 1-2. A two-sample t-test is conducted to compare conditional first-birth rates of commuting and non-commuting women who are childless at a certain age. FBR are significantly lower for commuters in the 21-26 years of age and higher when they are 29-32 (Table 1).

<Table 1>

On average, commuters are better educated than non-commuters (Table 2), and commuters' individual earnings are significantly greater than those of non-commuters.

<Table 2>

Empirical results

The estimates of the bivariate model with an assumed endogenous commuting decision and the respective marginal effects for commuters and non-commuters are presented in Appendix 3 Tables 6-8 and Appendix 4 Tables 9-14. Appendix 5 Tables 15-17 demonstrate estimates of the linear probability model with an instrumented commuting decision. The estimates of the probit model are presented in Appendix 6 Tables 18-20. Tables within each method vary by daytime, night-time, or adjusted sex ratio included in the specification. The model of the probability of a first-birth event is estimated for women of each age from 21 to 32 years old at a time of possible childbearing. For the bivariate probit, the parameter estimates (App. 3) and marginal effects at the means conditional on commuting (App. 4) are presented for each specification. Therefore, it is possible to compare the estimates of the parameters with those from LPM and the probit models.

The estimates for the bivariate model suggest that the magnitude of the effects is greater for commuters. For certain explanatory variables, the effect

changes over time. Education is negatively linked to FBR but is found insignificant for women around the average age of first birth (AAFB). The influence of the daytime sex ratio as a marriage market effect, found insignificant earlier, is positive but does not reach ten per cent significance level in most of the estimations. The effect of the night-time sex ratio is positive and significant for women older than 25 years of age. This supports the theory that at the year close to the average age of first birth, women are likely in search for a partner and this search is facilitated by a greater proportion of the male population. However, the effect of the adjusted sex ratio is negative and significant for women in the mentioned age group, as in Kotyrlo (2016). It can be related to the promotion of female employment and childless pattern through social roles if the proportion of commuters is large.

Relative income is significant and positive for all estimates. Marginal effects at the means for commuters contribute 1.7-5.5 percentage points (pp) of the increase in the probability of age-specific FBR. On the other hand, for non-commuters, this effect is lower and varies across age from 0.5 to 0.9 pp. This confirms that earnings are an important reason in the childbearing decision and subjective wellbeing plays an important role in the decision to have a child. Taken the stationarity of fertility rates in the long run, the effect of earnings is likely associated with situational advantage, that is, the postponement or acceleration of timing of birth.

Estimates on the average treatment effect (in three types of models) and the average treatment effect on the treated in the bivariate model are presented in Tables 3 and 4 and depicted in Figure 1. Age-specific first-birth rates increase over the considered period. ATTs also rise with age or age-specific first-birth rates and grow faster for commuters. A slight reduction in FBR of commuters up to the age of 32 is reflected in a minor decline of ATT. ATTs are positive and significant for women having a first child at age 29-32 and significantly negative for women at age 24. Ages 24 and 26 likely refer to the acquisition of a bachelor's degree (for about 50 per cent of women in the sample) and a master's degree, respectively, and then the first full-time employment engagement of that woman. Therefore, the last year of study and search for a job after graduation seems to influence the postponement of childbearing significantly. ATEs for the subsamples of 21-23, 25, and 27 years old are negative but not significant. The robustness of the effect is verified by the probit, linear probit, and bivariate models estimated with the assumptions of exogenous and endogenous commuting decisions. The average effect of commuting is found positive and significant for women of 29-32 years old, approximately the average age of first birth in Sweden. This corresponds to 1-2.5 percentage point shifts in FBR. It is also found significantly negative for women 24 and 26 years old and corresponds to a one-percentage point decrease in probability. Differences in FBR, conditional to childless women, suggest that commuting women younger than 28 years old are less likely to have a child. The observed pattern suggests

that they likely postpone their first childbirth. Therefore, at the age of AAFB (29-32 years old), the probability of first birth is higher for commuters.

<Table 3>

<Table 4>

<Figure 1>

The results advocate that commuting affects reproductive behaviours through the diffusion of fertility norms, changes in the structure of the population, and welfare flows at the municipal and inter-municipal levels. The relationship between fertility and earnings is positive. Relative income included in the model, as the ratio of individual earnings to the average taxable income in the municipality is significant and positive for all estimates. The effect is greater for commuters.

Changes in gender structures related to commuting and expected to affect the propensity of a marital match are negatively linked to fertility. Namely, the proportion of commuters in the population is found to have a negative impact on fertility, confirming previous results (Kotyrlo 2016). This is explained by a dominating pattern of working life and being childless over family life in municipalities with a higher proportion of commuters in the daytime population.

Fertility is an individual decision, influenced by social interactions caused by commuting. The results support previous findings (Balbo and Barban 2012;

Keim et al. 2009; and Kotyrlo 2015, 2016). A positive and statistically significant relationship is greater in magnitude for commuting women.

Conclusion

This paper presents a study of how daily commuting for work affects childbearing. It has a twofold effect, direct effects on childbearing of commuting women and spillover effects from the lifestyle pattern on childbearing of both commuting and non-commuting women. The mechanism of interaction between commuting and childbearing decisions is assumed to appear through changes in time distribution between work and household production, shifts in budget constraints due to changes in the absolute and relative level of incomes, and changes in the utility of children resulting from fertility norms diffusion.

Summarizing the results, modern women reconcile family life with work and daily travelling to their job. Though differences in first birth decisions between women working in the place of residence and commuting women are not dramatic, it seems that commuting makes women plan the timing of birth differently, likely postponing the first birth. As young women at the age of 21-32 years old are selected for the analysis, it is not possible to conclude whether commuting has any effect on cohort fertility rates or if it remains an effect on the timing of the first birth.

Another limitation of the study is a possible link between residential changes in response to family formation and commuting. Because of movement, a woman could become a commuter, and this status precedes childbearing. However, relocation may be caused by a desire to live closer to work; therefore, the link between relocation and commuting is not straightforward and needs further investigation.

Low fertility rates are a concern in many European countries. Although the study is conducted on Swedish data, the results shed a light on the link between fertility and commuting in developed countries with a high proportion of commuters among female workers supposed to be affected by costs of commuting, diffusion of social norms, welfare flows, and changes in the gender structure of the population daily. The study provides useful details for demographic policy aiming to reconcile females' family and labour life. First, the positive effect of earnings on first birth rates justifies the policy that supports maternity by allowances linked to the previous level of earnings. It is important that not the absolute value of income but the perception of income relative to its average level in a community plays a role in the childbearing decision. The results also suggest that fertility norms affect the childbearing decision. However, the promotion or discouraging of childbearing can be caused by an attitude towards working life as a competing social role.

Acknowledgments

My sincere gratitude is to Prof. Giovanni Forchini. His comments helped me to improve the paper remarkably. I would like to thank Prof. Gunnar Malmberg and Lars Person as well as the staff of Demographic Data Base at Umeå University for their assistance in providing the data used in this paper. I thank my supervisor, Prof. Magnus Wikström and my co-supervisor Niklas Hanes for their valuable comments, review, and discussion of the earlier draft of the paper.

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Tables and Figures

Table 1 Age-specific FBR conditional on childless women

age	Commuters			Non commuters			two-sided t-test (Commuting -Not commuting)	
	mean	std.err.	N obs	mean	std.err.	N obs	mean	std.err
18	0.019	0.002	3519	0.016	0.001	9275	0.004	0.003
19	0.023	0.002	4120	0.022	0.002	9070	0.001	0.028
20	0.026	0.002	5214	0.031	0.002	9144	-0.00541*	0.003
21	0.029	0.002	5715	0.039	0.002	9282	-0.00978**	0.003
22	0.030	0.002	5784	0.043	0.002	9070	-0.0128***	0.003
23	0.035	0.002	5731	0.048	0.002	9270	-0.0131***	0.003
24	0.043	0.003	5952	0.049	0.002	9366	-0.00632*	0.004
25	0.054	0.003	5984	0.064	0.003	9442	-0.0103**	0.004
26	0.066	0.003	5898	0.077	0.003	9473	-0.0115**	0.004
27	0.093	0.004	5691	0.093	0.003	9121	-0.000	0.005
28	0.122	0.005	5279	0.113	0.003	8507	0.00964*	0.006
29	0.145	0.005	4751	0.125	0.004	7675	0.02***	0.006
30	0.160	0.006	4238	0.133	0.004	6810	0.0265***	0.007
31	0.157	0.006	3783	0.140	0.004	6157	0.0173*	0.007

Note: Here and further *** p<0.01, ** p<0.05, * p<0.1

Table 2 Means in variables in 2005, age of women is 31

Domain	Variable	Non commuters			Commuters			Difference (Non-commuters)- (Commuters)
		mean	std.err.	N obs	mean	std.err.	N obs	
Variable of the interest	New born children (complete sample)	0.128	0.003	12335	0.161	0.004	7588	-0.033***
	New born children in the next period	0.140	0.004	6157	0.157	0.006	3783	-0.017**
Individual	Log earnings	7.216	0.014	6211	7.309	0.017	3818	-0.093***
	Relative individual income to the average municipality level	1.018	0.007	6211	1.049	0.009	3818	-0.031***
	Secondary education	0.431	0.006	6211	0.395	0.008	3818	0.036***
	Tertiary education	0.510	0.006	6211	0.557	0.008	3818	-0.048***
Fertility	Children <7 years old in the complete subsample of the year	0.701	0.007	12335	0.701	0.009	7588	0.000
	Total fertility rate in the place of residence	1.767	0.002	5936	1.833	0.003	3641	-0.066***
	Difference in total fertility rate in the place of residence	0.000	0.000	5936	-0.031	0.004	3300	0.031
Labour market	Difference in log average earnings between places of residence and work	0	0	6211	0.006	0.003	3797	-0.006***
	Difference in log labour forces between places of residence and work	0	0	6161	0.190	0.037	3650	-0.190***
	Difference in the proportion of unemployed	-0.004	0.001	6119	0.020	0.002	3679	-0.024***
	Adjusted sex ratio	0.478	0.003	5936	0.565	0.007	3641	-0.087***
	Day-time sex ratio	1.086	0.001	5936	1.083	0.001	3641	0.004***
	Night-time sex ratio	1.027	0.000	5936	1.024	0.000	3641	0.003***
	Labour force in the place of residence	309416	3030	6161	192633	3708	3709	116783***
	Log average earnings in the place of residence	12.113	0.001	6211	12.146	0.002	3818	-0.033***
	The proportion of unemployed in the place of residence	0.505	0.001	6161	0.487	0.001	3709	0.019***

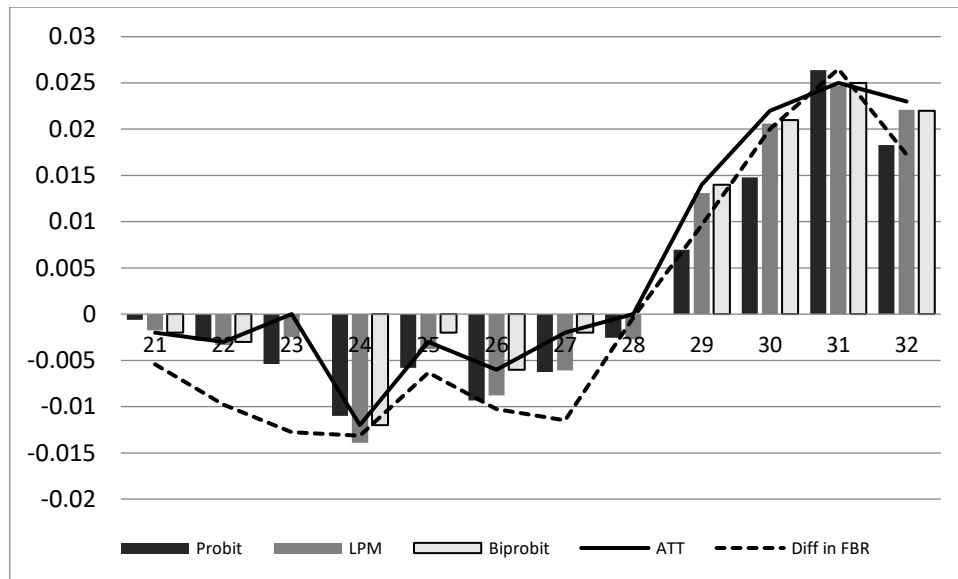


Figure 1 Average treatment effect (in three types of models – probit, LPM, and bivariate probit) and average treatment effect on the treated in the bivariate model (ATT). Difference in age-specific FBR of commuters and non-commuters is depicted by dashed line. The estimates correspond to specifications with adjusted sex ratio included. Age of first childbearing is on X-axis.

Table 3 Estimates of the average treatment effects (ATT) and average treatment effects on the treated (ATT)⁴ for LPM and probit models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Included sex ratio	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
LPM. Day-time sex	-0.00239 (0.00418)	-0.00579 (0.00423)	-0.00284 (0.00460)	-0.0168*** (0.00400)	-0.00390 (0.00449)	-0.0124*** (0.00465)	-0.0134*** (0.00513)	-0.00940 (0.00608)	0.00631 (0.00705)	0.0173** (0.00807)	0.0154* (0.00868)	0.0199** (0.00977)
LPM. Night-time	-0.00129 (0.00428)	-0.00314 (0.00445)	-0.000515 (0.00478)	-0.0142*** (0.00409)	-0.00235 (0.00452)	-0.00826* (0.00466)	-0.00956* (0.00506)	-0.00526 (0.00612)	0.00943 (0.00705)	0.0199** (0.00807)	0.0152* (0.00863)	0.0194** (0.00970)
LPM. Adjusted sex	-0.00104 (0.00424)	-0.00396 (0.00442)	-0.000901 (0.00458)	-0.0138*** (0.00418)	-0.00231 (0.00470)	-0.00769 (0.00483)	-0.00317 (0.00544)	0.00321 (0.00653)	0.0126* (0.00757)	0.0243*** (0.00855)	0.0247*** (0.00903)	0.0261** (0.0102)
Probit. Day-time sex	-0.00531 (0.00345)	-0.00604* (0.00338)	-0.0137*** (0.00348)	-0.00600 (0.00369)	-0.0128*** (0.00399)	-0.0122*** (0.00443)	-0.00812 (0.00523)	0.00140 (0.00608)	0.0125* (0.00686)	0.0188** (0.00752)	0.0158* (0.00809)	-0.00531 (0.00345)
Probit. Night-time	-0.00305 (0.00355)	-0.00482 (0.00349)	-0.0121*** (0.00358)	-0.00525 (0.00375)	-0.00924** (0.00409)	-0.00911** (0.00453)	-0.00457 (0.00535)	0.00439 (0.00619)	0.0146** (0.00691)	0.0190** (0.00756)	0.0162** (0.00810)	-0.00305 (0.00355)
Probit. Adjusted sex	-0.00411 (0.00368)	-0.00323 (0.00365)	-0.0113*** (0.00373)	-0.00404 (0.00393)	-0.00783* (0.00434)	-0.00251 (0.00484)	0.00364 (0.00576)	0.00614 (0.00665)	0.0190** (0.00745)	0.0264*** (0.00810)	0.0232*** (0.00862)	-0.00411 (0.00368)

⁴ 1) ATE is the estimate of the parameter on Commuting. Standard errors are in parentheses. 2) Here and further *** p<0.01, ** p<0.05, * p<0.1

Table 4 Estimates of the average treatment effects (ATE) and average treatment effects on the treated (ATT) for bivariate model

Included sex ratio	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Day-time sex ratio.												
ATE	-0.003	-0.005	-0.001	-0.015**	-0.003	-0.011**	-0.010*	-0.007	0.006	0.017**	0.015*	0.019**
se	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
ATT	-0.003***	-0.005***	-0.001***	-0.015***	-0.003***	-0.011***	-0.011***	-0.007***	0.006***	0.018***	0.016***	0.019***
se	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Night-time sex ratio.												
ATE	-0.002	-0.004	0.000	-0.014**	-0.003	-0.007	-0.006	-0.003	0.010	0.020**	0.016*	0.019**
se	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
ATT	-0.002***	-0.004***	0.000***	-0.014***	-0.003***	-0.007***	-0.006***	-0.003***	0.010***	0.021***	0.017***	0.020***
se	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted sex ratio. ATE												
se	-0.002	-0.003	0.000	-0.012**	-0.002	-0.006	-0.002	0.000	0.014*	0.021**	0.025**	0.022**
ATT	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.010)
se	-0.002***	-0.003***	0.000***	-0.012***	-0.003***	-0.006***	-0.002***	0.000***	0.014***	0.022***	0.025***	0.023***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sub-sample number of observations for the treated	3911	4203	4288	4485	4818	4980	5008	4891	4549	4114	3668	3300

Appendix

Appendix 1 List of municipalities' names considered in the sample

Älvkarleby, Aneby, Åtvidaberg, Botkyrka, Boxholm, Danderyd, Ekerö, Eksjö, Enköpings, Eskilstuna, Finspång, Flen, Gislaved, Gnosjö, Habo, Håbo, Haninge, Huddinge, Järfälla, Jönköping, Katrineholm, Kinda, Lidingö, Linköping, Mjölby, Motala, Mullsjö, Nacka, Nässjö, Norrköping, Norrtälje, Nyköping, Nynäshamn, Ödeshög, Östhammar, Oxelösund, Sävsjö, Sigtuna, Söderköping, Södertälje, Sollentuna, Solna, Stockholm, Strängnäs, Sundbyberg, Täby, Tierp, Tranås, Tyresö, Upplands Väsby, Upplands-Bro, Uppsala, Vadstena, Vaggeryd, Valdemarsvik, Vallentuna, Värmdö, Värnamo, Vaxholm, Vetlanda, Vingåker, Ydre.

Appendix 2 List of variables

Table 5 List of variables

TFR	Total fertility rates (TFR), as the sum of the age-specific fertility rates for women aged 16-49 years living in the municipality
First-birth rates	These are calculated as the sum of first-birth events to the number of women.
Commuter / Non-commuter	According to definition of Statistics of Sweden, commuter is a gainfully employed person, older than 15 years, who works in one municipality, but belongs to the population of the region in which he or she resides. Non-commuter is a gainfully employed person, older than 15 years, who works and resides in one municipality. In estimations <i>Commuter</i> is dummy equal 1 for commuters and 0 otherwise.
Adjusted sex ratio	The proportion of commuters in the night-time population
Sex ratio in the night-time population	The proportion of the number of men to the number of women in their fertility ages in the residing population
Sex ratio in the day-time population	The sex ratio of day-time population with daily mobility considered
The size of labour force	The size of total population of 15 to 65 years old in municipality
The average taxable earnings per capita	The average taxable earnings per capita deflated by the consumer price index, measured in 100 SEK. Zeroes changed to 1 before log operation.
Individual earnings	Annual individual earnings from employment and self-employment, measured in 100 SEK. Earnings deflated by consumer price index. Zeroes changed to 1 before log operation.
Female age	Years
Relative income	The ratio of individual earnings to the average taxable income in municipality. Reference – Compulsory; schooling 9 years or less <i>Edu₁</i> : 1 – if secondary, secondary, and post-secondary education less than two years; 0 – otherwise. <i>Edu₂</i> : 1 – if tertiary, post-secondary for two years or longer or postgraduate education; 0 – otherwise.
Education	
University	Presence of university in the place of residence (1 – yes, 0 – no)

Appendix 3 Estimates of bivariate probability models⁵
Table 6 Estimates with day-time sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0182*** (0.00623)	0.0267*** (0.00735)	0.0507*** (0.00847)	0.0644*** (0.00933)	0.0702*** (0.0201)	0.0969*** (0.0126)	0.147*** (0.0161)	0.133*** (0.0173)	0.0990*** (0.0199)	0.0617*** (0.0213)	0.0760*** (0.0260)	0.0302 (0.0292)
Difference in TFR	0.00230 (0.00745)	0.00666 (0.00828)	0.0243*** (0.00931)	0.0175* (0.0105)	0.0198 (0.0132)	0.0366*** (0.0130)	0.0687*** (0.0166)	0.0231 (0.0181)	-0.0203 (0.0209)	-0.00525 (0.0206)	-0.0149 (0.0262)	-0.00116 (0.0275)
Secondary education	-0.0452*** (0.00683)	-0.0514*** (0.00764)	-0.0326*** (0.00659)	-0.0220*** (0.00657)	-0.0152* (0.00920)	- (0.00725)	-0.0119 (0.00845)	-0.00164 (0.0103)	0.00584 (0.0125)	0.0138 (0.0142)	-0.00536 (0.0154)	0.0213 (0.0170)
Tertiary education	-0.0141*** (0.00457)	-0.0179*** (0.00376)	-0.0183*** (0.00292)	-0.0134*** (0.00480)	-0.0180** (0.00858)	- (0.00559)	- (0.00845)	-0.0198* (0.0104)	0.00400 (0.0125)	0.0223 (0.0139)	0.0317** (0.0152)	0.0675*** (0.0162)
Relative individual income	0.0168*** (0.00343)	0.0211*** (0.00342)	0.0234*** (0.00298)	0.0228*** (0.00332)	0.0235*** (0.00667)	0.0318*** (0.00379)	0.0275*** (0.00393)	0.0260*** (0.00355)	0.0357*** (0.00492)	0.0539*** (0.00568)	0.0547*** (0.00608)	0.0465*** (0.00609)
Day-time sex ratio	0.0145 (0.0201)	0.0157 (0.0219)	0.0366* (0.0206)	0.0504** (0.0253)	0.0546* (0.0300)	0.0893*** (0.0321)	0.0584 (0.0390)	-0.00932 (0.0437)	0.0330 (0.0478)	0.0552 (0.0540)	0.0758 (0.0614)	-0.00565 (0.0673)
Differences in day-time sex ratio in the place of residence and work	0.00934 (0.0246)	-0.0536** (0.0260)	0.0183 (0.0237)	-0.0282 (0.0306)	0.0185 (0.0304)	-0.0289 (0.0352)	-0.0288 (0.0423)	-0.00553 (0.0476)	0.0417 (0.0517)	0.00884 (0.0560)	0.0833 (0.0656)	0.0908 (0.0682)
Differences in log average earnings in the place of residence and work	0.00228 (0.0182)	-0.0113 (0.0174)	0.0236 (0.0171)	0.00893 (0.0199)	0.0190 (0.0235)	-0.0297 (0.0216)	-0.0163 (0.0232)	-0.0201 (0.0248)	-0.00187 (0.0275)	0.0342 (0.0327)	0.00155 (0.0392)	-0.0271 (0.0418)
Commuter	-0.00210 (0.00362)	-0.00472 (0.00374)	-0.000763 (0.00333)	-0.0124*** (0.00399)	-0.00229 (0.00407)	- (0.00452)	-0.00943* (0.00496)	-0.00637 (0.00581)	0.00580 (0.00633)	0.0152** (0.00703)	0.0146* (0.00811)	0.0176** (0.00844)
Labour force	8.38e- 08*** (1.04e-08)	9.64e- 08*** (1.17e-08)	1.12e- 07*** (1.09e-08)	9.24e- 08*** (1.28e-08)	1.04e-07 (9.84e-08)	1.08e- 07*** (1.47e-08)	1.21e- 07*** (1.70e-08)	1.61e- 07*** (2.21e-08)	2.64e- 07*** (2.98e-08)	2.96e- 07*** (3.61e-08)	2.12e- 07*** (3.39e-08)	2.90e- 07*** (4.00e-08)
Difference in log labour forces	0.0106*** (0.00128)	0.0124*** (0.00147)	0.0148*** (0.00137)	0.0122*** (0.00166)	0.0142 (0.0135)	0.0154*** (0.00203)	0.0169*** (0.00231)	0.0221*** (0.00296)	0.0360*** (0.00384)	0.0421*** (0.00474)	0.0332*** (0.00501)	0.0406*** (0.00541)

Note: 1) Instruments are size of labour force, difference in log labour forces in place of work and residence, the proportion of unemployed people in the labour force, presence of university in the place of residence, the product of difference in labour force and difference in log average earnings, the product of the difference in log average earnings and presence of university, the product of the difference in labour force and size of labour force, local labour market fixed effects. 2) Size of labour force is not logged to provide large support instrument for commuting as it is argued in Han and Vytlačil (2017). 3) Primary education is the reference. 4) Relative individual income is the ratio of individual earnings to the average taxable incomes in municipality. 5) Relocation is considered as dummy (1=yes) if a woman moved at the considered year. 6) Here and further age is shown for the time of first birth. 7) Standard errors in parentheses. 8) *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The proportion of unemployed	-0.0164***	-0.0242***	-0.0255***	-0.0172***	-0.0217	-	-	-	-0.0556***	-0.0714***	-	-0.0856***
University	(0.00323)	(0.00434)	(0.00457)	(0.00402)	(0.0208)	0.0244***	0.0294***	0.0495***	(0.0140)	(0.0182)	0.0714***	(0.0232)
	0.00360***	0.00501***	0.00521***	0.00142***	0.000975	0.000862	-0.000658	-0.00116	-	-	-0.00287*	-
	(0.000649)	(0.000830)	(0.000792)	(0.000513)	(0.00110)	(0.000591)	(0.000645)	(0.000858)	0.00604***	0.00526***		0.00728***
Diff in Labour force * Diff in Log average earnings	0.0198***	0.0199***	0.0242***	0.0211***	0.0245	0.0255***	0.0285***	0.0348***	0.0563***	0.0499***	0.0426***	0.0655***
	(0.00249)	(0.00239)	(0.00256)	(0.00287)	(0.0237)	(0.00334)	(0.00388)	(0.00473)	(0.00630)	(0.00826)	(0.00852)	(0.00858)
Diff in log average earnings*University	0.0110**	0.0180***	0.0441***	0.0445***	0.0559	0.0632***	0.0723***	0.0888***	0.133***	0.125***	0.0542**	0.127***
	(0.00542)	(0.00552)	(0.00826)	(0.00870)	(0.0545)	(0.0118)	(0.0137)	(0.0169)	(0.0245)	(0.0294)	(0.0215)	(0.0343)
Diff in Labour force * Labour force	-1.25e-07***	-1.47e-07***	-1.74e-07***	-1.36e-07***	-1.53e-07	-1.62e-07***	-1.78e-07***	-2.35e-07***	-3.80e-07***	-4.29e-07***	-3.15e-07***	-4.16e-07***
	(1.55e-08)	(1.81e-08)	(1.68e-08)	(1.91e-08)	(1.45e-07)	(2.26e-08)	(2.60e-08)	(3.38e-08)	(4.51e-08)	(5.52e-08)	(5.29e-08)	(6.08e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 7 Estimates with night-time sex ratio is included

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0150**	0.0187**	0.0439***	0.0611***	0.0693***	0.0815***	0.129***	0.110***	0.0806***	0.0545***	0.0714***	0.0288
	(0.00720)	(0.00818)	(0.00941)	(0.0100)	(0.0151)	(0.0129)	(0.0162)	(0.0179)	(0.0202)	(0.0207)	(0.0255)	(0.0291)
Difference in TFR	-0.00181	0.00176	0.0163	0.0173	0.0156	0.0287**	0.0592***	0.00710	-0.0307	-0.00951	-0.0220	0.000629
	(0.00844)	(0.00923)	(0.0102)	(0.0107)	(0.0125)	(0.0132)	(0.0166)	(0.0184)	(0.0211)	(0.0205)	(0.0262)	(0.0273)
Secondary education	-0.0451***	-0.0517***	-0.0325***	-0.0222***	-0.0157**	-	-0.0125	-0.00160	0.00564	0.0143	-0.00567	0.0211
	(0.00681)	(0.00766)	(0.00656)	(0.00658)	(0.00750)	0.0217***	(0.00838)	(0.0102)	(0.0124)	(0.0142)	(0.0154)	(0.0170)
Tertiary education	-0.0141***	-0.0176***	-0.0183***	-0.0133***	-	-	-	-0.0189*	0.00419	0.0231*	0.0312**	0.0669***
	(0.00449)	(0.00375)	(0.00286)	(0.00478)	0.0184***	0.0240***	0.0293***	(0.0104)	(0.0124)	(0.0139)	(0.0152)	(0.0162)
Relative individual income	0.0166***	0.0204***	0.0231***	0.0229***	0.0235***	0.0308***	0.0261***	0.0251***	0.0346***	0.0532***	0.0544***	0.0468***
	(0.00341)	(0.00340)	(0.00296)	(0.00330)	(0.00480)	(0.00375)	(0.00390)	(0.00353)	(0.00490)	(0.00565)	(0.00608)	(0.00609)
Night-time sex ratio	-0.123	-0.0337	-0.221	-0.174	-0.342*	-0.0385	0.198	-0.348	-0.561*	0.448	-0.721**	-0.0245
	(0.160)	(0.157)	(0.155)	(0.190)	(0.180)	(0.195)	(0.233)	(0.268)	(0.297)	(0.306)	(0.347)	(0.401)
Differences in night-time sex ratio in the place of residence and work	-0.0867	-0.0712	-0.158*	-0.135	-0.223**	-0.179*	-0.0628	-0.350**	-0.473***	0.0767	-0.534***	-0.0257
	(0.0879)	(0.0875)	(0.0856)	(0.105)	(0.1000)	(0.108)	(0.129)	(0.149)	(0.163)	(0.170)	(0.191)	(0.220)
Differences in log average	0.00263	0.00352	0.0255	0.0206	0.0270	-0.0162	-0.0124	-0.0106	0.0107	0.0239	0.00920	-0.0532

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
earnings in the place of residence and work												
Commuter	(0.0175) -0.00122 (0.00371)	(0.0162) -0.00222 (0.00384)	(0.0166) 0.000872 (0.00341)	(0.0194) -0.0102** (0.00408)	(0.0205) -0.000813 (0.00411)	(0.0211) -0.00455 (0.00467)	(0.0224) -0.00508 (0.00511)	(0.0245) -0.00201 (0.00594)	(0.0273) 0.00906 (0.00646)	(0.0312) 0.0177** (0.00708)	(0.0368) 0.0142* (0.00818)	(0.0399) 0.0174** (0.00846)
Labour force	8.51e-08*** (1.04e-08) 0.0108***	9.95e-08*** (1.18e-08) 0.0128***	1.15e-07*** (1.09e-08) 0.0151***	9.64e-08*** (1.29e-08) 0.0127***	1.08e-07* (5.93e-08) 0.0146*	1.14e-07*** (1.51e-08) 0.0161***	1.27e-07*** (1.74e-08) 0.0176***	1.65e-07*** (2.23e-08) 0.0227***	2.66e-07*** (2.99e-08) 0.0363***	2.99e-07*** (3.62e-08) 0.0425***	2.10e-07*** (3.38e-08) 0.0328***	2.87e-07*** (3.99e-08) 0.0402***
Difference in log labour forces												
The proportion of unemployed	(0.00127) -0.0166***	(0.00148) -0.0250***	(0.00136) -0.0260***	(0.00167) -0.0180***	(0.00804) -0.0224*	(0.00208) -	(0.00235) -	(0.00299) -	(0.00385) -0.0561***	(0.00475) -0.0725***	(0.00500) -	(0.00540) -0.0846***
University	(0.00326) 0.00365***	(0.00444) 0.00517***	(0.00463) 0.00529***	(0.00416) 0.00148***	(0.0131) 0.000996	(0.00560) 0.000888	(0.00679) -0.000698	(0.0104) -0.00119	(0.0142) -	(0.0185) -	(0.0182) -0.00284*	(0.0230) -
Diff in Labour force * Diff in Log average earnings	(0.000653) 0.0201***	(0.000836) 0.0206***	(0.000793) 0.0247***	(0.000530) 0.0220***	(0.000757) 0.0253*	(0.000616) 0.0268***	(0.000675) 0.0297***	(0.000880) 0.0357***	(0.00164) 0.0568***	(0.00189) 0.0503***	(0.00149) 0.0421***	(0.00221) 0.0648***
Diff in log average earnings*University	(0.00250) 0.0112**	(0.00241) 0.0186***	(0.00256) 0.0450***	(0.00290) 0.0464***	(0.0139) 0.0576*	(0.00343) 0.0663***	(0.00396) 0.0756***	(0.00477) 0.0909***	(0.00632) 0.134***	(0.00830) 0.126***	(0.00847) 0.0535**	(0.00857) 0.126***
Diff in Labour force * Labour force	(0.00550) -1.27e-07*** (1.55e-08)	(0.00567) -1.52e-07*** (1.82e-08)	(0.00836) -1.77e-07*** (1.66e-08)	(0.00892) -1.42e-07*** (1.93e-08)	(0.0313) -1.58e-07* (8.70e-08)	(0.0122) -1.70e-07*** (2.32e-08)	(0.0141) -1.86e-07*** (2.65e-08)	(0.0171) -2.41e-07*** (3.41e-08)	(0.0247) -3.83e-07*** (4.53e-08)	(0.0297) -4.33e-07*** (5.53e-08)	(0.0213) -3.11e-07*** (5.27e-08)	(0.0341) -4.12e-07*** (6.06e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 8 Estimates with adjusted sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0133*	0.0171**	0.0441***	0.0561***	0.0670***	0.0769***	0.0936***	0.0898***	0.0753***	0.0473**	0.0501*	0.00712
	(0.00715)	(0.00858)	(0.00929)	(0.00978)	(0.0128)	(0.0140)	(0.0175)	(0.0186)	(0.0212)	(0.0219)	(0.0260)	(0.0302)
Difference in TFR	-0.00194	0.0105	0.0184*	0.0234**	0.0131	0.0347**	0.0497***	0.00396	-0.0132	-0.0139	-0.00274	-0.0230
	(0.00839)	(0.00912)	(0.00990)	(0.0107)	(0.0132)	(0.0146)	(0.0182)	(0.0183)	(0.0220)	(0.0213)	(0.0268)	(0.0293)
Secondary education	-0.0459***	-0.0518***	-0.0333***	-0.0228***	-0.0157**	-	-0.0120	-0.00150	0.00560	0.0134	-0.00462	0.0208
	(0.00689)	(0.00767)	(0.00665)	(0.00659)	(0.00649)	0.0217***	(0.00726)	(0.00828)	(0.0102)	(0.0124)	(0.0141)	(0.0170)
Tertiary education	-0.0141***	-0.0177***	-0.0185***	-0.0138***	-	-	-	-0.0187*	0.00364	0.0217	0.0328**	0.0677***
	(0.00457)	(0.00368)	(0.00289)	(0.00465)	(0.00492)	0.0186***	0.0244***	0.0290***	(0.0124)	(0.0139)	(0.0151)	(0.0162)
Relative individual income	0.0171***	0.0208***	0.0238***	0.0230***	0.0243***	0.0244***	0.00551	(0.00828)	0.0254***	0.0358***	0.0543***	0.0472***
	(0.00342)	(0.00337)	(0.00298)	(0.00327)	(0.00359)	0.0323***	0.0270***	(0.00385)	(0.00351)	(0.00489)	(0.00565)	(0.00608)
Adjusted sex ratio	-0.00900	-0.0152**	-0.0125**	-0.0205***	-0.0106	-	-	-	-0.0293***	-0.0254**	-	-0.0280**
	(0.00586)	(0.00652)	(0.00566)	(0.00649)	(0.00661)	0.0305***	0.0534***	0.0458***	(0.00917)	(0.01000)	0.0563***	(0.0127)
Differences in adjusted - time sex ratio in the place of residence and work	-0.00777	0.00663	-0.0122**	0.00185	-0.0123*	-0.00852	-0.0200**	-	0.00389	-0.0159*	3.60e-05	-0.0273**
	(0.00608)	(0.00631)	(0.00592)	(0.00697)	(0.00703)	(0.00783)	(0.00815)	0.0262***	(0.00749)	(0.00750)	(0.00841)	(0.0117)
Differences in log average earnings in the place of residence and work	0.00119	-0.00477	0.0240	0.00786	0.0207	-0.0237	-0.0163	-0.0268	-0.0173	0.0340	-0.0285	-0.0522
	(0.0177)	(0.0166)	(0.0168)	(0.0192)	(0.0186)	(0.0206)	(0.0216)	(0.0233)	(0.0255)	(0.0298)	(0.0351)	(0.0381)
Commuter	-0.000909	-0.00287	0.00116	-0.00940**	-0.000847	-0.00405	0.00116	0.00547	0.0113*	0.0214***	0.0231***	0.0235***
	(0.00377)	(0.00383)	(0.00351)	(0.00413)	(0.00422)	(0.00480)	(0.00531)	(0.00626)	(0.00676)	(0.00752)	(0.00858)	(0.00890)
Labour force	8.29e-08***	9.96e-08***	1.11e-07***	9.57e-08***	1.03e-07***	1.11e-07***	1.26e-07***	1.64e-07***	2.70e-07***	2.99e-07***	2.18e-07***	2.85e-07***
	(1.05e-08)	(1.19e-08)	(1.10e-08)	(1.30e-08)	(2.64e-08)	(1.51e-08)	(1.75e-08)	(2.23e-08)	(3.00e-08)	(3.63e-08)	(3.44e-08)	(4.00e-08)
Difference in log labour forces	0.0105***	0.0128***	0.0146***	0.0126***	0.0140***	0.0158***	0.0176***	0.0226***	0.0369***	0.0424***	0.0341***	0.0399***
	(0.00129)	(0.00149)	(0.00138)	(0.00168)	(0.00358)	(0.00208)	(0.00236)	(0.00299)	(0.00387)	(0.00476)	(0.00507)	(0.00540)
The proportion of unemployed	-0.0162***	-0.0250***	-0.0253***	-0.0178***	-	-	-	-	-0.0566***	-0.0721***	-	-0.0840***
	(0.00322)	(0.00444)	(0.00456)	(0.00414)	0.0215***	0.0250***	0.0307***	0.0505***	(0.0143)	(0.0184)	0.0734***	(0.0229)
University	0.00356***	0.00517***	0.00514***	0.00147***	0.000960*	0.000868	-0.000710	-0.00119	-	-	-0.00292*	-
	(0.000647)	(0.000837)	(0.000785)	(0.000525)	(0.000580)	(0.000603)	(0.000675)	(0.000878)	0.00622***	0.00533***	(0.00155)	0.00717***
									(0.00167)	(0.00189)		(0.00220)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Diff in Labour force * Diff in Log average earnings	0.0195*** (0.00251)	0.0206*** (0.00242)	0.0239*** (0.00257)	0.0218*** (0.00292)	0.0242*** (0.00624)	0.0262*** (0.00342)	0.0297*** (0.00396)	0.0355*** (0.00477)	0.0577*** (0.00635)	0.0502*** (0.00830)	0.0437*** (0.00865)	0.0644*** (0.00858)
Diff in log average earnings*University	0.0109** (0.00537)	0.0186*** (0.00567)	0.0436*** (0.00822)	0.0461*** (0.00889)	0.0552*** (0.0160)	0.0648*** (0.0120)	0.0753*** (0.0141)	0.0905*** (0.0171)	0.136*** (0.0249)	0.126*** (0.0297)	0.0555** (0.0220)	0.125*** (0.0340)
Diff in Labour force * Labour force	-1.24e- 07*** (1.57e-08)	-1.52e- 07*** (1.83e-08)	-1.72e- 07*** (1.69e-08)	-1.40e- 07*** (1.94e-08)	-1.51e- 07*** (3.90e-08)	-1.66e- 07*** (2.31e-08)	-1.86e- 07*** (2.65e-08)	-2.39e- 07*** (3.41e-08)	-3.90e- 07*** (4.54e-08)	-4.32e- 07*** (5.54e-08)	-3.23e- 07*** (5.36e-08)	-4.09e- 07*** (6.07e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Appendix 4 Marginal effects at means in bivariate probability model

Table 9 Marginal effects at means for commuters. Day-time sex ratio is included

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0182*** (0.00623)	0.0267*** (0.00735)	0.0507*** (0.00847)	0.0644*** (0.00933)	0.0702*** (0.0201)	0.0969*** (0.0126)	0.147*** (0.0161)	0.133*** (0.0173)	0.0990*** (0.0199)	0.0617*** (0.0213)	0.0760*** (0.0260)	0.0302 (0.0292)
Difference in TFR	0.00230 (0.00745)	0.00666 (0.00828)	0.0243*** (0.00931)	0.0175* (0.0105)	0.0198 (0.0132)	0.0366*** (0.0130)	0.0687*** (0.0166)	0.0231 (0.0181)	-0.0203 (0.0209)	-0.00525 (0.0206)	-0.0149 (0.0262)	-0.00116 (0.0275)
Secondary education	-0.0452*** (0.00683)	-0.0514*** (0.00764)	-0.0326*** (0.00659)	-0.0220*** (0.00657)	-0.0152* (0.00920)	- (0.00725)	-0.0119 (0.00845)	-0.00164 (0.0103)	0.00584 (0.0125)	0.0138 (0.0142)	-0.00536 (0.0154)	0.0213 (0.0170)
Tertiary education	-0.0141*** (0.00457)	-0.0179*** (0.00376)	-0.0183*** (0.00292)	-0.0134*** (0.00480)	-0.0180** (0.00858)	- (0.00559)	- (0.00845)	-0.0198* (0.0104)	0.00400 (0.0125)	0.0223 (0.0139)	0.0317** (0.0152)	0.0675*** (0.0162)
Relative individual income	0.0168*** (0.00343)	0.0211*** (0.00342)	0.0234*** (0.00298)	0.0228*** (0.00332)	0.0235*** (0.00667)	0.0318*** (0.00379)	0.0275*** (0.00393)	0.0260*** (0.00355)	0.0357*** (0.00492)	0.0539*** (0.00568)	0.0547*** (0.00608)	0.0465*** (0.00609)
Day-time sex ratio	0.0145 (0.0201)	0.0157 (0.0219)	0.0366* (0.0206)	0.0504** (0.0253)	0.0546* (0.0300)	0.0893*** (0.0321)	0.0584 (0.0390)	-0.00932 (0.0437)	0.0330 (0.0478)	0.0552 (0.0540)	0.0758 (0.0614)	-0.00565 (0.0673)
Differences in day-time sex ratio in the	0.00934 (0.0246)	-0.0536** (0.0260)	0.0183 (0.0237)	-0.0282 (0.0306)	0.0185 (0.0304)	-0.0289 (0.0352)	-0.0288 (0.0423)	-0.00553 (0.0476)	0.0417 (0.0517)	0.00884 (0.0560)	0.0833 (0.0656)	0.0908 (0.0682)
Differences in log average earnings in the place of residence and work	0.00228 (0.0182)	-0.0113 (0.0174)	0.0236 (0.0171)	0.00893 (0.0199)	0.0190 (0.0235)	-0.0297 (0.0216)	-0.0163 (0.0232)	-0.0201 (0.0248)	-0.00187 (0.0275)	0.0342 (0.0327)	0.00155 (0.0392)	-0.0271 (0.0418)
Commuter	-0.00210 (0.00362)	-0.00472 (0.00374)	-0.000763 (0.00333)	-0.0124*** (0.00399)	-0.00229 (0.00407)	- (0.00452)	-0.00943* (0.00496)	-0.00637 (0.00581)	0.00580 (0.00633)	0.0152** (0.00703)	0.0146* (0.00811)	0.0176** (0.00844)
Labour force	8.38e-08*** (1.04e-08)	9.64e-08*** (1.17e-08)	1.12e-07*** (1.09e-08)	9.24e-08*** (1.28e-08)	1.04e-07 (9.84e-08)	1.08e-07*** (1.47e-08)	1.21e-07*** (1.70e-08)	1.61e-07*** (2.21e-08)	2.64e-07*** (2.98e-08)	2.96e-07*** (3.61e-08)	2.12e-07*** (3.39e-08)	2.90e-07*** (4.00e-08)
Difference in log	0.0106***	0.0124***	0.0148***	0.0122***	0.0142	0.0154***	0.0169***	0.0221***	0.0360***	0.0421***	0.0332***	0.0406***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
labour forces	(0.00128)	(0.00147)	(0.00137)	(0.00166)	(0.0135)	(0.00203)	(0.00231)	(0.00296)	(0.00384)	(0.00474)	(0.00501)	(0.00541)
The proportion of unemployed	-0.0164*** (0.00323)	-0.0242*** (0.00434)	-0.0255*** (0.00457)	-0.0172*** (0.00402)	-0.0217 (0.0208)	- (0.00533)	- (0.00651)	- (0.0101)	-0.0556*** (0.0140)	-0.0714*** (0.0182)	- (0.0184)	-0.0856*** (0.0232)
University	0.00360*** (0.000649)	0.00501*** (0.000830)	0.00521*** (0.000792)	0.00142*** (0.000513)	0.000975 (0.00110)	0.000862 (0.000591)	-0.000658 (0.000645)	-0.00116 (0.000858)	- (0.00604*** (0.00162)	- (0.00526*** (0.00187)	-0.00287* (0.00151)	- (0.00728*** (0.00223)
Diff in Labour force * Diff in Log average earnings	0.0198*** (0.00249)	0.0199*** (0.00239)	0.0242*** (0.00256)	0.0211*** (0.00287)	0.0245 (0.0237)	0.0255*** (0.00334)	0.0285*** (0.00388)	0.0348*** (0.00473)	0.0563*** (0.00630)	0.0499*** (0.00826)	0.0426*** (0.00852)	0.0655*** (0.00858)
Diff in log average earnings*University	0.0110** (0.00542)	0.0180*** (0.00552)	0.0441*** (0.00826)	0.0445*** (0.00870)	0.0559 (0.0545)	0.0632*** (0.0118)	0.0723*** (0.0137)	0.0888*** (0.0169)	0.133*** (0.0245)	0.125*** (0.0294)	0.0542** (0.0215)	0.127*** (0.0343)
Diff in Labour force * Labour force	-1.25e-07*** (1.55e-08)	-1.47e- 07*** (1.81e-08)	-1.74e- 07*** (1.68e-08)	-1.36e- 07*** (1.91e-08)	-1.53e-07 (1.45e-07)	-1.62e- 07*** (2.26e-08)	-1.78e- 07*** (2.60e-08)	-2.35e- 07*** (3.38e-08)	-3.80e- 07*** (4.51e-08)	-4.29e- 07*** (5.52e-08)	-3.15e- 07*** (5.29e-08)	-4.16e- 07*** (6.08e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 10 Marginal effects at means for non-commuters. Day-time sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.00675*** (0.00217)	0.0181*** (0.00394)	0.0110*** (0.00247)	0.0117 (0.0172)	0.0121*** (0.00258)	0.0153*** (0.00320)	0.0137*** (0.00305)	0.0146*** (0.00374)	0.00932*** (0.00359)	0.00728** (0.00290)	0.00375 (0.00367)	0.00675*** (0.00217)
Difference in TFR	0.00168 (0.00219)	0.00867** (0.00384)	0.00298 (0.00195)	0.00329 (0.00492)	0.00455** (0.00189)	0.00715*** (0.00224)	0.00237 (0.00194)	-0.00299 (0.00308)	-0.000793 (0.00311)	-0.00143 (0.00252)	-0.000143 (0.00341)	0.00168 (0.00219)
Secondary education	-0.0146*** (0.00338)	-0.0162*** (0.00371)	-0.00621*** (0.00202)	-0.00582 (0.00702)	-0.00423*** (0.00158)	-0.00247* (0.00143)	-0.00236 (0.00174)	-0.00205 (0.00295)	-0.00162 (0.00345)	-0.00693** (0.00283)	-0.0109*** (0.00395)	-0.0146*** (0.00338)
Tertiary education	-0.00499*** (0.00123)	-0.00782*** (0.00145)	-0.00412*** (0.000983)	-0.00568 (0.00728)	-0.00531*** (0.00119)	-0.00786*** (0.00192)	-0.00920*** (0.00237)	-0.0123*** (0.00354)	-0.0109*** (0.00393)	-0.0120*** (0.00359)	-0.0170*** (0.00468)	-0.00499*** (0.00123)
Relative individual income	0.00534*** (0.00125)	0.00833*** (0.00156)	0.00388*** (0.000910)	0.00391 (0.00597)	0.00396*** (0.000855)	0.00286*** (0.000675)	0.00267*** (0.000625)	0.00525*** (0.00114)	0.00814*** (0.00174)	0.00524*** (0.00130)	0.00577*** (0.00140)	0.00534*** (0.00125)
Day-time sex ratio	0.00396 (0.00559)	0.0130* (0.00758)	0.00856* (0.00459)	0.00910 (0.0140)	0.0111** (0.00451)	0.00608 (0.00425)	-0.000957 (0.00449)	0.00486 (0.00708)	0.00834 (0.00833)	0.00726 (0.00613)	-0.000701 (0.00834)	0.00396 (0.00559)
Differences in day-time sex ratio in the	-0.0135** (0.00689)	0.00654 (0.00860)	-0.00479 (0.00522)	0.00307 (0.00724)	-0.00359 (0.00439)	-0.00299 (0.00441)	-0.000568 (0.00489)	0.00613 (0.00772)	0.00134 (0.00848)	0.00798 (0.00660)	0.0113 (0.00887)	-0.0135** (0.00689)
Differences in log average earnings in the place of residence and work	0.00496 (0.00489)	0.0169** (0.00700)	0.00357 (0.00399)	0.0129 (0.0155)	0.00857** (0.00364)	0.00965*** (0.00358)	0.0152*** (0.00436)	0.0205*** (0.00692)	-0.00241 (0.00967)	-0.0107 (0.00783)	-0.0104 (0.00969)	0.00496 (0.00489)
Commuter	-0.00119 (0.000822)	-0.000272 (0.00116)	-0.00211*** (0.000571)	-0.000381 (0.000840)	-0.00116** (0.000512)	-0.000982** (0.000484)	-0.000655 (0.000573)	0.000853 (0.000978)	0.00229* (0.00123)	0.00140 (0.000896)	0.00218* (0.00123)	-0.00119 (0.000822)
Labour force	-9.64e-08*** (1.17e-08)	-1.12e-07*** (1.09e-08)	-9.24e-08*** (1.27e-08)	-1.04e-07 (9.87e-08)	-1.08e-07*** (1.47e-08)	-1.21e-07*** (1.70e-08)	-1.61e-07*** (2.21e-08)	-2.64e-07*** (2.98e-08)	-2.96e-07*** (3.61e-08)	-2.12e-07*** (3.39e-08)	-2.90e-07*** (3.99e-08)	-9.64e-08*** (1.17e-08)
Difference in log labour forces	-0.0124*** (0.00147)	-0.0148*** (0.00137)	-0.0122*** (0.00165)	-0.0142 (0.0132)	-0.0154*** (0.00203)	-0.0169*** (0.00231)	-0.0221*** (0.00296)	-0.0360*** (0.00384)	-0.0421*** (0.00474)	-0.0332*** (0.00501)	-0.0406*** (0.00541)	-0.0124*** (0.00147)
The proportion of unemployed	0.0242*** (0.00434)	0.0255*** (0.00457)	0.0172*** (0.00402)	0.0217 (0.0212)	0.0244*** (0.00533)	0.0294*** (0.00651)	0.0495*** (0.0101)	0.0556*** (0.0140)	0.0714*** (0.0182)	0.0714*** (0.0184)	0.0856*** (0.0232)	0.0242*** (0.00434)
University	-0.00501*** (0.000830)	-0.00521*** (0.000792)	-0.00142*** (0.000512)	-0.000975 (0.00887)	-0.000862 (0.000592)	0.000658 (0.000645)	0.00116 (0.000858)	0.00604*** (0.00162)	0.00526*** (0.00187)	0.00287* (0.00151)	0.00728*** (0.00223)	-0.00501*** (0.000830)
Diff in Labour force *	-0.0199*** (0.00240)	-0.0242*** (0.00256)	-0.0211*** (0.00287)	-0.0245 (0.0219)	-0.0255*** (0.00334)	-0.0285*** (0.00388)	-0.0348*** (0.00473)	-0.0563*** (0.00630)	-0.0499*** (0.00826)	-0.0426*** (0.00852)	-0.0655*** (0.00858)	-0.0199*** (0.00240)
Diff in Log average earnings	-0.0180*** (0.00552)	-0.0441*** (0.00826)	-0.0445*** (0.00869)	-0.0559 (0.0384)	-0.0632*** (0.0118)	-0.0723*** (0.0137)	-0.0888*** (0.0169)	-0.133*** (0.0245)	-0.125*** (0.0294)	-0.0542** (0.0215)	-0.127*** (0.0343)	-0.0180*** (0.00552)
Diff in log average earnings*University	1.47e-07*** (1.81e-08)	1.74e-07*** (1.68e-08)	1.36e-07*** (1.91e-08)	1.53e-07 (1.44e-07)	1.62e-07*** (2.26e-08)	1.78e-07*** (2.60e-08)	2.35e-07*** (3.38e-08)	3.80e-07*** (4.51e-08)	4.29e-07*** (5.52e-08)	3.15e-07*** (5.29e-08)	4.16e-07*** (6.08e-08)	1.47e-07*** (1.81e-08)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 11 Marginal effects at means for commuters. Night-time sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0150** (0.00720)	0.0187** (0.00818)	0.0439*** (0.00941)	0.0611*** (0.0100)	0.0693*** (0.0151)	0.0815*** (0.0129)	0.129*** (0.0162)	0.110*** (0.0179)	0.0806*** (0.0202)	0.0545*** (0.0207)	0.0714*** (0.0255)	0.0288 (0.0291)
Difference in TFR	-0.00181 (0.00844)	0.00176 (0.00923)	0.0163 (0.0102)	0.0173 (0.0107)	0.0156 (0.0125)	0.0287** (0.0132)	0.0592*** (0.0166)	0.00710 (0.0184)	-0.0307 (0.0211)	-0.00951 (0.0205)	-0.0220 (0.0262)	0.000629 (0.0273)
Secondary education	-0.0451*** (0.00681)	-0.0517*** (0.00766)	-0.0325*** (0.00656)	-0.0222*** (0.00658)	-0.0157** (0.00750)	-0.0217*** (0.00725)	-0.0125 (0.00838)	-0.00160 (0.0102)	0.00564 (0.0124)	0.0143 (0.0142)	-0.00567 (0.0154)	0.0211 (0.0170)
Tertiary education	-0.0141*** (0.00449)	-0.0176*** (0.00375)	-0.0183*** (0.00286)	-0.0133*** (0.00478)	-0.0184*** (0.00634)	-0.0240*** (0.00552)	-0.0293*** (0.00838)	-0.0189* (0.0104)	0.00419 (0.0124)	0.0231* (0.0139)	0.0312** (0.0152)	0.0669*** (0.0162)
Relative individual income	0.0166*** (0.00341)	0.0204*** (0.00340)	0.0231*** (0.00296)	0.0229*** (0.00330)	0.0235*** (0.00480)	0.0308*** (0.00375)	0.0261*** (0.00390)	0.0251*** (0.00353)	0.0346*** (0.00490)	0.0532*** (0.00565)	0.0544*** (0.00608)	0.0468*** (0.00609)
Night-time sex ratio	-0.123 (0.160)	-0.0337 (0.157)	-0.221 (0.155)	-0.174 (0.190)	-0.342* (0.180)	-0.0385 (0.195)	0.198 (0.233)	-0.348 (0.268)	-0.561* (0.297)	0.448 (0.306)	-0.721** (0.347)	-0.0245 (0.401)
Differences in night-time sex ratio in the place of residence and work	-0.0867 (0.0879)	-0.0712 (0.0875)	-0.158* (0.0856)	-0.135 (0.105)	-0.223** (0.1000)	-0.179* (0.108)	-0.0628 (0.129)	-0.350** (0.149)	-0.473*** (0.163)	0.0767 (0.170)	-0.534*** (0.191)	-0.0257 (0.220)
Differences in log average earnings in the place of residence and Commuter	0.00263 (0.0175)	0.00352 (0.0162)	0.0255 (0.0166)	0.0206 (0.0194)	0.0270 (0.0205)	-0.0162 (0.0211)	-0.0124 (0.0224)	-0.0106 (0.0245)	0.0107 (0.0273)	0.0239 (0.0312)	0.00920 (0.0368)	-0.0532 (0.0399)
Labour force	-0.00122 (0.00371)	-0.00222 (0.00384)	0.000872 (0.00341)	-0.0102** (0.00408)	-0.000813 (0.00411)	-0.00455 (0.00467)	-0.00508 (0.00511)	-0.00201 (0.00594)	0.00906 (0.00646)	0.0177** (0.00708)	0.0142* (0.00818)	0.0174** (0.00846)
Difference in log labour forces	8.51e-08*** (1.04e-08)	9.95e-08*** (1.18e-08)	1.15e-07*** (1.09e-08)	9.64e-08*** (1.29e-08)	1.08e-07* (5.93e-08)	1.14e-07*** (1.51e-08)	1.27e-07*** (1.74e-08)	1.65e-07*** (2.23e-08)	2.66e-07*** (2.99e-08)	2.99e-07*** (3.62e-08)	2.10e-07*** (3.38e-08)	2.87e-07*** (3.99e-08)
The proportion of unemployed	0.0108*** (0.00127)	0.0128*** (0.00148)	0.0151*** (0.00136)	0.0127*** (0.00167)	0.0146* (0.00804)	0.0161*** (0.00208)	0.0176*** (0.00235)	0.0227*** (0.00299)	0.0363*** (0.00385)	0.0425*** (0.00475)	0.0328*** (0.00500)	0.0402*** (0.00540)
University	-0.0166*** (0.00326)	-0.0250*** (0.00444)	-0.0260*** (0.00463)	-0.0180*** (0.00416)	-0.0224* (0.0131)	-0.0257*** (0.00560)	-0.0309*** (0.00679)	-0.0507*** (0.0104)	-0.0561*** (0.0142)	-0.0725*** (0.0185)	-0.0704*** (0.0182)	-0.0846*** (0.0230)
Diff in Labour force *	0.00365*** (0.000653)	0.00517*** (0.000836)	0.00529*** (0.000793)	0.00148*** (0.000530)	0.000996 (0.000757)	0.000888 (0.000616)	-0.000698 (0.000675)	-0.00119 (0.000880)	-0.00611*** (0.00164)	-0.00533*** (0.00189)	-0.00284* (0.00149)	-0.00720*** (0.00221)
Diff in Log average earnings	0.0201*** (0.00250)	0.0206*** (0.00241)	0.0247*** (0.00256)	0.0220*** (0.00290)	0.0253* (0.0139)	0.0268*** (0.00343)	0.0297*** (0.00396)	0.0357*** (0.00477)	0.0568*** (0.00632)	0.0503*** (0.00830)	0.0421*** (0.00847)	0.0648*** (0.00857)
Diff in log average earnings*University	0.0112** (0.00550)	0.0186*** (0.00567)	0.0450*** (0.00836)	0.0464*** (0.00892)	0.0576* (0.0313)	0.0663*** (0.0122)	0.0756*** (0.0141)	0.0909*** (0.0171)	0.134*** (0.0247)	0.126*** (0.0297)	0.0535** (0.0213)	0.126*** (0.0341)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Diff in Labour force *	-1.27e-07***	-1.52e-07***	-1.77e-07***	-1.42e-07***	-1.58e-07*	-1.70e-07***	-1.86e-07***	-2.41e-07***	-3.83e-07***	-4.33e-	-3.11e-	-4.12e-07***
Labour force	(1.55e-08)	(1.82e-08)	(1.66e-08)	(1.93e-08)	(8.70e-08)	(2.32e-08)	(2.65e-08)	(3.41e-08)	(4.53e-08)	(5.53e-08)	(5.27e-08)	(6.06e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 12 Marginal effects at means for non-commuters. Night-time sex ratio is included

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.00497** (0.00229)	0.0163*** (0.00408)	0.0110*** (0.00254)	0.0120 (0.00995)	0.0108*** (0.00247)	0.0142*** (0.00304)	0.0117*** (0.00281)	0.0120*** (0.00356)	0.00835** (0.00347)	0.00676** (0.00279)	0.00354 (0.00361)	0.00497** (0.00229)
Difference in TFR	0.000467 (0.00247)	0.00604 (0.00403)	0.00311 (0.00207)	0.00271 (0.00264)	0.00380* (0.00194)	0.00651*** (0.00224)	0.000753 (0.00196)	-0.00458 (0.00318)	-0.00145 (0.00313)	-0.00208 (0.00251)	7.72e-05 (0.00336)	0.000467 (0.00247)
Secondary education	-0.0152*** (0.00350)	-0.0167*** (0.00380)	-0.00656*** (0.00211)	-0.00616 (0.00460)	-0.00458*** (0.00168)	-0.00267* (0.00150)	-0.00242 (0.00179)	-0.00209 (0.00298)	-0.00157 (0.00349)	-0.00686** (0.00280)	-0.0108*** (0.00391)	-0.0152*** (0.00350)
Tertiary education	-0.00520*** (0.00128)	-0.00812*** (0.00148)	-0.00435*** (0.00103)	-0.00597 (0.00454)	-0.00566*** (0.00125)	-0.00830*** (0.00200)	-0.00935*** (0.00241)	-0.0124*** (0.00356)	-0.0109*** (0.00395)	-0.0119*** (0.00357)	-0.0169*** (0.00466)	-0.00520*** (0.00128)
Relative individual income	0.00542*** (0.00127)	0.00858*** (0.00158)	0.00411*** (0.000945)	0.00409 (0.00364)	0.00408*** (0.000879)	0.00287*** (0.000682)	0.00266*** (0.000626)	0.00516*** (0.00114)	0.00814*** (0.00174)	0.00515*** (0.00128)	0.00574*** (0.00140)	0.00542*** (0.00127)
Night-time sex ratio	-0.00895 (0.0418)	-0.0819 (0.0598)	-0.0313 (0.0351)	-0.0594 (0.0601)	-0.00510 (0.0259)	0.0218 (0.0259)	-0.0369 (0.0292)	-0.0836* (0.0464)	0.0686 (0.0486)	-0.0683* (0.0360)	-0.00301 (0.0493)	-0.00895 (0.0418)
Differences in night-time sex ratio in the place of residence and work	-0.0189 (0.0238)	-0.0588* (0.0338)	-0.0243 (0.0197)	-0.0387 (0.0372)	-0.0237 (0.0151)	-0.00691 (0.0143)	-0.0371** (0.0172)	-0.0705*** (0.0271)	0.0117 (0.0261)	-0.0505** (0.0212)	-0.00315 (0.0270)	-0.0189 (0.0238)
Differences in log average earnings in the place of residence and work	0.00907* (0.00485)	0.0183** (0.00710)	0.00588 (0.00414)	0.0148** (0.00747)	0.0108*** (0.00386)	0.0105*** (0.00369)	0.0167*** (0.00448)	0.0226*** (0.00702)	-0.00399 (0.00964)	-0.00987 (0.00763)	-0.0134 (0.00974)	0.00907* (0.00485)
Commuter	-0.000588 (0.000952)	0.000324 (0.00130)	-0.00183*** (0.000616)	-0.000141 (0.000712)	-0.000604 (0.000580)	-0.000559 (0.000534)	-0.000213 (0.000620)	0.00135 (0.00105)	0.00271** (0.00129)	0.00135 (0.000890)	0.00214* (0.00121)	-0.000588 (0.000952)
Labour force	-9.95e-08*** (1.18e-08)	-1.15e-07*** (1.09e-08)	-9.64e-08*** (1.29e-08)	-1.08e-07* (5.91e-08)	-1.14e- (1.51e-08)	-1.27e-07*** (1.74e-08)	-1.65e-07*** (2.23e-08)	-2.66e-07*** (2.99e-08)	-2.99e-07*** (3.62e-08)	-2.10e-07*** (3.38e-08)	-2.87e-07*** (3.98e-08)	-9.95e-08*** (1.18e-08)
Difference in log labour forces	-0.0128*** (0.00148)	-0.0151*** (0.00136)	-0.0127*** (0.00167)	-0.0146* (0.00766)	-0.0161*** (0.00208)	-0.0176*** (0.00235)	-0.0227*** (0.00299)	-0.0363*** (0.00385)	-0.0425*** (0.00475)	-0.0328*** (0.00500)	-0.0402*** (0.00540)	-0.0128*** (0.00148)
The proportion of unemployed	0.0250*** (0.00444)	0.0260*** (0.00463)	0.0180*** (0.00416)	0.0224* (0.0129)	0.0257*** (0.00560)	0.0309*** (0.00679)	0.0507*** (0.0104)	0.0561*** (0.0142)	0.0725*** (0.0185)	0.0704*** (0.0182)	0.0846*** (0.0230)	0.0250*** (0.00444)
University	-0.00517*** (0.000836)	-0.00529*** (0.000793)	-0.00148*** (0.000530)	-0.000996 (0.000617)	-0.000888 (0.000675)	0.000698 (0.000675)	0.00119 (0.000880)	0.00611*** (0.00164)	0.00533*** (0.00189)	0.00284* (0.00149)	0.00720*** (0.00221)	-0.00517*** (0.000836)
Diff in Labour force *	-0.0206*** (0.00241)	-0.0247*** (0.00256)	-0.0220*** (0.00289)	-0.0253*** (0.00949)	-0.0268*** (0.00343)	-0.0297*** (0.00396)	-0.0357*** (0.00477)	-0.0568*** (0.00632)	-0.0503*** (0.00830)	-0.0421*** (0.00847)	-0.0648*** (0.00857)	-0.0206*** (0.00241)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Diff in log average earnings*University	-0.0186*** (0.00567)	-0.0450*** (0.00836)	-0.0464*** (0.00893)	-0.0576* (0.0300)	-0.0663*** (0.0122)	-0.0756*** (0.0141)	-0.0909*** (0.0171)	-0.134*** (0.0247)	-0.126*** (0.0297)	-0.0535** (0.0213)	-0.126*** (0.0341)	-0.0186*** (0.00567)
Diff in Labour force * Labour force	1.52e-07*** (1.82e-08)	1.77e-07*** (1.66e-08)	1.42e-07*** (1.93e-08)	1.58e-07* (8.64e-08)	1.70e-07*** (2.32e-08)	1.86e-07*** (2.65e-08)	2.41e-07*** (3.41e-08)	3.83e-07*** (4.53e-08)	4.33e-07*** (5.53e-08)	3.11e-07*** (5.27e-08)	4.12e-07*** (6.06e-08)	1.52e-07*** (1.82e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 13 Marginal effects at means for commuters. Adjusted sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0133* (0.00715)	0.0171** (0.00858)	0.0441*** (0.00929)	0.0561*** (0.00978)	0.0670*** (0.0128)	0.0769*** (0.0140)	0.0936*** (0.0175)	0.0898*** (0.0186)	0.0753*** (0.0212)	0.0473** (0.0219)	0.0501* (0.0260)	0.00712 (0.0302)
Difference in TFR	-0.00194 (0.00839)	0.0105 (0.00912)	0.0184* (0.00990)	0.0234** (0.0107)	0.0131 (0.0132)	0.0347** (0.0146)	0.0497*** (0.0182)	0.00396 (0.0183)	-0.0132 (0.0220)	-0.0139 (0.0213)	-0.00274 (0.0268)	-0.0230 (0.0293)
Secondary education	-0.0459*** (0.00689)	-0.0518*** (0.00767)	-0.0333*** (0.00665)	-0.0228*** (0.00659)	-0.0157** (0.00649)	-0.0217*** (0.00726)	-0.0120 (0.00828)	-0.00150 (0.0102)	0.00560 (0.0124)	0.0134 (0.0141)	-0.00462 (0.0153)	0.0208 (0.0170)
Tertiary education	-0.0141*** (0.00457)	-0.0177*** (0.00368)	-0.0185*** (0.00289)	-0.0138*** (0.00465)	-0.0186*** (0.00492)	-0.0244*** (0.00551)	-0.0290*** (0.00828)	-0.0187* (0.0104)	0.00364 (0.0124)	0.0217 (0.0139)	0.0328** (0.0151)	0.0677*** (0.0162)
Relative individual income	0.0171*** (0.00342)	0.0208*** (0.00337)	0.0238*** (0.00298)	0.0230*** (0.00327)	0.0243*** (0.00359)	0.0323*** (0.00375)	0.0270*** (0.00385)	0.0254*** (0.00351)	0.0358*** (0.00489)	0.0543*** (0.00565)	0.0548*** (0.00605)	0.0472*** (0.00608)
Adjusted sex ratio	-0.00900 (0.00586)	-0.0152** (0.00652)	-0.0125** (0.00566)	-0.0205*** (0.00649)	-0.0106 (0.00661)	-0.0305*** (0.00766)	-0.0534*** (0.00818)	-0.0458*** (0.00852)	-0.0293*** (0.00917)	-0.0254** (0.01000)	-0.0563*** (0.0120)	-0.0280** (0.0127)
Differences in adjusted sex ratio in the place of residence and work	-0.00777 (0.00608)	0.00663 (0.00631)	-0.0122** (0.00592)	0.00185 (0.00697)	-0.0123* (0.00703)	-0.00852 (0.00783)	-0.0200** (0.00815)	-0.0262*** (0.00749)	0.00389 (0.00750)	-0.0159* (0.00841)	3.60e-05 (0.00979)	-0.0273** (0.0117)
Differences in log average earnings in the place of residence and work	0.00119 (0.0177)	-0.00477 (0.0166)	0.0240 (0.0168)	0.00786 (0.0192)	0.0207 (0.0186)	-0.0237 (0.0206)	-0.0163 (0.0216)	-0.0268 (0.0233)	-0.0173 (0.0255)	0.0340 (0.0298)	-0.0285 (0.0351)	-0.0522 (0.0381)
Commuter	-0.000909 (0.00377)	-0.00287 (0.00383)	0.00116 (0.00351)	-0.00940** (0.00413)	-0.000847 (0.00422)	-0.00405 (0.00480)	0.00116 (0.00531)	0.00547 (0.00626)	0.0113* (0.00676)	0.0214*** (0.00752)	0.0231*** (0.00858)	0.0235*** (0.00890)
Labour force	8.29e-08*** (1.05e-08)	9.96e-08*** (1.19e-08)	1.11e-07*** (1.10e-08)	9.57e-08*** (1.30e-08)	1.03e-07*** (2.64e-08)	1.11e-07*** (1.51e-08)	1.26e-07*** (1.75e-08)	1.64e-07*** (2.23e-08)	2.70e-07*** (3.00e-08)	2.99e-07*** (3.63e-08)	2.18e-07*** (3.44e-08)	2.85e-07*** (4.00e-08)
Difference in log labour forces	0.0105*** (0.00129)	0.0128*** (0.00149)	0.0146*** (0.00138)	0.0126*** (0.00168)	0.0140*** (0.00358)	0.0158*** (0.00208)	0.0176*** (0.00236)	0.0226*** (0.00299)	0.0369*** (0.00387)	0.0424*** (0.00476)	0.0341*** (0.00507)	0.0399*** (0.00540)
The proportion of unemployed	-0.0162*** (0.00322)	-0.0250*** (0.00444)	-0.0253*** (0.00456)	-0.0178*** (0.00414)	-0.0215*** (0.00673)	-0.0250*** (0.00549)	-0.0307*** (0.00675)	-0.0505*** (0.0103)	-0.0566*** (0.0143)	-0.0721*** (0.0184)	-0.0734*** (0.0187)	-0.0840*** (0.0229)
University	0.00356*** (0.000647)	0.00517*** (0.000837)	0.00514*** (0.000785)	0.00147*** (0.000525)	0.000960* (0.000580)	0.000868 (0.000603)	-0.000710 (0.000675)	-0.00119 (0.000878)	-0.00622*** (0.00167)	-0.00533*** (0.00189)	-0.00292* (0.00155)	-0.00717*** (0.00220)
Diff in Labour force *	0.0195*** (0.00251)	0.0206*** (0.00242)	0.0233*** (0.00257)	0.0218*** (0.00292)	0.0242*** (0.00624)	0.0262*** (0.00342)	0.0297*** (0.00396)	0.0355*** (0.00477)	0.0577*** (0.00635)	0.0502*** (0.00830)	0.0437*** (0.00865)	0.0644*** (0.00858)
Diff in Log average earnings												
Diff in log average	0.0109**	0.0186***	0.0436***	0.0461***	0.0552***	0.0648***	0.0753***	0.0905***	0.136***	0.126***	0.0555**	0.125***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
earnings*University	(0.00537)	(0.00567)	(0.00822)	(0.00889)	(0.0160)	(0.0120)	(0.0141)	(0.0171)	(0.0249)	(0.0297)	(0.0220)	(0.0340)
Diff in Labour force *	-1.24e-07***	-1.52e-07***	-1.72e-07***	-1.40e-07***	-1.51e-	-1.66e-07***	-1.86e-07***	-2.39e-07***	-3.90e-07***	-4.32e-	-3.23e-	-4.09e-07***
Labour force	(1.57e-08)	(1.83e-08)	(1.69e-08)	(1.94e-08)	(3.90e-08)	(2.31e-08)	(2.65e-08)	(3.41e-08)	(4.54e-08)	(5.54e-08)	(5.36e-08)	(6.07e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 14 Marginal effects at means for non-commuters. Adjusted sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.00461*	0.0155***	0.0101***	0.0110**	0.00990***	0.0104***	0.00953***	0.0114***	0.00722**	0.00495*	0.000869	0.00461*
	(0.00244)	(0.00396)	(0.00245)	(0.00455)	(0.00244)	(0.00263)	(0.00258)	(0.00368)	(0.00353)	(0.00275)	(0.00369)	(0.00244)
Difference in TFR	0.00282	0.00646*	0.00423*	0.00215	0.00447**	0.00554**	0.000421	-0.00200	-0.00213	-0.000270	-0.00280	0.00282
	(0.00264)	(0.00385)	(0.00221)	(0.00242)	(0.00215)	(0.00235)	(0.00195)	(0.00333)	(0.00325)	(0.00265)	(0.00359)	(0.00264)
Secondary education	-0.0154***	-0.0163***	-0.00670***	-0.00585**	-0.00446***	-0.00263*	-0.00240	-0.00213	-0.00170	-0.00707**	-0.0107***	-0.0154***
	(0.00355)	(0.00373)	(0.00213)	(0.00249)	(0.00164)	(0.00150)	(0.00178)	(0.00303)	(0.00348)	(0.00290)	(0.00389)	(0.00355)
Tertiary education	-0.00527***	-0.00772***	-0.00440***	-0.00565***	-0.00554***	-0.00830***	-0.00930***	-0.0127***	-0.0111***	-0.0122***	-0.0166***	-0.00527***
	(0.00130)	(0.00144)	(0.00103)	(0.00204)	(0.00123)	(0.00200)	(0.00241)	(0.00363)	(0.00397)	(0.00365)	(0.00462)	(0.00130)
Relative individual income	0.00559***	0.00835***	0.00415***	0.00398**	0.00416***	0.00301***	0.00269***	0.00544***	0.00828***	0.00542***	0.00576***	0.00559***
	(0.00130)	(0.00156)	(0.000957)	(0.00167)	(0.000893)	(0.000707)	(0.000632)	(0.00118)	(0.00177)	(0.00134)	(0.00140)	(0.00130)
Adjusted sex ratio	-0.00409**	-0.00439**	-0.00369***	-0.00175	-0.00393***	-0.00595***	-0.00487***	-0.00445***	-0.00387**	-0.00557***	-0.00342**	-0.00409**
	(0.00190)	(0.00209)	(0.00136)	(0.00130)	(0.00123)	(0.00146)	(0.00131)	(0.00159)	(0.00171)	(0.00172)	(0.00171)	(0.00190)
Differences in adjusted sex ratio in	0.00178	-0.00429**	0.000333	-0.00201	-0.00110	-0.00223**	-0.00278***	0.000591	-0.00243*	3.56e-06	-0.00333**	0.00178
	(0.00176)	(0.00213)	(0.00126)	(0.00134)	(0.00102)	(0.000977)	(0.000946)	(0.00115)	(0.00135)	(0.000968)	(0.00157)	(0.00176)
Differences in log average earnings in the place of residence and work	0.00688	0.0168**	0.00358	0.0130***	0.00960***	0.0100***	0.0149***	0.0187***	-0.00243	-0.0140*	-0.0132	0.00688
	(0.00494)	(0.00673)	(0.00407)	(0.00480)	(0.00365)	(0.00361)	(0.00426)	(0.00681)	(0.00954)	(0.00799)	(0.00958)	(0.00494)
Commuter	-0.000773	0.000409	-0.00169***	-0.000139	-0.000521	0.000130	0.000581	0.00171	0.00327**	0.00228**	0.00287**	-0.000773
	(0.000949)	(0.00127)	(0.000635)	(0.000682)	(0.000587)	(0.000601)	(0.000703)	(0.00113)	(0.00141)	(0.00107)	(0.00135)	(0.000949)
Labour force	-9.96e-08***	-1.11e-07***	-9.57e-08***	-1.03e-07***	-1.11e-07***	-1.26e-07***	-1.64e-07***	-2.70e-07***	-2.99e-07***	-2.18e-07***	-2.85e-07***	-9.96e-08***
	(1.19e-08)	(1.10e-08)	(1.29e-08)	(2.64e-08)	(1.51e-08)	(1.75e-08)	(2.23e-08)	(3.00e-08)	(3.63e-08)	(3.43e-08)	(4.00e-08)	(1.19e-08)
Difference in log labour forces	-0.0128***	-0.0146***	-0.0126***	-0.0140***	-0.0158***	-0.0176***	-0.0226***	-0.0369***	-0.0424***	-0.0341***	-0.0399***	-0.0128***
	(0.00149)	(0.00138)	(0.00168)	(0.00350)	(0.00208)	(0.00235)	(0.00299)	(0.00387)	(0.00476)	(0.00507)	(0.00540)	(0.00149)
The proportion of unemployed	0.0250***	0.0253***	0.0178***	0.0215***	0.0250***	0.0307***	0.0505***	0.0566***	0.0721***	0.0734***	0.0840***	0.0250***
	(0.00444)	(0.00456)	(0.00414)	(0.00657)	(0.00549)	(0.00675)	(0.0103)	(0.0143)	(0.0184)	(0.0187)	(0.0229)	(0.00444)
University	-0.00517***	-0.00514***	-0.00147***	-0.000960	-0.000868	0.000710	0.00119	0.00622***	0.00533***	0.00292*	0.00717***	-0.00517***
	(0.000836)	(0.000785)	(0.000525)	(0.000735)	(0.000603)	(0.000675)	(0.000878)	(0.00167)	(0.00189)	(0.00155)	(0.00220)	(0.000836)
Diff in Labour force *	-0.0206***	-0.0239***	-0.0218***	-0.0242***	-0.0262***	-0.0297***	-0.0355***	-0.0577***	-0.0502***	-0.0437***	-0.0644***	-0.0206***
Diff in Log average earnings	(0.00242)	(0.00257)	(0.00292)	(0.00402)	(0.00342)	(0.00396)	(0.00477)	(0.00635)	(0.00830)	(0.00865)	(0.00858)	(0.00242)
Diff in log average earnings*University	-0.0186***	-0.0436***	-0.0461***	-0.0552**	-0.0648***	-0.0753***	-0.0905***	-0.136***	-0.126***	-0.0555**	-0.125***	-0.0186***
	(0.00567)	(0.00822)	(0.00886)	(0.0218)	(0.0120)	(0.0141)	(0.0171)	(0.0249)	(0.0297)	(0.0220)	(0.0340)	(0.00567)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Diff in Labour force *	1.52e-07***	1.72e-07***	1.40e-07***	1.51e-07***	1.66e-07***	1.86e-07***	2.39e-07***	3.90e-07***	4.32e-07***	3.23e-07***	4.09e-07***	1.52e-07***
Labour force	(1.83e-08)	(1.69e-08)	(1.94e-08)	(3.86e-08)	(2.31e-08)	(2.65e-08)	(3.41e-08)	(4.55e-08)	(5.54e-08)	(5.36e-08)	(6.07e-08)	(1.83e-08)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Appendix 5 Linear probability model with endogenous treatment (LPM)⁶

Table 15 Day-time sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0248*** (0.00856)	0.0378*** (0.0103)	0.0847*** (0.0142)	0.0991*** (0.0148)	0.100*** (0.0171)	0.131*** (0.0174)	0.192*** (0.0221)	0.173*** (0.0240)	0.127*** (0.0264)	0.0729*** (0.0263)	0.0861*** (0.0295)	0.0348 (0.0328)
Difference in TFR	0.00284 (0.00947)	0.0123 (0.0112)	0.0419*** (0.0128)	0.0357*** (0.0126)	0.0293* (0.0166)	0.0540*** (0.0159)	0.0911*** (0.0201)	0.0341 (0.0213)	-0.0261 (0.0251)	-0.0114 (0.0250)	-0.0240 (0.0315)	-0.00324 (0.0328)
Secondary education	-0.0605*** (0.00842)	-0.0658*** (0.00921)	-0.0498*** (0.00901)	-0.0299*** (0.00848)	-0.0212** (0.00840)	-0.0262*** (0.00944)	-0.0159 (0.0117)	-0.00327 (0.0126)	0.00439 (0.0139)	0.0131 (0.0141)	-0.0117 (0.0153)	0.00718 (0.0145)
Tertiary education	-0.0520*** (0.0166)	-0.0564*** (0.0161)	-0.0592*** (0.0124)	-0.0268** (0.0109)	-0.0325*** (0.00944)	-0.0375*** (0.0103)	-0.0380*** (0.0117)	-0.0287** (0.0126)	-0.00677 (0.0140)	0.0136 (0.0140)	0.0213 (0.0155)	0.0481*** (0.0148)
Relative individual income	0.0249*** (0.00574)	0.0289*** (0.00491)	0.0366*** (0.00458)	0.0290*** (0.00443)	0.0288*** (0.00398)	0.0365*** (0.00414)	0.0296*** (0.00393)	0.0344*** (0.00706)	0.0406*** (0.00530)	0.0607*** (0.00588)	0.0603*** (0.00624)	0.0542*** (0.00680)
Day-time sex ratio	0.0239 (0.0284)	0.0218 (0.0290)	0.0567* (0.0327)	0.0767** (0.0335)	0.0740** (0.0354)	0.114*** (0.0398)	0.0784 (0.0491)	-0.0191 (0.0508)	0.0360 (0.0573)	0.0625 (0.0638)	0.0824 (0.0666)	-0.00575 (0.0706)
Differences in day-time sex ratio in the place of	0.0172 (0.0322)	-0.0649* (0.0336)	0.0330 (0.0339)	-0.0156 (0.0341)	0.0290 (0.0359)	-0.0181 (0.0387)	-0.0172 (0.0524)	-0.00399 (0.0538)	0.0520 (0.0590)	0.0138 (0.0729)	0.0942 (0.0718)	0.106 (0.0767)
Differences in log average earnings in the place of residence and work	0.0260 (0.0211)	-0.00627 (0.0186)	0.0361* (0.0211)	0.00976 (0.0204)	0.0315* (0.0189)	-0.0187 (0.0192)	-0.00438 (0.0235)	-0.00409 (0.0251)	0.0262 (0.0327)	0.0369 (0.0390)	-0.00645 (0.0445)	-0.0404 (0.0457)
Commuter	-0.00239 (0.00418)	-0.00579 (0.00423)	-0.00284 (0.00460)	-0.0168*** (0.00400)	-0.00390 (0.00449)	-0.0124*** (0.00465)	-0.0134*** (0.00513)	-0.00940 (0.00608)	0.00631 (0.00705)	0.0173** (0.00807)	0.0154* (0.00868)	0.0199** (0.00977)
Constant	0.00429 (0.0336)	-0.00381 (0.0338)	-0.130*** (0.0383)	-0.173*** (0.0416)	-0.181*** (0.0415)	-0.254*** (0.0474)	-0.301*** (0.0596)	-0.169*** (0.0635)	-0.173** (0.0701)	-0.140* (0.0737)	-0.174** (0.0812)	-0.000293 (0.0853)
Commuter equation												
Secondary education	0.0504 (0.0622)	0.0476 (0.0646)	0.149** (0.0702)	0.147** (0.0731)	0.205*** (0.0725)	0.108 (0.0712)	0.0951 (0.0855)	0.134 (0.0872)	0.105 (0.0974)	0.115 (0.0997)	0.283*** (0.106)	0.451*** (0.122)
Tertiary education	0.424***	0.131	0.240**	0.340***	0.416***	0.300***	0.381***	0.423***	0.452***	0.439***	0.619***	0.827***

Note: 1) Instruments are size of labour force, difference in log labour forces in place of work and residence, the proportion of unemployed people in the labour force, presence of university in the place of residence, the product of difference in labour force and difference in log average earnings, the product of the difference in log average earnings and presence of university, the product of the difference in labour force and size of labour force, local labour market fixed effects. 2) Size of labour force is not logged to provide large support instrument for commuting as it is argued in Han and Vytlačil (2017). 3) Primary education is the reference. 4) Relative individual income is the ration of individual earnings to the average taxable incomes in municipality. 5) Relocation is considered as dummy (1=yes) if a woman moved at the considered year. 6) Here and further age is shown for the time of first birth. 7) Standard errors in parentheses. 8) *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	(0.156)	(0.138)	(0.112)	(0.0926)	(0.0834)	(0.0784)	(0.0863)	(0.0876)	(0.0971)	(0.0998)	(0.106)	(0.123)
Labour force	1.04e-05*** (4.38e-07)	1.04e-05*** (4.37e-07)	9.95e-06*** (3.22e-07)	1.06e-05*** (3.23e-07)	1.04e-05*** (3.30e-07)	1.02e-05*** (3.48e-07)	1.05e-05*** (3.62e-07)	1.07e-05*** (4.06e-07)	1.08e-05*** (4.42e-07)	1.06e-05*** (4.64e-07)	9.80e-06*** (3.63e-07)	1.05e-05*** (5.48e-07)
Difference in log labour forces	1.318***	1.340***	1.309***	1.396***	1.417***	1.454***	1.456***	1.476***	1.477***	1.501***	1.531***	1.469***
	(0.0340)	(0.0307)	(0.0288)	(0.0334)	(0.0360)	(0.0378)	(0.0369)	(0.0416)	(0.0416)	(0.0599)	(0.0669)	(0.0468)
Differences in log average earnings in the place of residence and work	-2.314*** (0.490)	-0.675* (0.372)	-0.557 (0.436)	-0.202 (0.368)	-0.833** (0.331)	-1.031*** (0.327)	-0.887*** (0.300)	-1.048*** (0.296)	-0.741** (0.296)	0.235 (0.420)	0.458 (0.458)	0.226 (0.359)
The proportion of unemployed	-2.037*** (0.303)	-2.620*** (0.323)	-2.259*** (0.332)	-1.972*** (0.353)	-2.165*** (0.379)	-2.301*** (0.385)	-2.537*** (0.409)	-3.304*** (0.454)	-2.281*** (0.509)	-2.548*** (0.550)	-3.288*** (0.628)	-3.100*** (0.662)
University	0.447*** (0.0504)	0.542*** (0.0488)	0.462*** (0.0484)	0.163*** (0.0505)	0.0980* (0.0504)	0.0818 (0.0524)	-0.0566 (0.0548)	-0.0772 (0.0556)	-0.248*** (0.0611)	-0.188*** (0.0626)	-0.133** (0.0668)	-0.263*** (0.0746)
Diff in Labour force * Diff	2.455*** (0.139)	2.158*** (0.0678)	2.143*** (0.171)	2.414*** (0.0968)	2.447*** (0.0886)	2.411*** (0.0826)	2.458*** (0.0881)	2.324*** (0.110)	2.311*** (0.113)	1.779*** (0.262)	1.966*** (0.312)	2.372*** (0.0950)
Diff in log average earnings*University	1.370 (0.896)	1.952*** (0.694)	3.908*** (0.732)	5.095*** (0.835)	5.577*** (0.858)	5.972*** (0.888)	6.238*** (0.876)	5.929*** (0.891)	5.452*** (0.961)	4.458*** (1.147)	2.503** (1.104)	4.592*** (1.453)
Diff in Labour force * Labour force	-1.55e-05*** (4.96e-07)	-1.60e-05*** (4.86e-07)	-1.54e-05*** (3.46e-07)	-1.55e-05*** (3.16e-07)	-1.53e-05*** (3.08e-07)	-1.53e-05*** (3.15e-07)	-1.54e-05*** (3.24e-07)	-1.57e-05*** (3.76e-07)	-1.56e-05*** (3.91e-07)	-1.53e-05*** (4.12e-07)	-1.45e-05*** (3.22e-07)	-1.51e-05*** (4.85e-07)
Constant	-1.413*** (0.316)	-1.365*** (0.484)	-1.654*** (0.488)	-1.706*** (0.520)	-5.863*** (1.097)	-1.290** (0.573)	-0.972 (0.625)	-0.485 (0.506)	-1.642*** (0.601)	-1.555*** (0.598)	-1.319** (0.628)	-1.535** (0.659)
athrho	0.00791 (0.0197)	0.00874 (0.0182)	-0.0314 (0.0206)	0.00487 (0.0166)	-0.0248 (0.0193)	-0.0173 (0.0176)	-0.0116 (0.0190)	-0.00597 (0.0199)	-0.0283 (0.0225)	-0.0272 (0.0249)	0.0187 (0.0253)	-0.0225 (0.0304)
lnsigma	-1.757*** (0.0240)	-1.673*** (0.0214)	-1.650*** (0.0208)	-1.601*** (0.0194)	-1.558*** (0.0181)	-1.444*** (0.0155)	-1.354*** (0.0137)	-1.244*** (0.0120)	-1.144*** (0.0106)	-1.089*** (0.0101)	-1.057*** (0.0100)	-1.045*** (0.0103)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 16 Night-time sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0202** (0.00991)	0.0252** (0.0121)	0.0714*** (0.0163)	0.0920*** (0.0159)	0.0986*** (0.0172)	0.110*** (0.0180)	0.171*** (0.0222)	0.146*** (0.0249)	0.106*** (0.0270)	0.0644** (0.0259)	0.0808*** (0.0293)	0.0330 (0.0329)
Difference in TFR	-0.00308 (0.0115)	0.00414 (0.0131)	0.0290** (0.0143)	0.0327** (0.0135)	0.0235 (0.0170)	0.0418** (0.0163)	0.0782*** (0.0203)	0.0147 (0.0219)	-0.0381 (0.0252)	-0.0166 (0.0249)	-0.0326 (0.0314)	-0.00135 (0.0329)
Secondary education	-0.0607*** (0.00843)	-0.0663*** (0.00922)	-0.0502*** (0.00903)	-0.0306*** (0.00847)	-0.0218*** (0.00840)	-0.0275*** (0.00943)	-0.0166 (0.0117)	-0.00315 (0.0126)	0.00444 (0.0139)	0.0136 (0.0141)	-0.0119 (0.0153)	0.00696 (0.0145)
Tertiary education	-0.0524*** (0.0166)	-0.0567*** (0.0162)	-0.0602*** (0.0124)	-0.0275** (0.0109)	-0.0335*** (0.00946)	-0.0387*** (0.0103)	-0.0390*** (0.0117)	-0.0280** (0.0126)	-0.00646 (0.0140)	0.0146 (0.0140)	0.0210 (0.0155)	0.0476*** (0.0148)
Relative individual income	0.0249*** (0.00573)	0.0284*** (0.00488)	0.0368*** (0.00457)	0.0297*** (0.00439)	0.0292*** (0.00395)	0.0363*** (0.00409)	0.0288*** (0.00389)	0.0334*** (0.00682)	0.0395*** (0.00528)	0.0601*** (0.00587)	0.0599*** (0.00623)	0.0545*** (0.00682)
Night-time sex ratio	-0.154 (0.215)	-0.0314 (0.203)	-0.249 (0.199)	-0.180 (0.182)	-0.369* (0.198)	-0.0409 (0.230)	0.223 (0.257)	-0.418 (0.294)	-0.674* (0.361)	0.554 (0.374)	-0.905** (0.410)	-0.0408 (0.472)
Differences in night-time sex ratio in the place of	-0.115 (0.121)	-0.0986 (0.119)	-0.211* (0.113)	-0.172 (0.106)	-0.261** (0.113)	-0.245* (0.130)	-0.116 (0.143)	-0.421** (0.166)	-0.569*** (0.201)	0.0998 (0.205)	-0.654*** (0.228)	-0.0370 (0.259)
Differences in log average earnings in the place of residence and work	0.0264 (0.0193)	0.0130 (0.0177)	0.0404* (0.0213)	0.0232 (0.0205)	0.0415** (0.0189)	-0.00437 (0.0183)	-0.000233 (0.0226)	0.00746 (0.0249)	0.0404 (0.0320)	0.0230 (0.0384)	0.00371 (0.0420)	-0.0701 (0.0435)
Commuter	-0.00129 (0.00428)	-0.00314 (0.00445)	-0.000515 (0.00478)	-0.0142*** (0.00409)	-0.00235 (0.00452)	-0.00826* (0.00466)	-0.00956* (0.00506)	-0.00526 (0.00612)	0.00943 (0.00705)	0.0199** (0.00807)	0.0152* (0.00863)	0.0194** (0.00970)
Constant	0.190 (0.218)	0.0680 (0.207)	0.197 (0.202)	0.0953 (0.185)	0.268 (0.202)	-0.0707 (0.232)	-0.419 (0.258)	0.257 (0.297)	0.563 (0.363)	-0.623* (0.374)	0.821** (0.412)	0.0369 (0.474)
Commuter equation												
Secondary education	0.0505 (0.0622)	0.0473 (0.0646)	0.149** (0.0702)	0.147** (0.0731)	0.205*** (0.0725)	0.108 (0.0712)	0.0953 (0.0855)	0.134 (0.0872)	0.105 (0.0974)	0.115 (0.0997)	0.282*** (0.106)	0.450*** (0.122)
Tertiary education	0.424*** (0.156)	0.131 (0.138)	0.240** (0.112)	0.340*** (0.0925)	0.416*** (0.0834)	0.300*** (0.0784)	0.381*** (0.0863)	0.423*** (0.0876)	0.452*** (0.0971)	0.439*** (0.0998)	0.619*** (0.106)	0.827*** (0.123)
Labour force	1.04e-05*** (4.38e-07)	1.04e-05*** (4.37e-07)	9.96e-06*** (3.22e-07)	1.06e-05*** (3.23e-07)	1.04e-05*** (3.30e-07)	1.03e-05*** (3.48e-07)	1.05e-05*** (3.62e-07)	1.07e-05*** (4.06e-07)	1.08e-05*** (4.42e-07)	1.06e-05*** (4.64e-07)	9.80e-06*** (3.63e-07)	1.05e-05*** (5.48e-07)
Difference in log labour forces	1.317*** (0.0340)	1.340*** (0.0308)	1.309*** (0.0288)	1.396*** (0.0334)	1.417*** (0.0360)	1.454*** (0.0378)	1.455*** (0.0369)	1.477*** (0.0417)	1.477*** (0.0416)	1.501*** (0.0599)	1.531*** (0.0669)	1.470*** (0.0468)
Differences in log average earnings in the place of residence and work	-2.315***	-0.675*	-0.558	-0.202	-0.833**	-1.032***	-0.886***	-1.048***	-0.741**	0.235	0.458	0.225

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	(0.490)	(0.372)	(0.435)	(0.368)	(0.331)	(0.327)	(0.300)	(0.296)	(0.296)	(0.419)	(0.458)	(0.359)
The proportion of unemployed	-2.036*** (0.303)	-2.619*** (0.323)	-2.263*** (0.332)	-1.972*** (0.353)	-2.170*** (0.379)	-2.309*** (0.385)	-2.545*** (0.409)	-3.306*** (0.454)	-2.285*** (0.509)	-2.559*** (0.551)	-3.284*** (0.628)	-3.096*** (0.662)
University	0.447*** (0.0504)	0.542*** (0.0488)	0.461*** (0.0484)	0.163*** (0.0505)	0.0972* (0.0504)	0.0800 (0.0524)	-0.0576 (0.0547)	-0.0773 (0.0556)	-0.248*** (0.0611)	-0.189*** (0.0626)	-0.133** (0.0667)	-0.264*** (0.0746)
Diff in Labour force * Diff in Log average earnings	2.456*** (0.139)	2.158*** (0.0678)	2.144*** (0.171)	2.414*** (0.0968)	2.447*** (0.0886)	2.411*** (0.0825)	2.457*** (0.0881)	2.324*** (0.110)	2.311*** (0.113)	1.779*** (0.262)	1.965*** (0.312)	2.372*** (0.0950)
Diff in log average earnings*University	1.371 (0.896)	1.950*** (0.694)	3.910*** (0.732)	5.096*** (0.835)	5.576*** (0.858)	5.973*** (0.888)	6.240*** (0.876)	5.926*** (0.891)	5.456*** (0.962)	4.461*** (1.147)	2.503** (1.103)	4.599*** (1.453)
Diff in Labour force * Labour force	-1.55e-05*** (4.96e-07)	-1.60e-05*** (4.86e-07)	-1.54e-05*** (3.46e-07)	-1.55e-05*** (3.16e-07)	-1.53e-05*** (3.08e-07)	-1.53e-05*** (3.15e-07)	-1.54e-05*** (3.23e-07)	-1.57e-05*** (3.76e-07)	-1.56e-05*** (3.91e-07)	-1.53e-05*** (4.12e-07)	-1.45e-05*** (3.22e-07)	-1.51e-05*** (4.86e-07)
Constant	-1.414*** (0.316)	-1.362*** (0.483)	-1.653*** (0.488)	-1.707*** (0.520)	-5.861 (0.572)	-1.281** (0.572)	-0.968 (0.624)	-0.486 (0.506)	-1.640*** (0.601)	-1.549*** (0.598)	-1.323** (0.628)	-1.537** (0.660)
athrho	0.00510 (0.0203)	0.00133 (0.0191)	-0.0353* (0.0211)	-0.00104 (0.0168)	-0.0270 (0.0192)	-0.0240 (0.0179)	-0.0179 (0.0190)	-0.0102 (0.0200)	-0.0292 (0.0224)	-0.0295 (0.0248)	0.0222 (0.0250)	-0.0186 (0.0299)
lnsigma	-1.757*** (0.0240)	-1.673*** (0.0214)	-1.651*** (0.0208)	-1.601*** (0.0194)	-1.558*** (0.0181)	-1.445*** (0.0155)	-1.355*** (0.0137)	-1.245*** (0.0119)	-1.145*** (0.0106)	-1.090*** (0.0101)	-1.058*** (0.0100)	-1.044*** (0.0103)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 17 Adjusted sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0187*	0.0271**	0.0762***	0.0898***	0.0972***	0.110***	0.137***	0.125***	0.0998***	0.0561**	0.0584**	0.00906
	(0.0104)	(0.0122)	(0.0155)	(0.0164)	(0.0183)	(0.0194)	(0.0250)	(0.0256)	(0.0284)	(0.0274)	(0.0298)	(0.0338)
Difference in TFR	-0.00236	0.0161	0.0331**	0.0403***	0.0223	0.0511***	0.0707***	0.0125	-0.0205	-0.0229	-0.0106	-0.0290
	(0.0109)	(0.0129)	(0.0141)	(0.0135)	(0.0175)	(0.0178)	(0.0225)	(0.0219)	(0.0267)	(0.0263)	(0.0322)	(0.0353)
Secondary education	-0.0608***	-0.0663***	-0.0503***	-0.0307***	-0.0217***	-0.0270***	-0.0157	-0.00344	0.00415	0.0129	-0.0109	0.00704
	(0.00844)	(0.00920)	(0.00902)	(0.00847)	(0.00840)	(0.00943)	(0.0117)	(0.0126)	(0.0139)	(0.0141)	(0.0154)	(0.0145)
Tertiary education	-0.0522***	-0.0566***	-0.0598***	-0.0279**	-0.0334***	-0.0386***	-0.0386***	-0.0283**	-0.00748	0.0132	0.0224	0.0490***
	(0.0167)	(0.0162)	(0.0124)	(0.0109)	(0.00946)	(0.0103)	(0.0117)	(0.0126)	(0.0140)	(0.0141)	(0.0155)	(0.0148)
Relative individual income	0.0253***	0.0293***	0.0374***	0.0304***	0.0299***	0.0379***	0.0302***	0.0342***	0.0409***	0.0612***	0.0609***	0.0549***
	(0.00571)	(0.00490)	(0.00459)	(0.00443)	(0.00399)	(0.00412)	(0.00393)	(0.00700)	(0.00529)	(0.00586)	(0.00623)	(0.00680)
Adjusted sex ratio	-0.0107	-0.0155**	-0.0146**	-0.0204***	-0.0111	-0.0305***	-0.0504***	-0.0470***	-0.0310***	-0.0285**	-0.0578***	-0.0311**
	(0.00745)	(0.00771)	(0.00657)	(0.00732)	(0.00692)	(0.00807)	(0.00818)	(0.00887)	(0.0106)	(0.0115)	(0.0118)	(0.0143)
Differences in adjusted sex ratio in the place of residence and work	-0.00885	0.00680	-0.0149*	-0.000508	-0.0128*	-0.00934	-0.0194***	-0.0263***	0.00258	-0.0186*	-7.12e-05	-0.0316**
	(0.00764)	(0.00773)	(0.00762)	(0.00731)	(0.00687)	(0.00838)	(0.00696)	(0.00722)	(0.00916)	(0.00992)	(0.0111)	(0.0133)
Differences in log average earnings in the place of residence and work	0.0245	0.00376	0.0382*	0.0115	0.0332*	-0.0115	-0.00363	-0.0125	0.0107	0.0360	-0.0390	-0.0689*
	(0.0198)	(0.0178)	(0.0215)	(0.0198)	(0.0180)	(0.0178)	(0.0216)	(0.0234)	(0.0300)	(0.0358)	(0.0399)	(0.0415)
Commuter	-0.00104	-0.00396	-0.000901	-0.0138***	-0.00231	-0.00769	-0.00317	0.00321	0.0126*	0.0243***	0.0247***	0.0261**
	(0.00424)	(0.00442)	(0.00458)	(0.00418)	(0.00470)	(0.00483)	(0.00544)	(0.00653)	(0.00757)	(0.00855)	(0.00903)	(0.0102)
Constant	0.0452**	0.0434*	-0.0495*	-0.0689***	-0.0907***	-0.0857***	-0.110***	-0.0955**	-0.0754	-0.0310	-0.0103	0.0532
	(0.0225)	(0.0238)	(0.0266)	(0.0262)	(0.0295)	(0.0313)	(0.0407)	(0.0435)	(0.0506)	(0.0505)	(0.0573)	(0.0647)
Commuter equation												
Secondary education	0.0503	0.0473	0.149**	0.147**	0.205***	0.108	0.0953	0.134	0.104	0.115	0.283***	0.450***
	(0.0622)	(0.0646)	(0.0702)	(0.0731)	(0.0725)	(0.0712)	(0.0855)	(0.0872)	(0.0974)	(0.0997)	(0.106)	(0.122)
Tertiary education	0.424***	0.131	0.241**	0.340***	0.416***	0.300***	0.381***	0.423***	0.451***	0.439***	0.620***	0.827***
	(0.156)	(0.138)	(0.112)	(0.0925)	(0.0834)	(0.0784)	(0.0863)	(0.0876)	(0.0971)	(0.0998)	(0.106)	(0.123)
Labour force	1.04e-05***	1.04e-05***	9.96e-06***	1.06e-05***	1.04e-05***	1.02e-05***	1.05e-05***	1.07e-05***	1.08e-05***	1.06e-05***	9.80e-06***	1.05e-05***
	(4.38e-07)	(4.37e-07)	(3.22e-07)	(3.23e-07)	(3.30e-07)	(3.48e-07)	(3.62e-07)	(4.06e-07)	(4.42e-07)	(4.64e-07)	(3.63e-07)	(5.48e-07)
Difference in log labour forces	1.318***	1.340***	1.309***	1.396***	1.417***	1.454***	1.455***	1.477***	1.477***	1.501***	1.531***	1.470***
	(0.0340)	(0.0308)	(0.0288)	(0.0334)	(0.0360)	(0.0378)	(0.0369)	(0.0417)	(0.0416)	(0.0599)	(0.0669)	(0.0468)
Differences in log average	-2.313***	-0.675*	-0.559	-0.202	-0.833**	-1.031***	-0.886***	-1.047***	-0.742**	0.234	0.458	0.225

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
earnings in the place of residence and work	(0.490)	(0.372)	(0.436)	(0.368)	(0.331)	(0.327)	(0.300)	(0.296)	(0.295)	(0.419)	(0.458)	(0.359)
The proportion of unemployed	-2.037*** (0.303)	-2.619*** (0.323)	-2.262*** (0.332)	-1.972*** (0.353)	-2.170*** (0.379)	-2.303*** (0.385)	-2.539*** (0.409)	-3.303*** (0.454)	-2.269*** (0.509)	-2.551*** (0.551)	-3.297*** (0.628)	-3.096*** (0.662)
University	0.447*** (0.0504)	0.542*** (0.0488)	0.462*** (0.0484)	0.163*** (0.0505)	0.0975* (0.0504)	0.0802 (0.0523)	-0.0584 (0.0547)	-0.0776 (0.0556)	-0.249*** (0.0611)	-0.189*** (0.0625)	-0.131** (0.0667)	-0.264*** (0.0746)
Diff in Labour force * Diff in Log average earnings	2.455*** (0.139)	2.158*** (0.0678)	2.143*** (0.171)	2.414*** (0.0968)	2.447*** (0.0886)	2.411*** (0.0825)	2.457*** (0.0881)	2.324*** (0.110)	2.311*** (0.113)	1.779*** (0.262)	1.966*** (0.312)	2.372*** (0.0950)
Diff in log average earnings*University	1.368 (0.896)	1.949*** (0.694)	3.912*** (0.732)	5.096*** (0.835)	5.580*** (0.858)	5.969*** (0.888)	6.240*** (0.876)	5.926*** (0.890)	5.453*** (0.961)	4.462*** (1.147)	2.499** (1.104)	4.603*** (1.454)
Diff in Labour force * Labour force	-1.55e-05*** (4.96e-07)	-1.60e-05*** (4.86e-07)	-1.54e-05*** (3.46e-07)	-1.55e-05*** (3.16e-07)	-1.53e-05*** (3.08e-07)	-1.53e-05*** (3.15e-07)	-1.54e-05*** (3.23e-07)	-1.57e-05*** (3.76e-07)	-1.56e-05*** (3.91e-07)	-1.53e-05*** (4.12e-07)	-1.45e-05*** (3.22e-07)	-1.51e-05*** (4.86e-07)
Constant	-1.413*** (0.316)	-1.361*** (0.483)	-1.651*** (0.488)	-1.707*** (0.520)	-5.863*** (0.691)	-1.287** (0.573)	-0.973 (0.624)	-0.489 (0.506)	-1.653*** (0.601)	-1.555*** (0.598)	-1.313** (0.627)	-1.538** (0.660)
athrho	0.00954 (0.0202)	0.000959 (0.0193)	-0.0277 (0.0202)	-0.000691 (0.0168)	-0.0220 (0.0190)	-0.0203 (0.0179)	-0.0197 (0.0192)	-0.0121 (0.0201)	-0.0352 (0.0227)	-0.0298 (0.0250)	0.0110 (0.0256)	-0.0169 (0.0300)
lnsigma	-1.757*** (0.0240)	-1.673*** (0.0214)	-1.651*** (0.0208)	-1.601*** (0.0194)	-1.558*** (0.0181)	-1.444*** (0.0155)	-1.355*** (0.0137)	-1.245*** (0.0119)	-1.145*** (0.0106)	-1.090*** (0.0101)	-1.059*** (0.0100)	-1.045*** (0.0103)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Appendix 6 Probit model⁷

Table 18 Day-time sex ratio is included

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0335*** (0.00909)	0.0687*** (0.0110)	0.0752*** (0.0105)	0.0831*** (0.0128)	0.110*** (0.0138)	0.164*** (0.0172)	0.147*** (0.0186)	0.116*** (0.0225)	0.0739*** (0.0243)	0.0815*** (0.0282)	0.0367 (0.0326)	0.0335*** (0.00909)
Difference in TFR	0.00889 (0.0101)	0.0275** (0.0125)	0.0212* (0.0121)	0.0206 (0.0141)	0.0394*** (0.0146)	0.0748*** (0.0182)	0.0248 (0.0198)	-0.0280 (0.0237)	-0.00894 (0.0236)	-0.0151 (0.0287)	-0.00357 (0.0307)	0.00889 (0.0101)
Secondary education	-0.0660*** (0.00909)	-0.0487*** (0.00859)	-0.0283*** (0.00775)	-0.0209*** (0.00739)	-0.0252*** (0.00815)	-0.0144 (0.00926)	-0.00398 (0.0112)	0.00383 (0.0140)	0.0125 (0.0160)	-0.0125 (0.0166)	0.0106 (0.0185)	-0.0660*** (0.00909)
Tertiary education	-0.0229*** (0.00437)	-0.0261*** (0.00346)	-0.0176*** (0.00523)	-0.0235*** (0.00511)	-0.0290*** (0.00606)	-0.0368*** (0.00923)	-0.0289** (0.0114)	-0.00792 (0.0141)	0.0120 (0.0159)	0.0193 (0.0166)	0.0510*** (0.0181)	-0.0229*** (0.00437)
Relative individual income	0.0265*** (0.00413)	0.0317*** (0.00370)	0.0267*** (0.00380)	0.0274*** (0.00385)	0.0357*** (0.00419)	0.0303*** (0.00431)	0.0286*** (0.00388)	0.0407*** (0.00556)	0.0618*** (0.00631)	0.0601*** (0.00655)	0.0521*** (0.00672)	0.0265*** (0.00413)
Day-time sex ratio	0.0197 (0.0275)	0.0489* (0.0279)	0.0591** (0.0295)	0.0627** (0.0316)	0.0990*** (0.0360)	0.0632 (0.0431)	-0.0110 (0.0481)	0.0367 (0.0549)	0.0605 (0.0622)	0.0852 (0.0672)	-0.00870 (0.0756)	0.0197 (0.0275)
Differences in day-time sex ratio in the place of residence and work	-0.0669** (0.0323)	0.0199 (0.0317)	-0.0322 (0.0357)	0.0185 (0.0348)	-0.0346 (0.0393)	-0.0341 (0.0464)	-0.00793 (0.0521)	0.0406 (0.0589)	0.00237 (0.0640)	0.0960 (0.0715)	0.0958 (0.0762)	-0.0669** (0.0323)
Differences in log average earnings in the place of residence	-0.00656 (0.0216)	0.0421* (0.0225)	0.0118 (0.0230)	0.0337 (0.0214)	-0.0194 (0.0239)	-0.00613 (0.0254)	-0.00467 (0.0270)	0.0196 (0.0308)	0.0319 (0.0364)	-0.00993 (0.0423)	-0.0359 (0.0461)	-0.00656 (0.0216)
Commuter	-0.00531 (0.00345)	-0.00604* (0.00338)	-0.0137*** (0.00348)	-0.00600 (0.00369)	-0.0128*** (0.00399)	-0.0122*** (0.00443)	-0.00812 (0.00523)	0.00140 (0.00608)	0.0125* (0.00686)	0.0188** (0.00752)	0.0158* (0.00809)	-0.00531 (0.00345)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Note: 1) Primary education is the reference. 2) Relative individual income is the ration of individual earnings to the average taxable incomes in municipality. 3) Relocation is considered as dummy (1=yes) if a woman moved at the considered year. 4) Here and further age is shown for the time of first birth. 5) Standard errors in parentheses. 6) *** p<0.01, ** p<0.05, * p<0.1

Table 19 Night-time sex ratio is included

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0237** (0.0103)	0.0610*** (0.0125)	0.0721*** (0.0114)	0.0830*** (0.0130)	0.0944*** (0.0142)	0.145*** (0.0175)	0.124*** (0.0194)	0.0950*** (0.0230)	0.0659*** (0.0237)	0.0762*** (0.0277)	0.0347 (0.0325)	0.0237** (0.0103)
Difference in TFR	0.00205 (0.0115)	0.0176 (0.0139)	0.0204 (0.0126)	0.0157 (0.0144)	0.0296** (0.0148)	0.0638*** (0.0184)	0.00661 (0.0202)	-0.0403* (0.0239)	-0.0147 (0.0234)	-0.0223 (0.0285)	-0.00134 (0.0306)	0.00205 (0.0115)
Secondary education	-0.0669*** (0.00915)	-0.0490*** (0.00862)	-0.0287*** (0.00781)	-0.0216*** (0.00743)	-0.0261*** (0.00819)	-0.0151 (0.00924)	-0.00398 (0.0112)	0.00360 (0.0140)	0.0130 (0.0160)	-0.0128 (0.0166)	0.0104 (0.0185)	-0.0669*** (0.00915)
Tertiary education	-0.0228*** (0.00440)	-0.0263*** (0.00341)	-0.0177*** (0.00525)	-0.0241*** (0.00503)	-0.0293*** (0.00602)	-0.0373*** (0.00920)	-0.0281** (0.0114)	-0.00772 (0.0141)	0.0131 (0.0158)	0.0188 (0.0166)	0.0505*** (0.0181)	-0.0228*** (0.00440)
Relative individual income	0.0259*** (0.00414)	0.0318*** (0.00369)	0.0270*** (0.00380)	0.0277*** (0.00384)	0.0348*** (0.00417)	0.0288*** (0.00429)	0.0277*** (0.00387)	0.0396*** (0.00555)	0.0611*** (0.00629)	0.0597*** (0.00654)	0.0524*** (0.00672)	0.0259*** (0.00414)
Night-time sex ratio	-0.0413 (0.198)	-0.257 (0.206)	-0.205 (0.224)	-0.367* (0.201)	-0.0353 (0.220)	0.228 (0.258)	-0.389 (0.296)	-0.643* (0.340)	0.505 (0.352)	-0.781** (0.380)	-0.0278 (0.450)	-0.0413 (0.198)
Differences in night-time sex ratio in the place of residence and	-0.0891 (0.110)	-0.188* (0.114)	-0.159 (0.123)	-0.240** (0.110)	-0.194 (0.122)	-0.0616 (0.143)	-0.387** (0.164)	-0.538*** (0.187)	0.0852 (0.196)	-0.582*** (0.209)	-0.0269 (0.247)	-0.0891 (0.110)
Differences in log average earnings in the place of residence and work	0.0127 (0.0202)	0.0457** (0.0220)	0.0266 (0.0225)	0.0436** (0.0211)	-0.00213 (0.0234)	-0.000300 (0.0245)	0.00739 (0.0266)	0.0361 (0.0305)	0.0227 (0.0346)	-0.00321 (0.0395)	-0.0640 (0.0438)	0.0127 (0.0202)
Commuter	-0.00305 (0.00355)	-0.00482 (0.00349)	-0.0121*** (0.00358)	-0.00525 (0.00375)	-0.00924** (0.00409)	-0.00911** (0.00453)	-0.00457 (0.00535)	0.00439 (0.00619)	0.0146** (0.00691)	0.0190** (0.00756)	0.0162** (0.00810)	-0.00305 (0.00355)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Table 20 Adjusted sex ratio is included

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	21 years old	22 years old	23 years old	24 years old	25 years old	26 years old	27 years old	28 years old	29 years old	30 years old	31 years old	32 years old
TFR	0.0217** (0.0109)	0.0592*** (0.0122)	0.0662*** (0.0112)	0.0791*** (0.0140)	0.0884*** (0.0155)	0.107*** (0.0191)	0.101*** (0.0202)	0.0897*** (0.0242)	0.0581** (0.0250)	0.0544* (0.0284)	0.0102 (0.0337)	0.0217** (0.0109)
Difference in TFR	0.0128 (0.0112)	0.0191 (0.0132)	0.0275** (0.0125)	0.0124 (0.0151)	0.0359** (0.0163)	0.0520*** (0.0201)	0.00285 (0.0201)	-0.0224 (0.0249)	-0.0202 (0.0243)	-0.00235 (0.0293)	-0.0285 (0.0325)	0.0128 (0.0112)
Secondary education	-0.0672*** (0.00916)	-0.0495*** (0.00864)	-0.0295*** (0.00782)	-0.0214*** (0.00742)	-0.0260*** (0.00818)	-0.0146 (0.00914)	-0.00386 (0.0112)	0.00356 (0.0140)	0.0120 (0.0160)	-0.0118 (0.0165)	0.0102 (0.0185)	-0.0672*** (0.00916)
Tertiary education	-0.0229*** (0.00432)	-0.0261*** (0.00342)	-0.0182*** (0.00510)	-0.0241*** (0.00504)	-0.0297*** (0.00599)	-0.0369*** (0.00910)	-0.0278** (0.0114)	-0.00848 (0.0141)	0.0114 (0.0158)	0.0205 (0.0166)	0.0515*** (0.0181)	-0.0229*** (0.00432)
Relative individual income	0.0263*** (0.00410)	0.0321*** (0.00367)	0.0271*** (0.00376)	0.0283*** (0.00381)	0.0364*** (0.00416)	0.0299*** (0.00424)	0.0280*** (0.00385)	0.0409*** (0.00554)	0.0623*** (0.00628)	0.0603*** (0.00652)	0.0528*** (0.00670)	0.0263*** (0.00410)
Adjusted sex ratio	-0.0193** (0.00824)	-0.0169** (0.00760)	-0.0241*** (0.00763)	-0.0122 (0.00766)	-0.0340*** (0.00862)	-0.0587*** (0.00904)	-0.0503*** (0.00938)	-0.0327*** (0.0105)	-0.0282** (0.0115)	-0.0621*** (0.0131)	-0.0310** (0.0142)	-0.0193** (0.00824)
Differences in adjusted sex ratio in the place of residence and work	0.00826 (0.00798)	-0.0173** (0.00789)	0.00214 (0.00821)	-0.0149* (0.00810)	-0.0105 (0.00879)	-0.0230** (0.00901)	-0.0291*** (0.00826)	0.00339 (0.00863)	-0.0190** (0.00966)	0.000171 (0.0107)	-0.0312** (0.0131)	0.00826 (0.00798)
Differences in log average earnings in the place of residence and work	0.00241 (0.0206)	0.0437** (0.0219)	0.0116 (0.0222)	0.0361* (0.0207)	-0.0108 (0.0226)	-0.00384 (0.0236)	-0.0105 (0.0253)	0.00507 (0.0285)	0.0339 (0.0329)	-0.0432 (0.0377)	-0.0627 (0.0417)	0.00241 (0.0206)
Commuter	-0.00411 (0.00368)	-0.00323 (0.00365)	-0.0113*** (0.00373)	-0.00404 (0.00393)	-0.00783* (0.00434)	-0.00251 (0.00484)	0.00364 (0.00576)	0.00614 (0.00665)	0.0190** (0.00745)	0.0264*** (0.00810)	0.0232*** (0.00862)	-0.00411 (0.00368)
Observations	12,358	12,800	12,751	13,181	13,661	13,944	14,000	13,575	12,650	11,416	10,161	9,155

Appendix 7

Table 21 Testing instruments

IV estimation		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Endogeneity	Durbin test	0.011	0.011	0.812	0.925	0.904	0.922	0.637	0.759
value									
P-value		0.918	0.918	0.368	0.336	0.342	0.337	0.425	0.384
Endogeneity	Wu test	0.011	0.011	0.811	0.924	0.903	0.921	0.636	0.758
value									
p-value		0.918	0.918	0.368	0.336	0.342	0.337	0.425	0.384
Overidentification	Sargan	0.469	0.469	2.465	2.831	2.852	3.456	3.968	11.590
test value									
p-value		0.494	0.494	0.292	0.418	0.583	0.485	0.554	0.562
Overidentification		0.468	0.468	2.463	2.828	2.850	3.454	3.964	11.579
Basmann test value									
p-value		0.494	0.494	0.292	0.419	0.583	0.485	0.555	0.562

Instruments in specifications:

- 1) Labour market size.
- 2) Labour market size, difference in the labour market size between places of residence and work.
- 3) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work.
- 4) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work, the proportion of not employed in the place of residences.
- 5) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work, the proportion of not employed in the place of residence, presence of university in the place of residence.
- 6) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work, the proportion of not employed in the place of residence, presence of university in the place of residence, interaction between difference in incomes and presence of university in the place of residence.
- 7) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work, the proportion of not employed in the place of residence, presence of university in the place of residence, interaction between difference in incomes and presence of university in the place of residence, interaction between labour market size and difference in labour market sizes.
- 8) Labour market size, difference in the labour market size between places of residence and work, difference in log incomes between places of residence and work, the proportion of not employed in the place of residence, presence of university in the place of residence, interaction between difference in incomes and presence of university in the place of residence, interaction between labour market size and difference in labour market sizes, categorical variables for counties.