BANK OF ENGLAND

Staff Working Paper No. 873

On-the-job training and intra-family dynamics

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June 2020

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Tommaso Aquilante,[1] Luca Livio[2] and Tom Potoms[3]

Abstract

This paper shows that marital status and gender crucially impact whether individuals receive certain types of on-the-job training. Using data from the British Household Panel Survey, we show robust evidence that when training is self-financed, married workers have significantly lower participation rates, whereas women have higher rates. The correlation between demographic characteristics and the likelihood of receiving employer-sponsored training is instead much weaker. We rationalize the relationship between training incidence and marital status with a simple two-period collective model of the household with limited commitment, where contemporaneous training decisions affect future bargaining power within the household. The core prediction of the model is confirmed empirically: the likelihood to participate in self-financed on-the-job training is negatively affected by higher levels of (a proxy for) intra-household bargaining power of the spouse of the individual. The results suggest there is scope for policy to increase workers' training participation rates by targeting individuals with weaker bargaining power within the household.

Key words: Self-financed on-the-job training, intra-household bargaining, human capital formation, Nash bargaining.

JEL classification: J12, J16, J24, D15.

(1) Bank of England. Email: tommaso.aquilante@bankofengland.co.uk
(2) ECARES-ULB. Email: luca.livio85@gmail.com
(3) University of Sussex. Email: t.potoms@sussex.ac.uk

The views expressed are those of the authors and do not reflect those of the Bank of England or members of the Monetary Policy Committee, Financial Policy Committee, Prudential Regulation Committee or McKinsey. We would like to thank an anonymous referee, Alessandro De Chiara, Bram De Rock, Thomas Demuynck, Paula Gobbi, Geert Dhaene, John van Reenen, Imran Rasul, seminar participants at ECARES and the ENTER Jamboree at Universidad Carlos III in Madrid for useful comments. All remaining errors are on us.

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Bank of England, Threadneedle Street, London, EC2R 8AH
Email enquiries@bankofengland.co.uk

ISSN 1749-9135 (on-line)

1 Introduction

Investments in human capital are widely recognized as an important source for economic growth on both the macro-economic level as well as a way to increase or sustain the earnings potential in the labour market on the micro level. Pioneering contributions in linking labour market participation and continued expanding of skills and human capital by on-the-job training date back to Becker (1962) and Mincer (1962).

An important distinction between schooling and on-the-job training is the fact that the latter are joint decisions between the firm and the worker. Both take their decisions based on expected returns and costs related to training courses, which are likely to be functions of the particular worker's characteristics. This is one important motivation to study the impact of socio-demographic characteristics on the incidence of firm-sponsored training, which is a key objective of this paper. To do this, we exploit the information regarding on-the-job training (OJT) present in the British Household Panel Survey (BHPS). In particular, this dataset provides both information on participation of individuals to (on-the-job) training courses, as well as the intensity of participation (in terms of duration of training.) Furthermore, there is also information regarding the source of financing, which we will exploit in the paper to differentiate between *employer-sponsored* and *self-financed* training.

We provide evidence for several empirical findings. First, when training is sponsored by the employer, demographic characteristics play a smaller role than when training is self-financed. The opposite is true for unobserved individual characteristics (e.g. productivity). In contrast, we do find evidence for demographic characteristics of individuals to matter in participation rates of self-financed OJT courses. In particular, women and singles seem to be more likely to partake in self-financed training. Interestingly, these results complement the analysis by Blundell et al. (2019), who show that women tend to increase their participation rates to (self-financed) OJT courses during post-motherhood, in order to (partially) offset the incurred losses due to childbirth. However, their analysis does not focus on differences in terms of training rates across marital status.

We highlight that marital status might be an important factor determining participation into self-financed OJT. Indeed, we show that being married lowers the training participation rate anywhere in the range of 1.2 to 1.7 percentage points. Interestingly, we also find some evidence that married individuals with children have a positive effect on the probability of participating to self-financed OJT.

In order to explain these findings, in the second part of the paper, we provide a simple theoretical framework which is able to explain the observed negative relationship between marital status and the participation likelihood to self-financed training courses. To be more precise, we borrow from the fundamental insight in the literature on family economics, in particular that a household is comprised of multiple decision makers with differing preferences over the allocation of the joint resources. The latter are then distributed in a two-period sequential bargaining model.

To be more precise, we will have one spouse who, in the first period, is considering to partake in a training course, which affects the future marital surplus *and* future distribution of this surplus among the household members (intra-household bargaining power). A particular feature of the model is that training decision is taken jointly in the first period, which implies that each spouse effectively obtains a veto power over the training choice. If training occurs, the spouse who received training will obtain an increase in his/her resources (income), whereas the other potentially incurs a loss, but the overall resources (joint surplus) is assumed to increase. Due to a lack in commitment and the resulting effects on individual resources, the intra-household bargaining power will change in the benefit of the spouse who participates in training. As a result of this, the other spouse faces a clear trade-of between a lower share of an increased marital surplus (in case (s)he allows training to occur) or a higher share of lower total resources (in case (s)he blocks the training to occur). In case the latter is larger than the former, the other spouse can block training to occur, resulting in a non-efficient training choice at the household level.

More importantly, this simple model shows how the decision process within the household might impede on OJT choices of its members. Hence, our simple model can explain the observed negative correlation between being married and the likelihood to participate in training courses. Furthermore, the same model can be slightly modified and extended to incorporate children and we show that this extension can explain the findings regarding the interaction between marriage and number of dependent children on training incidence.

Finally, in the last part of the paper, we study one of the testable implications of our simple model, namely that if a spouse has a higher initial intra-household bargaining then (s)he will be more likely to participate in OJT. To test this, we construct a measure of intra-household bargaining power through the use of relative potential wages. To be more precise, for each observed (married or cohabiting) individual, we divide the potential wage of his/her spouse by the sum of the potential wages for both spouses. Our use of relative potential wages can be reinterpreted as an instrumental variables

(IV) estimation in which we correct for endogeneity in observed relative wages by a central measure of the wage distribution for workers with similar observable characteristics (based on gender, age and occupation). We then show that this measure of relative potential wages has a negative predicted effect on the likelihood to participate in self-financed training courses.

Our paper does not specifically address optimal policies through a fully fledged welfare analysis. However, by shedding light on the interaction between intra-household decision making and the incidence of (self-financed) OJT, our empirical findings can be useful for policy makers who want to encourage self-investment in human capital for particular types of workers, e.g. those with a discontinuous employment history. In that sense, our results can be used to complement those policy recommendations contained in Blundell et al. (2019) and point towards heterogeneous responses from policies aimed at stimulating OJT along the marital status dimension.

The outline for the remainder of the paper is as follows: Section 2 discusses the related literature. Section 3 provides a discussion of the dataset used in this paper, and some descriptive statistics. Section 4 contains the main empirical analysis where we study the relationship between the participation likelihood to both firm-sponsored and self-financed training courses and demographic characteristics. Furthermore, we subject our main empirical findings to an extensive list of robustness checks. Section 6 uses insights from the literature in family economics and show how bargaining within the household can be an impediment for married workers to self-finance training courses. We also test the testable restriction from our model that higher bargaining power for the spouse of the worker considering to participate in training negatively affects the likelihood to participate in (self-financed) training courses. Section 7 concludes the paper.

2 Literature

Most of the literature on OJT has focussed on how firms and workers share training costs. An important insight from this literature is that the way costs are shared is very much related to the specific nature/content of the training courses. Indeed, Becker (1964) explored cost sharing, where he made a distinction between *general* and *firm specific training*. General training skills can be easily transferred between firms, hence one would expect that in a competitive market workers will reap all benefits of such investments in general training, and therefore, firms will not share in the costs of

general training programs.

Obviously, the risk of providing (general) training to a worker is that the latter can quit post-training and that a competitor hires the trained worker. Therefore, a higher likelihood of poaching will lead to under-investment in training, which is socially suboptimal. In that sense, the presence of some rigidities (barriers to mobility) might provide the incentives of the firm to share in the costs of providing training to its workers. The idea that rigidities and labour market imperfections could rationalize the observed general training incidence has been formalized by Acemoglu and Pischke (1999), who discuss several mechanisms through which general training might become profitable for the firm.

Essentially, what is needed is some sort of non-competitive feature in the labour market. This has sparked an extensive theoretical and empirical literature on the link between the structure of the labour market and the incidence of training.[1]

In this paper we focus the relationship between training incidence and the individual's characteristics. There are several other papers that have looked at this topic. A robust finding among these papers is that younger and more educated workers are more likely to participate in training, see e.g. Altonji and Spletzer (1991); Greenhalgh and Stewart (1987); Leuven and Oosterbeek (1999); Pischke (2000).

With respect to gender, results are more mixed. Some studies show that women are less likely to follow training courses (see e.g. Bishop, 1997), whereas others find more training participation if the content of such training is not only job-related (e.g. Miller, 1994; Veum, 1993). Several mechanisms at work that might explain the participation likelihood. One possible reason is that women might hold jobs which require less training (e.g. jobs which are less capital intensive). This might be explained by the fact that firms are less likely to choose women for capital-intensive jobs, as turnover costs are higher for such jobs (Barron et al., 1993). There is other evidence for statistical discrimination against women of certain age categories in the literature, e.g. (Fitzenberger and Muehler, 2015) provide empirical evidence that a gender training gap is prevalent for all women within a particular childbearing age category. Further-

[1]The evidence on the link between market structure (of product and labour markets) and training incidence is mixed. Some papers, e.g. Autor (2001) and Bassanini and Brunello (2010) show a positive relationship between deregulation/competitive pressures and training incidence. In contrast, Brunello and Gambarotto (2007) and Brunello and Paola (2008) show that higher labour market density (i.e. higher likelihood of poaching) induces lower training incidence. An important aspect of Acemoglu and Pischke (1999) is *wage compression*, i.e. the fact that workers do not receive the full share of the increased productivity due to training, which implies that some share of the returns of training are reaped by the firm. Empirical studies using datasets from different countries have documented the extent of such wage compression, e.g. Dearden et al. (2006) and Konings and Vanormelingen (2015).

more, Puhani and Sonderhof (2011) analyzed the impact of an extension in maternity leave in Germany. They have shown a decrease in the number of courses offered to younger female workers, even when they are childless.

Others, like us, use the BHPS to study the incidence of training for UK workers. (Booth and Bryan, 2002) provide descriptive statistics on training incidence across the wage distribution of individuals and estimates the impact of received training on wages. They show that firm-sponsored training increases the wages of workers, both at current and future employers which they argue is consistent with the new training theory from Acemoglu and Pischke (1999) and Loewenstein and Spletzer (1998), in which the returns to training are 'compressed' compared to the productivity increase from training, thereby providing firms positive profits from sharing the costs of training courses offered to their workers.

The paper by Arulampalam et al. (2004) uses the BHPS to study the impact on training incidence from the introduction of the 'national minimum wage' (NMW) in April 1999. They use two treatment groups, one based on whether or not the respondent's wage is below the NMW in the 1998-wave of the BHPS and another based on self-reported wage increases due to the NMW. They show there is no evidence for a negative impact on training incidence from the NMW, and some evidence that it had a small positive effect. These results are then interpreted as evidence against the Beckerian-theory of OJT, which is based on fully competitive labour markets and absence of credit constraints. [2]

In an recent contribution, Blundell et al. (2019) combine training information from the BHPS with exogenous variation in both welfare and the tax system in a structural model of female labour supply, where individuals can choose to obtain (self-financed) OJT . They show that women tend to increase participation to (self-financed) OJT post-motherhood, in order to (partially) offset the earnings losses incurred during fertility episodes. Furthermore, they find the strongest effects among women who have finished high school but didn't attend college. Hence, from a welfare perspective the finding that higher educated women have higher training incidence might not be optimal, confirming the importance to study incidence of OJT training for specific groups of workers.

[2] In a Beckerian model, workers would fully fund training courses themselves, since all returns to training accrue to them. Therefore, given that workers would bear the costs of received training through lower wages during training, in a competitive labour market, the incidence of general training should be negatively affected by the NMW (given that the floor for wages is raised). Given that many respondents indicate that they consider the training followed as 'general skills', the authors interpret their findings as evidence in favor of the Acemoglu-Pischke theory of OJT.

An important limitation of many studies relating demographic characteristics to training participation is that they cannot distinguish between a case where these demographic characteristics induce employers to offer less training to workers having particular characteristics, from the one where the same workers are less likely to participate in training themselves. In the present paper, we specifically look at the relationship between demographic characteristics and participation in self-financed training courses, which allows us to capture the demand side for training courses of workers, i.e. which type of workers are more willing to share more in the costs to participate in training programs.

3 Data

Our source of data is the BHPS, which is a nationally representative micro-level panel dataset on UK households including yearly individual-level observations from 1991 to 2008.[3]

The first wave consists of a sample size around 5000 households (10.000 adult interviews). Because of attrition and a net outflow of households, the sample size has decreased. The first seven waves contained information on training, but quite limited in scope. From wave 8 onwards, survey questions were expanded. Respondents now have to indicate how many courses they started in the past year, together with more detailed information on the financing and the type (purpose) of the three longest training events (or all events if there were fewer than three). We also have information on whether these training events led to a qualification (the General National Vocational Qualifications, GNVQ). We make use of waves 8 to 18 (survey years 1998-2008). The sample consists of respondents working in the private sector between 16 and 65 years old.[4]

[3]The BHPS resembles many features of the US-based PSID in the sense that it tracks individuals across household changes and tries to match the population age distribution by taking a refresher sample of new adults in each wave. More information as well as links to access the data is available on https://www.iser.essex.ac.uk/bhps.

[4]In order to be better able to compare the training incidence between employer-sponsored and self-financed courses we chose not to include respondents during unemployment or inactivity spells, given that the motivations to invest in on-the-job training is likely to be very different than for individuals in paid employment.

3.1 Training

The BHPS includes a wealth of information on respondents job training activities. In particular, they have the choice between (i) help to get started in their current job, (ii) to increase their skills in the current job, (iii) to improve their skills in the current job, (iv) to prepare for future job(s), (v) to develop general skills. Crucially for our paper, respondents also answer on the financing of the training they follow. In particular, there is a distinction between 'no fees', 'fees paid by: self/family', 'fees paid by: employer/future employer'. Both the reason and the financing of training is given for up to 3 courses in the last 12 months before the date of the interview.

For the purposes of this paper, for the financing of training, we distinguish between self-financed and employer-financed training. Furthermore, given we don't see a clear distinction between (ii) and (iii), we follow (Booth and Bryan, 2005) and combine these two reasons into one category that we label 'skills in the current job'. The first category will be called 'induction training' and then we are left with 'future skills' (category (iv)) and 'general skills'.

Finally, the respondents are also asked to give the duration of each reported course. We use the total number of days spent in training since September 1st of the previous fieldwork year as a measure of duration of training. Table 1 gives an overview of the average proportions of the different sorts of training in the sample, together with the average intensity of training.

On average, about 28.5 % of women across different ages and education levels indicate they have received some training.[5] This is about the same as for men. The majority of training events, about 85 % , is employer-sponsored. The average employer-sponsored training rate of males is higher than for women, whereas women have a higher average self-financed training rate. The mean incidence of training for both sources of financing seems to be higher for singles compared to married individuals.

The lower part of Table 1 provides the frequencies across the different reasons for training, conditional on receiving respectively firm-and self-financed training. It is noticeable how few respondents indicate that the training course are to help start their jobs. Also clear is that relatively higher fractions of self-financed training seem to be to improve future skills, in contrast to the training courses financed by the firm/employer from the respondent. This is consistent with the idea that employees

[5] In the appendix we also show how the training rate evolves as a function of age, in figure A.1 and across education levels, see table A2.

who want to finance their own course do this with an eye to develop new skills (possibly with the purpose to improve the future outside options on the labour market).

Table 1: Training in the BHPS

	Female	Male	Married	Single
Any training	0.285	0.288	0.271	0.31
Training firm-sponsored	0.232	0.252	0.234	0.254
Training self-sponsored	0.052	0.034	0.0387	0.0471
Intensity of training (days)				
firm-sponsored	20.09	19.61	15.51	28.72
self-sponsored	46.76	38.49	34.77	52.23
Proportion of firm-sponsored training				
start job	0.01	0.01	0.01	0.015
improve skills	0.11	0.11	0.12	0.085
future skills	0.056	0.057	0.052	0.063
general skills	0.86	0.85	0.85	0.87
Proportion of self-sponsored training				
improve skills	0.02	0.036	0.029	0.025
future skills	0.066	0.089	0.065	0.082
general skills	0.87	0.83	0.87	0.84

Source: BHPS waves 1998-2008, main subsample consists of individuals aged between 16 and 65. Firm-sponsored training is a dummy equal to one if the individual reports 'no fees paid' or 'employer paid fees'. Self-sponsored training is a dummy equal to one in case the respondent answers 'yes' to 'fees paid by self/family'. Intensity of self-financed and firm-sponsored training refers to the sum of the length (measured in days) of all reported self-financed, resp. firm-sponsored training courses.

A remarkable feature, which has already been documented by Booth and Bryan (2005), is that a large share of training courses are reported to be with the purpose of accumulating 'general skills', with about 85 % of firm-sponsored training reported to be to develop general skills. Women who self-finance their training courses report in about 87 % of the cases their intent is to develop general skills. Whereas the high share of courses pertaining to general skills is consistent for those courses which are self-financed, the almost equally high share of general training purpose of firm-sponsored courses is in stark contrast to standard human capital theory in the line of Becker (1964).

In terms of intensity of training, the length of self-financed training for women is about 47 days, more than the 38 days spent on average by men on (self-financed) training courses over the course of the year preceding their interview. In contrast, the firm-sponsored training courses have a shorter duration, with an average of 20 days spent in such training courses by both men and women. In terms of other characteristics of those individuals, we note that around 60% of respondents indicating having received or participated in either firm-sponsored or self-financed training has a higher degree, i.e. has a higher level of education (at least above A levels). This is in line with previous findings in the literature (e.g. Arulampalam et al., 2004; Booth and Bryan, 2005).[6]

4 Results

We start the analysis by looking at how and if demographic characteristics impact the incidence and duration of training. First, we study the correlation between several worker characteristics and the incidence of training, which is either firm-sponsored or self-financed. To do this, we estimate linear models[7] of the following form:

$$T^j_{i,t} = \mathbf{X}'_{i,t-1}\beta_0 + \beta_1 Married_{i,t-1} + \beta_2 Female_i + \beta_3 \#Child_{i,t-1} + \alpha_r + \alpha_t + \epsilon_{i,t}, \quad (1)$$

where $T^j_{i,t}$ is a dummy variable which takes value one if individual i has followed some training of type j in the year before wave t, where $j = SF, FF$ (i.e. either self-financed or financed by the employer of the respondent). The set $\mathbf{X}_{i,t-1}$ contains several demographic and job characteristics. Specific demographic variables of interest are the marital status of the individual, the gender and the number of children present in the household of the individual.[8] Furthermore, given the clear lifecycle pattern observable in training incidence (cfr. figure A.1), we add age and the square of age as controls to all our regressions.

In each specification we include region and time fixed effects, respectively α_r, α_t.

[6] We refer to Table A2 in the Appendix for more detailed descriptive analysis of training incidence across the different education levels.

[7] The results of Probit regressions, not shown here but available on request, yields very similar results. We also estimated specification (1) including an interaction effect between marital status and gender, however, this was never significant and therefore we always report the more limited version without this interaction term.

[8] The descriptive statistics of these main demographic controls are presented in Table A1 in the appendix. Overall, we have a balanced sample across gender, with about 48 % women and 56 % married individuals. The average age in the sample is around 35.

These controls absorb any variation across time (e.g. macro-shocks) and differences across regions (e.g. local labour market circumstances) that could impact the likelihood of attending training courses while being correlated with individuals' characteristics. To pick up different incidences of on-the-job training across different sort of sectors, or differences due to different requirements pertaining to occupation, we always include industry and occupation fixed effects. Since there is robust evidence (e.g. (Barron et al., 1987), (Leuven, 2005)) that training incidence is positively related to firm size, we also include dummies indicating firm size category through all specifications.[9]

Importantly, since training takes place in the year before the date of the interview, in (1), we lag all relevant demographic characteristics of individuals by one year. Results are shown in Table 2.

4.1 Individual characteristics

Several findings emerge from Table 2. First, the coefficient on $Female_i$ is not significant in column (1) and weakly significant in column (2), indicating that gender is not a stronger predictor of the likelihood of receiving (*any*) training. Second, the probability of receiving training is negatively and significantly associated with being married. In particular, the estimated coefficient on $Married_{i,t-1}$ is negative and significant, with the effect ranging between -2 and -2.2 percentage points (column (1) and column (2) of Table 2, respectively). Third, the presence and the number of a children in the household are not correlated with the incidence of overall training. Forth, when we distinguish between employer-sponsored (columns (3) and (4)) and self-financed training (columns (5) and (6)), we find that women have a higher incidence of following self-financed training courses.

Importantly, being married is strongly and negatively correlated with the likelihood to follow (self-financed) training courses, although the magnitude of the coefficient attached to $Married_{i,t-1}$ is now higher (-1.3 percentage points), indicating a smaller effect on the training. Finally, the estimated coefficient on # $Child_{i,t-1}$ is also negative and significant in column (5), indicating a lower likelihood of receiving training of individuals with children. The results in column (5) are qualitatively confirmed in column (6), where we interact gender and marital status with $\#Child_{i,t-1}$.

Interestingly, the interaction between marital status and the number of children

[9] We refer to the appendix, A.2 for more details on the firm size categories in the data.

is positive (and statistically significant), even though the interaction between $Female_i$ and $\#Child_{i,t-1}$, is statistically insignificant. This finding might be interpreted as complementing the finding by (Blundell et al., 2019) that women tend to increase their participation rates in self-financed OJT courses post-motherhood, to compensate for the earnings losses incurred due to child birth. The results we present here are broadly in line with this prediction, but seems to be specifically relevant for married women.

Table 2: Training and demographics (full sample)

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.0144	0.0195*	-0.00617	-0.00246	0.0239**	0.0264**
	(0.0136)	(0.0139)	(0.0096)	(0.0107)	(0.00755)	(0.00809)
$Married_{i,t-1}$	-0.0198**	-0.0223**	-0.00720	-0.00656	-0.0136***	-0.0169***
	(0.0105)	(0.0127)	(0.00768)	(0.00979)	(0.00392)	(0.00436)
$\#\ Child_{i,t-1}$	-0.00828	-0.00714	-0.00378	0.00690	-0.00914***	-0.0171**
	(0.00811)	(0.0224)	(0.00819)	(0.0239)	(0.00223)	(0.00680)
$Female_i \times \#\ Child_{i,t-1}$		-0.0106		-0.00977		-0.00353
		(0.0150)		(0.0116)		(0.00462)
$Married_{i,t-1} \times \#\ Child_{i,t-1}$		0.00533		-0.00640		0.0115**
		(0.0191)		(0.02096)		(0.00495)
Observations	10,334	10,334	10,334	10,334	10,334	10,334
R-squared	0.073	0.073	0.058	0.059	0.018	0.019

Notes: estimation on the full sample of workers, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effects, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Overall, the results in Table 2 indicate that when individuals self-finance the training courses, their demographic characteristics play a bigger role in determining the probability of receiving training. [10]

[10]One thing to note (see Table 1), of the individuals reporting having had training in the past year,

So far, our analysis was conducted on the full sample of individuals, irrespective of their employment status. Given that unemployed individuals might be more likely to take up training to recover or sustain skills on the labour market, whereas employed individuals might have different motives (to improve their skills), we might want to separate out these differential motives and therefore we restrict the sample now to individuals who were in paid employment the year before the interview.[11] The result of restricting the sample are given in Table 3.

Table 3: Training and demographics

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.0138	0.0191	-0.00503	-0.00146	0.0219**	0.0254**
	(0.0137)	(0.0142)	(0.00973)	(0.0109)	(0.00789)	(0.0085)
$Female_i \times \#\ Child_{i,t-1}$		-0.0114		-0.00943		-0.00607
		(0.0149)		(0.0121)		(0.00416)
$\#\ Child_{i,t-1}$	-0.00824	-0.00719	-0.00359	0.00629	-0.00971***	-0.0155**
	(0.00846)	(0.0222)	(0.00829)	(0.0235)	(0.00227)	(0.00628)
$Married_{i,t-1}$	-0.0189	-0.0214	-0.00583	-0.00533	-0.0144***	-0.0175***
	(0.0106)	(0.0129)	(0.00742)	(0.01002)	(0.00386)	(0.00431)
$Married_{i,t-1} \times \#\ Child_{i,t-1}$		0.00557		-0.00589		0.0104*
		(0.0207)		(0.0221)		(0.00475)
Observations	9,979	9,979	9,979	9,979	9,979	9,979
R-squared	0.094	0.094	0.081	0.081	0.023	0.024

Notes: estimation the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

approximately 85% of them had at least some of the training financed by their employer, hence the latter constitutes the majority of the observed training events in our sample. Given the proportions of training across funding source (that is, either firm-sponsored or self-financed) in Table 1, the results in tables 2 are unlikely to driven by lack of variation in self-financed training.

[11] Given the retrospective nature of the questions regarding training incidence, we need to consider the employment status in the year before the date of the interview.

We see that, both quantitatively and qualitatively, the results from Table 2 are confirmed by restricting to individuals in paid employment while training took place. Turning back to a discussion of the findings in Table 2 and Table 3, we find overall that female workers have a higher incidence of self-financed training, whereas for firm-sponsored training courses we find a predicted negative, although not significant effect for females on training incidence.

4.2 Job tenure

An important potential determinant of training incidence is the level of attachment of a worker to a particular firm. A higher level of attachment can be interpreted as signaling a lower risk of providing training to those particular workers, since they are less likely to quit. The reverse is also possible, e.g. providing OJT training makes an employee more likely to stay at the firm, as an act of positive reciprocity.[12]

Table 4: Job tenure

	Female	Male	Married	Single
job tenure current job (months) - Job Tenure$_{i,t-1}$				
mean	42.56	48.58	53.97	35.49
st.dev.	(55.56)	(67.54)	(67.37)	(53.26)

Source: BHPS waves 1998-2008, main subsample consists of individuals aged between 16 and 65. Job tenure is measured as the amount of months from the start of the job held before training takes place.

[12]The latter argument goes back to the idea that employer-employee relations often involve gift-exchanges, e.g. Akerlof (1982), Rabin (1993) , Fehr and Falk (2002), and Dufwenberg and Kirchsteiger (2004). In the context of firm-sponsored training Leuven et al. (2005) find a positive correlation between reciprocal attitudes (lower wage demands or greater effort) and OJT , using data on a large multinational company based in Germany, Kampkötter and Marggraf (2015) found that participation in on-the-job training courses lead to lower turnover and lower absenteeism. Using a field experiment, Sauermann (2019) shows that assignment to a training program in a firm induced higher returns through higher effort, which he interprets as reciprocative behavior from workers to the firm.

Table 5: Training, demographics and tenure

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00940	0.0130	-0.00859	-0.00718	0.0216***	0.0245***
	(0.0103)	(0.0116)	(0.00994)	(0.0110)	(0.00489)	(0.00559)
$Married_{i,t-1}$	-0.0214**	-0.0238**	-0.00814	-0.0102	-0.0151***	-0.0179***
	(0.0107)	(0.0115)	(0.0103)	(0.0110)	(0.00499)	(0.00540)
$\#\ Child_{i,t-1}$	-0.00911	-0.0116	-0.00352	0.00372	-0.0101***	-0.0157**
	(0.00631)	(0.0180)	(0.00604)	(0.0168)	(0.00243)	(0.00667)
$Female_i \times \#\ Child_{i,t-1}$		-0.00692		-0.00669		-0.00503
		(0.0113)		(0.0106)		(0.00429)
$Married_{i,t-1} \times \#\ Child_{i,t-1}$		0.00711		-0.00368		0.00957
		(0.0170)		(0.0157)		(0.00657)
$Job\ Tenure_{i,t-1}$	-0.0137***	-0.0137***	-0.0146***	-0.0140***	-0.000387	-0.000423
	(0.00374)	(0.00374)	(0.00360)	(0.00351)	(0.00162)	(0.00163)
Observations	9,167	9,167	9,167	9,477	9,167	9,167
R-squared	0.093	0.093	0.081	0.080	0.024	0.024

Notes: estimation the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Some papers have argued that the (on average) lower female participation rates in OJT can be attributed to lower tenure and discontinuous labour market histories (e.g. due to fertility), or sorting in specific occupations requiring less formal OJT.[13] A recent paper by Blundell et al. (2019) also looks at the training information contained in the BHPS for the purpose of studying the relationship between discontinuous labour force attachment and OJT rates. They find that women have lower participation rates in the start of their career, but for those women with higher education levels (high school or

[13]Indeed, there are some papers arguing women have lower participation rates, e.g. Bishop (1997) and (Leuven, 2005). In the present paper, we partially control for sorting by including occupation dummies throughout our estimations.

college), there is a significant increase in training rates, which can lead to higher levels of participation in training than their male counterparts. One reason to increase the training rate is to recuperate earnings losses incurred due to reduced labour supply post-motherhood. [14] These findings suggest that not controlling for job tenure might potentially bias our results. For this reason, we will use the information on job tenure, provided by the BHPS, to construct a worker-level job tenure measure ($Job\ Tenure_{i,t-1}$) and include it in our baseline specifications. First, Table 4 summarizes the average job tenure across gender and across marital status. We observe well-known patterns, both women and singles have on average lower job tenure, compared to their male respectively married counterparts.

To check whether the observed empirical patterns (i.e. females and singles are more likely to participate in self-financed training) are not solely driven by tenure on the job, we add job tenure as an extra control to our baseline specification.[15] The results are given in Table 5.

The effect of job tenure on firm-sponsored training incidence is significantly negative, possibly indicating that job tenure can be interpreted as a measure of 'informal training' [16] (which can act as a substitute to 'formal training'), or the fact that more tenured workers have less training requirements and, hence, have lower participation likelihood to (firm-sponsored) training courses. On the other hand, we don't find a statistically significant effect of job tenure on the training likelihood of self-financed courses, which might indicate that workers who have been longer in the same job want to take up courses to boost their human capital stocks and skill levels.

The main conclusions which emerged from Tables 2-3 remain robust to controlling for job tenure: being female has a positive predicted effect on the likelihood to participate in self-financed training courses, whereas being married has a negative predicted effect on the participation likelihood of self-financed training.

[14] However, the authors also point out that OJT can only partially recover the earnings losses, especially due to the fact that many women take up part time work post-children, which reduces their returns from human capital accumulation.

[15] The BHPS allows us to construct a consistent partial employment history, i.e. (un-)employment spells for each individual and, hence, compute the tenure at each job. See e.g. Halpin (1997), Halpin (2000) and Maré (2006). Unfortunately, we don't know the precise date at which training took place and, therefore, we can't precisely attribute job tenure at the time at which training took place. As an approximation and to be consistent with the period during which training took place, we therefore use the lagged job tenure, i.e. job tenure in the year before the interview took place as a measure of tenure.

[16] As Bishop (1997) pointed out, lots of on-the-job training is 'informal', i.e. observing coworkers, learning-by-doing etc. Given the general difficulty to have direct measures of these sorts of on-the-job training, job tenure has been suggested as a proxy for 'informal training', e.g. in Groot and de Brink (2000).

4.3 Self-selection and individual heterogeneity

One concern on interpretation of the results in the previous sections is that the effects of marital status and gender could be affected by selection. For example, if there are unobserved traits making it more likely for an individual to be both more attractive on the marriage market and less likely to self-finance training courses, then this would be picked up by the control for marital status and therefore exclude any possible direct relationship between interactions within marriage and the likelihood to participate in self-financed training courses.

To separate out selection into marriage from training courses, we adopt the following empirical strategy. First, we estimate a wage equation[17]

$$\log w_{i,t} = \mathbf{Z}'_{i,t}\beta^{w} + \alpha_i + \epsilon_{i,t}, \tag{2}$$

where $w_{i,t}$ denotes the (real) hourly wage for individual i in year t. The vector $\mathbf{Z}_{i,t}$ contains a set of (time-varying) controls pertaining to the individual and the associated job characteristics, (i.e. age, age squared, educational attainment, union membership, industry and occupational dummies, size of the workforce of the employer.) We also controlled for whether the respondent has received either employer-sponsored or self-financed training in the past year. We are specifically interested in the individual fixed effects, α_i , which are meant to capture (unobserved) worker-specific productivity/ability.[18]

[17] We estimated (2) separately for males and females, where we also took into account selection into the labour market for women, by estimating a Heckman selection model.

[18] As an additional exercise, we also made use of the work-history files provided by the BHPS to construct employment histories for workers, which allows us to track job changes of individuals and include job-match effects, $\alpha_{i,j}$ on wage dynamics of workers in our sample. Furthermore, the quality of the BHPS allows us to unequivocally attribute the wage information to the current job of the worker and we can clearly identify employer changes, which allows a proper analysis and minimizes biases from misattributing wage information, e.g. present in datasets like PSID where earnings refer to annual earnings, see e.g. Altonji and Williams (2005) for a discussion on this. Identification in this extended version of (2) then stems from the assumption that mobility is driven by observable characteristics, individual effects and match effects, but not endogenously by ϵ. Furthermore, in this case (2) would be over-parameterized, and we need to add more identifying restrictions in order to separately identify the individual fixed effects (α_i) from the match-fixed effects ($\alpha_{i,j}$). One assumption is to rule out any systematic relationship between $\alpha_{i,j}$ and the employer's identity. This effectively rules out the case where mobility of workers is driven by match-fixed effects, see e.g. Woodcock (2015) and Mittag (2019). Given the fact that the required amount of mobility to separate match fixed effects from individual fixed effects is too demanding for our dataset, we therefore opted to estimate the more restricted version as given in (2).

Table 6: Training, demographics and individual heterogeneity

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00893	0.0139	-0.00616	-0.00226	0.0170**	0.0202**
	(0.0142)	(0.0139)	(0.0127)	(0.0130)	(0.00670)	(0.00720)
# $Child_{i,t-1}$	-0.0110	-0.00903	-0.00791	0.00437	-0.00851***	-0.0148*
	(0.00870)	(0.0279)	(0.00807)	(0.0279)	(0.00207)	(0.00720)
$Female_i \times$ # $Child_{i,t-1}$		-0.0107		-0.0106		-0.00529
		(0.0161)		(0.0149)		(0.00414)
$Married_{i,t-1}$	-0.0157	-0.0177	-0.00388	-0.00299	-0.0128**	-0.0159**
	(0.0108)	(0.0127)	(0.00775)	(0.00971)	(0.00453)	(0.00526)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$		0.00402		-0.00797		0.0105*
		(0.0238)		(0.0242)		(0.00558)
$\hat{\alpha}_i$	0.0727**	0.0718**	0.0558*	0.0545*	0.0172	0.0171
	(0.0250)	(0.0254)	(0.0284)	(0.0285)	(0.0144)	(0.0147)
Observations	9,131	9,131	9,131	9,131	9,131	9,131
R-squared	0.098	0.098	0.086	0.086	0.023	0.023

Notes: estimation on the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

We then use the estimates of the individual fixed effects in (2), $\hat{\alpha}_i$ to proxy for selection in marriage and labour markets.[19] More precisely, we can re-estimate (1), but now including $\hat{\alpha}_i$, which is assumed to capture unobserved heterogeneity of individuals and therefore, controls for potential selection into labour and marriage markets. The results are reported in Table 6.

The coefficient attached to $\hat{\alpha}_i$ is positive and significant in almost all the specifi-

[19] There is an extensive literature on the *marriage premium* for males which typically uses panel data on households to difference out individual-level fixed effects. The latter serve as a way to control for selection into labour and marriage markets, which is one explanation for observed higher wage rates for married men, compared to their single counterparts. See e.g. Korenman and Neumark (1991), Loh (1996), Cornwell and Rupert (1997), Gray (1997), Hersch and Stratton (2000), Stratton (2002).

cations in Table 6, indicating that individuals with relatively higher productivity or latent abilities are selected more into training courses. However, the effects of the estimated individual fixed effects decrease towards zero and become borderline statistically significant for self-financed training. Being male and having more children still have a negative predicted effect on the likelihood to participate in self-financed training courses.

Overall, the pattern of the baseline results holds: marriage has a negative and significant coefficient. Given that we interpret $\hat{\alpha}_i$ as capturing potential selection driving both labour market-related and marriage market outcomes, the results in Table 6 can be seen as more evidence in favor of the hypothesis that marriage might have an impact on the decision of individuals to self-finance their human capital formation through on-the-job training.

5 Robustness

In this section we provide a battery of robustness checks on our baseline results. In particular, we test whether they are affected by controlling for i) whether the individual is in part-time or full-time work, ii) different measures of labour force attachment; iii) several types of individual-level borrowing constraints measures; iv) a measure of job mobility; and v) a measure for time allocation within the household.

Part-time or full-time work. The results presented in Table 6 did not distinguish between workers in part-time or full-time work. Table 7 shows the estimation results, now split according to whether the individual worked part-time or full-time in the year at which (s)he participated in a training event.

Overall, we obtain the same results as in Table 6, though more noisily estimated. Considering columns 5-6, we again find that women and singles are predicted to have higher participation rates in self-financed OJT. Interestingly, we do notice substantial differences in terms of the size of the effects between part-time and full-time workers. Whereas on the sample of full-time workers the predicted effect of being female is an increase of about 1.8 percentage points, for the part-time workers this effect is almost double. Similarly, the predicted effect of being married for full-time workers is a drop by about 1.45 percentage points, which is also doubled on the sample of part-time workers. [20]

[20] We can again compare our findings with those found by Blundell et al. (2019), who find that most of the changes in self-financed training rates are driven by part-time workers, especially women who want to partially offset their earnings losses during fertility episodes.

Table 7: Training incidence and Part-time/full-time employment

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.0161	0.0805	0.00231	0.0574	0.0186**	0.0305**
	(0.0164)	(0.0467)	(0.0148)	(0.0566)	(0.00776)	(0.0117)
# $Child_{i,t-1}$	-0.00180	0.114*	0.0123	0.150**	-0.0162**	-0.0290**
	(0.0400)	(0.0583)	(0.0393)	(0.0632)	(0.00558)	(0.0100)
$Female_i \times$ # $Child_{i,t-1}$	0.00968	-0.132*	0.0112	-0.151**	-0.00748	0.00408
	(0.0143)	(0.0672)	(0.0145)	(0.0651)	(0.00511)	(0.00371)
$Married_{i,t-1}$	-0.0158	-0.0190	-0.00251	0.0184	-0.0145**	-0.0376**
	(0.0128)	(0.0402)	(0.0103)	(0.0311)	(0.00567)	(0.0132)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$	-0.00641	0.0124	-0.0192	-0.00185	0.0123*	0.0122
	(0.0377)	(0.0304)	(0.0362)	(0.0319)	(0.00539)	(0.0112)
$\hat{\alpha}_i$	0.0561*	0.136**	0.0400	0.0933	0.0160	0.0326
	(0.0276)	(0.0411)	(0.0311)	(0.0578)	(0.0157)	(0.0233)
Observations	7,891	1,201	7,891	1,201	7,891	1,201
Sample	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
R-squared	0.096	0.130	0.085	0.124	0.024	0.105

Notes: estimation on the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Labour force attachment. In Table 5 we controlled for job tenure before training takes place. However, there are alternative measures to capture the extent of attachment to the labour market of individuals. One is the number of weeks in unemployment or out of the labour force prior to training. We can hypothesise that the more time an individual spends in unemployment or inactive spells, the more the potential need and willingness of this individual to participate in training courses, due to depreciation of human capital. To test if this is the case, we construct the variable#$Notwork_{i,t}$, which counts the number of weeks that respondent i has not been

working in a job until the year t. This includes both weeks spent in unemployment and weeks inactive on the labour market. [21] The results of this check are collected in Table 8 and show that including the new measure of labour force attachment leaves qualitatively unchanged the effects of marital status, gender and the presence of kids on the probability of getting training.[22] Interestingly, the effect of more discontinuous labour histories is (borderline) significantly negative for firm-sponsored training courses, whereas it is insignificant for self-financed training.

We also use another measure of labour force attachment: the (logarithm of) accumulated number of hours worked during the past waves, $AccHoursworked_{i,t-1}$. Indeed, a lower accumulated amount of hours worked on the labour market indicates less intensive attachment to the labour market. First, we note that we observe a similar pattern for accumulated working hours as for accumulated unemployment and inactivity spells in particular men and married individuals have more accumulated hours worked than their female or single counterparts.[23] The results of adding $AccHoursworked_{i,t-1}$ to the regression framework is given in Table 9.

We observe that $AccHoursworked_{i,t-1}$ has a different effect on the likelihood to partake in OJT depending on the latter's funding source. In particular, higher labour force attachment (in terms of $AccHoursworked_{i,t-1}$) has a positive predictive effect on the likelihood to participate in employer-sponsored training courses, whereas the predicted effect is negative for self-financed OJT courses. This suggests that the motives or mechanisms for the two different sorts of OJT are potentially different, or that participation in self-financed OJT is more likely to be chosen primarily by the individuals themselves. Indeed, one can also argue that, after controlling for the number of dependent children, # *Child*, the accumulated working hours reflect the desired labour supply of a respondent (driven by relative preferences for leisure). In that case, if a respondent expects that (s)he will have sufficient means to pay for (self-financed) OJT,

[21] Similar to the measure of tenure on the job, we notice that the descriptive statistics in Table A4 point towards a higher discontinuous labour force experience for both women and singles. In particular, women spend on average around 8 weeks not working in the labour market, while men about 6 weeks. Similarly, singles do not work for about 11 weeks on average, while their married counterparts do not work on the labour market for an average of 5 weeks.

[22] We also estimated all the regressions for this robustness check on a subsample of individuals which we observe for at least a given number of waves. The results are in line with the results presented here, therefore we omitted them from the paper. The results are available on request.

[23] The average accumulated hours worked per year equals 5695.05 for women, 7767.21 hours for men, 7243.99 for married individuals and 6194.80 for singles. We add the caveat that given the unbalanced nature of our dataset, these numbers are more difficult to interpret. we therefore add the results for this particular robustness check for those individuals for which we have at least a certain number of observations, and this yields results in line with those presented here. These are available from the authors upon request.

(s)he will be more willing to take time off from the labour market, thereby generating the same negative correlation between accumulated working hours and the incidence of self-financed OJT.

Table 8: Training and labour force attachment: accumulated unemployment and inactivity spells.

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00914	0.0137	-0.00590	-0.00250	0.0170**	0.0202**
	(0.0142)	(0.0137)	(0.0126)	(0.0129)	(0.00669)	(0.00721)
# $Child_{i,t-1}$	-0.0106	-0.00879	-0.00741	0.00469	-0.00847***	-0.0148*
	(0.00862)	(0.0277)	(0.00786)	(0.0276)	(0.00217)	(0.00724)
$Female_i$ × # $Child_{i,t-1}$		-0.00988		-0.00955		-0.00528
		(0.0162)		(0.0154)		(0.00410)
$Married_{i,t-1}$	-0.0165	-0.0183	-0.00488	-0.00374	-0.0129**	-0.0159**
	(0.0117)	(0.0132)	(0.00825)	(0.0101)	(0.00484)	(0.00545)
$Married_{i,t-1}$ × $Child_{i,t-1}$		0.00369		-0.00842		0.0105*
		(0.0236)		(0.0239)		(0.00563)
# $Notwork_{i,t}$	-0.000294	-0.000266	-0.000371	-0.000353	-2.51e-05	-3.86e-06
	(0.000412)	(0.000412)	(0.000368)	(0.000374)	(0.000196)	(0.000199)
$\hat{\alpha}_i$	0.0712**	0.0705**	0.0539*	0.0528	0.0171	0.0170
	(0.0252)	(0.0256)	(0.0287)	(0.0287)	(0.0138)	(0.0142)
Observations	9,131	9,131	9,131	9,131	9,131	9,131
R-squared	0.098	0.098	0.086	0.086	0.023	0.023

Notes: estimation on the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Table 9: Training and labour force attachment: accumulated hours worked

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.0143	0.0174	0.00123	0.00273	0.0141*	0.0180**
	(0.0170)	(0.0163)	(0.0153)	(0.0151)	(0.00702)	(0.00747)
# $Child_{i,t-1}$	-0.00799	-0.00600	-0.00366	0.00866	-0.0102***	-0.0167*
	(0.00844)	(0.0287)	(0.00734)	(0.0280)	(0.00253)	(0.00735)
$Female_i \times$ # $Child_{i,t-1}$		-0.00738		-0.00582		-0.00748*
		(0.0158)		(0.0152)		(0.00389)
$Married_{i,t-1}$	-0.0155	-0.0166	-0.00365	-0.00159	-0.0128**	-0.0163**
	(0.0109)	(0.0127)	(0.00806)	(0.0100)	(0.00459)	(0.00516)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$		0.00189		-0.0109		0.0117*
		(0.0244)		(0.0244)		(0.00556)
log $AccHoursworked_{i,t-1}$	0.0207	0.0196	0.0286**	0.0283*	-0.0112*	-0.0128**
	(0.0165)	(0.0168)	(0.0124)	(0.0127)	(0.00499)	(0.00492)
$\hat{\alpha}_i$	0.0682**	0.0677**	0.0495	0.0487	0.0197	0.0197
	(0.0260)	(0.0264)	(0.0293)	(0.0296)	(0.0137)	(0.0141)
Observations	9,128	9,128	9,128	9,128	9,128	9,128
R-squared	0.098	0.098	0.087	0.087	0.023	0.024

Notes: estimation on the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1.Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Borrowing constraints. Credit-constrained individuals might find it more difficult to finance the development of their human capital.[24] In the BHPS, individuals are asked whether housing payments required borrowing, required cutbacks and whether they were (more than 2 months) late with their housing payments. Since

[24]The central prediction from Becker (1964) is that, when training is general (in the sense that it is easily transferable to other firms/sectors), in a competitive labour market individuals will fully bear the financial cost of on-the-job training. This can take two forms: lower wages or reduced wage growth or direct financing through fees.

housing assets are likely to be a significant aspect of household's financial balances, we exploit the information in the BHPS to construct the following variable which indicates whether a household is self-reported having payment problems (specifically pertaining to housing payments):[25]

$$CC_{i,t} = \begin{cases} 1 & \textit{if payment problems reported} \\ 0 & \text{otherwise} \end{cases}$$

Second, we construct the variable $Renter_{i,t-1}$, which is a dummy variable indicating whether the individual is renting his/her home.[26] Table 10 adds, besides our fixed set of controls (including the unobserved heterogeneity as captured by $\hat{\alpha}_i$), a dummy for whether the individual rents in the period when training took place and our dummy variable indicating whether there are any self-reported problems with payments pertaining to housing ($CC_{i,t-1}$). We do not find any statistical significant effects from self-reported payment problems on participation rates, while being a renter is negatively associated to the probability of taking self-financed OJT. This could be due to the fact that renters have generally speaking less financial means, though we also control for total available income to the household (including earnings and non-labour income of the individual's spouse in case (s)he is married). More importantly, our main results remain robust to these controls for financial problems (in particular related to housing payments), in particular being female has a positive predicted effect on (self-financed) training incidence, whereas being married has a negative effect.

An important feature of becoming the owner of a house is that one is faced by specific leverage-based borrowing constraints, which put limits on the amount of debt they can accumulate over their life cycle.[27] As an alternative way to capture how borrowing constraints might impact on training participation, we use two popular leverage-based ratios, in particular the *loan-to-income* ratio (LTI) and the *loan-to-value* ratio (LTV). The former is defined as the ratio of the outstanding mortgage debt to the household income, the latter is defined as the ratio of the outstanding mortgage requirements divided by the (self-reported) housing value.[28] Results can be found in

[25]There are only 584 person-year observations in our sample ($\approx$ 5% of the sample) with a self-reported problem in payments with respect to housing. In the Appendix, Table A.3.2 shows that single individuals and individuals having more unemployment spells in the past year leading up to the interview are more likely to be faced with payment for housing problems.

[26]The average homeownership rate in the sample is about 80 %.

[27]There has been a literature devoted to studying how leverage-based collateral constraints interact with labour supply and household decisions, see e.g. Fortin (1995), Boca and Lusardi (2003), Bottazzi et al. (2007), Pizzinelli (2018) and Disney and Gathergood (2018).

[28]For individuals living in a couple we use the *primary loan-to-income ratio*, which is defined as the

table 11.

Table 10: Training and credit constraints

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00918	0.0141	-0.00616	-0.00225	0.0173**	0.0205**
	(0.0139)	(0.0137)	(0.0125)	(0.0130)	(0.00662)	(0.00708)
# $Child_{i,t-1}$	-0.0110	-0.00847	-0.00778	0.00468	-0.00865***	-0.0147*
	(0.00871)	(0.0287)	(0.00816)	(0.0290)	(0.00201)	(0.00686)
$Female_i \times$ # $Child_{i,t-1}$		-0.0108		-0.0106		-0.00537
		(0.0163)		(0.0150)		(0.00413)
$Married_{i,t-1}$	-0.0166	-0.0185	-0.00386	-0.00299	-0.0138**	-0.0168**
	(0.0110)	(0.0125)	(0.00749)	(0.00932)	(0.00465)	(0.00534)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$		0.00351		-0.00816		0.0102*
		(0.0243)		(0.0249)		(0.00523)
$CC_{i,t-1}$	0.00139	0.00152	-0.00735	-0.00784	0.0136	0.0142
	(0.0102)	(0.0108)	(0.0164)	(0.0171)	(0.0109)	(0.0108)
$Renter_{i,t-1}$	-0.00831	-0.00828	0.00297	0.00268	-0.0138*	-0.0136*
	(0.0155)	(0.0158)	(0.0154)	(0.0154)	(0.00630)	(0.00627)
$\hat{\alpha}_i$	0.0711**	0.0701**	0.0560*	0.0546*	0.0152	0.0150
	(0.0246)	(0.0252)	(0.0277)	(0.0279)	(0.0146)	(0.0150)
Observations	9,131	9,131	9,131	9,131	9,131	9,131
R-squared	0.098	0.098	0.086	0.086	0.024	0.024

Notes: estimation on the sample of individuals in paid employment in waves $t-1$ and t, standard errors clustered at occupation level, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

ratio of the total outstanding debt (=mortgages) to the income of the primary earner. The latter is a better measure of the exposure of the household budget to income/employment shocks, as argued by Bottazzi et al. (2007) and Pizzinelli (2018). Moreover, this measure circumvents the obvious endogeneity problem that arises due to the fact that training incidence could potentially impact the labour income of an individual. The average $LTI_{i,t-1}$ for homeowners is given 1.59, for renters the (primary) loan-to-income ratio is set to zero. Similarly, we set the loan-to-value equal to zero for renters and the average $LTV_{i,t-1}$ is equal to 0.33.

Table 11: Training and leverage-based constraints

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00781	0.0136	-0.00684	-0.000974	0.0160*	0.0183*
	(0.0134)	(0.0140)	(0.0128)	(0.0133)	(0.00707)	(0.00809)
# $Child_{i,t-1}$	0.0143	-0.0111	-0.0110	0.00425	-0.00985***	-0.0179**
	(0.00961)	(0.0309)	(0.00846)	(0.0323)	(0.00192)	(0.00730)
$Female_i \times$ # $Child_{i,t-1}$		-0.0127		-0.0154		-0.00306
		(0.0157)		(0.0149)		(0.00393)
$Married_{i,t-1}$	-0.00678	-0.00927	0.00836	0.00856	-0.0178***	-0.0209***
	(0.00896)	(0.00986)	(0.00744)	(0.00921)	(0.00470)	(0.00570)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$		0.00387		-0.00844		0.0111
		(0.0248)		(0.0272)		(0.00605)
$LTI_{i,t-1}$	0.0116**	0.0115**	0.00437	0.00427	0.00643*	0.00637*
	(0.00439)	(0.00436)	(0.00446)	(0.00452)	(0.00339)	(0.00340)
$LTV_{i,t-1}$	-0.0331*	-0.0329*	-0.0194	-0.0200	0.000839	0.00156
	(0.0168)	(0.0177)	(0.0188)	(0.0204)	(0.0142)	(0.0145)
$Renter_{i,t-1}$	-0.00719	-0.00721	-0.00200	-0.00259	-0.00784	-0.00740
	(0.0173)	(0.0179)	(0.0200)	(0.0206)	(0.00560)	(0.00541)
$\hat{\alpha}_i$	0.0840***	0.0827***	0.0704**	0.0684**	0.0145	0.0146
	(0.0207)	(0.0211)	(0.0273)	(0.0274)	(0.0161)	(0.0162)
Observations	8,242	8,242	8,242	8,242	8,242	8,242
R-squared	0.100	0.100	0.087	0.087	0.026	0.026

Notes: estimation on the sample of workers in paid employment in waves $t-1$ and t, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

We see that there is not much evidence of credit constraints or the particular balance sheet composition to have much impact on the participation decisions of individuals in on-the-job training courses. The predicted effect of LTI is positive, but almost everywhere statistically insignificant, with the only exception column 5 (excluding

interactions of number of children with demographic characteristics).[29] Again, our main results in terms of the predicted effects of gender, household composition and marital status on self-financed OJT incidence are preserved.[30]

Mobility. The main insight in Becker (1964) is that, when training is general enough to be easily transferable across sectors, the risk of poaching in a competitive labour market environment (i.e. full returns of training goes to the worker) implies that the firm will not contribute to the financing of human capital investments, i.e. training courses. It is likely that job mobility affects likelihood to receive training. To test this, we create a dummy equal to 1 if the individual changes job at time t and 0 otherwise ($Job\_Change_{i,t}$). We then regress this variables on three sets of controls.

First, we lag the incidence of training (self-financed or firm-financed), $T^j_{i,t-1}$. Second, accumulated training experience over the past years, in particular the total number of years in which the individual received some training of the type j ($j = SF, FF$), $Acc\_T^j_{i,t-1}$. Finally, to have a measure of training experience on the intensive margin, we can also count the total number of training courses taken by the respondent over the past years, $Count\_T^j_{i,t}$. we then regress $Job\_Change_{i,t}$, a dummy indicating whether or not individual i has changed job in the wave leading up to interview date t on a set of controls and the different sets of training experience.[31] The results are given in Table 12.

[29]The positive predicted effect can be rationalized by the fact that there is a positive relationship between labour supply and the LTI ratio, which has been shown both theoretically and empirically by Bottazzi et al. (2007) and Pizzinelli (2018).

[30]We also experimented with nonlinear effects of leverage-based constraints, following Disney and Gathergood (2018), by incorporating quintiles of the LTI and LTV ratio. This gave us similar results. we also tried to have a more direct measure of more 'committed' expenditures (in the terminology of Chetty and Szeidl (2007)) and adapted the notion of the 'obligation ratio' by Bottazzi (2007), where we divide either monthly rents or mortgage payments divided by monthly (household) income. Again, we couldn't find strong effects of these credit constraint measures on the participation likelihood of training courses.

[31]Notice that the BHPS, in its job history files, also asks respondents to give a reason of a change in job (her 'job' can be interpreted as a certain occupation within the same firm/with the same employer). Since we are interested in job mobility, we restrict to those changes in jobs where the respondent indicates they left their previous job for a better one.

Table 12: Job mobility and accumulated training

	(1)	(2)	(3)
$Job\_Change_{i,t}$			
$Female_i$	-0.0292***	-0.0290***	-0.0289***
	(0.00593)	(0.00594)	(0.00594)
# $Child_{i,t-1}$	0.00179	0.00169	0.00174
	(0.00281)	(0.00281)	(0.00281)
$Married_{i,t-1}$	-0.0344***	-0.0355***	-0.0355***
	(0.00620)	(0.00621)	(0.00621)
$T^{SF}_{i,t-1}$	0.0460***		
	(0.0137)		
$T^{FF}_{i,t-1}$	0.0324***		
	(0.00684)		
$Acc\_T^{SF}_{i,t-1}$		0.00948*	
		(0.00534)	
$Acc\_T^{FF}_{i,t-1}$		0.0104***	
		(0.00244)	
$Count\_T^{SF}_{i,t-1}$			0.00863*
			(0.00459)
$Count\_T^{FF}_{i,t-1}$			0.00499***
			(0.00130)
Observations	25,118	25,118	25,118
R-squared	0.042	0.041	0.041

Notes: estimation on the full sample of workers, *** p<0.01, ** p<0.05, * p<0.1.Education consists of 5 categories, based on highest educational achievement reported by the respondent: “Commercial or other qualifications", “O level GCE, A level GCE", “Other high qualification and higher degree". In each specification we control for individual’s age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to ‘jbsize’ in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

We see that marriage has a highly significant negative predicted effect on the likelihood to move from job, similar for women who also have a lower incidence of changing jobs. Having received training, irrespective of the financing source, makes individuals more likely to switch jobs. This is consistent throughout the different measures we use for training experience/incidence. Given that we observe married individuals have a lower predicted likelihood to quit jobs, whereas accumulated training

experience seems to be positively correlated with job changing behavior, we might hypothesize that the insignificance of marriage for the likelihood to be participating in firm-sponsored training courses in our baseline specifications might be due to dynamic effects. In particular, if married individuals are less risky for firms to be trained (as they have a lower probability to leave the firm), these individuals accumulate more (firm-sponsored) training, which then generates a higher job quitting rate. If we would then regress the likelihood to participate firm-sponsored training courses, we would expect an insignificant effect of marital status because of these counteracting dynamics. But overall, we can conclude that, even without controlling for job changing behavior would bias our estimates downwards, as we see that the marginal effect of being married on job changing behavior is negative.

One possible incentive for individuals to invest in their human capital (through participating in self-financed training courses) is to improve their outside options on the labour market. If this would be the case, we would observe a positive relationship between job mobility and the likelihood to participate in OJT. In order to see how the relationship between the characteristics of individuals and the likelihood to follow self-financed courses is influenced by job changing behavior, we re-estimate our main empirical specification on the two subsamples of those individuals who didn't change jobs, and those that did. The results are given in Table 13.[32]

We observe quantitatively and qualitatively some differences in terms of the predicted effects of being female and being married on the likelihood to participate in training. In particular, when we look at self-financed training incidence (our main outcome variable of interest), we observe that the size of the marginal effect of being married for job changers increases (compared to those individuals who stay at their previous job.)[33]

On the other hand, we don't find any significant effect of being female on the likelihood to participate in self-financed training in the sample of those individuals who have changed jobs. We do still find a positive predicted effect of being female on the likelihood to participate in self-financed training on the sample of individuals who didn't change their job.[34] Interestingly, we pick up a significantly negative predicted interaction effect of being female and having more dependent children on the

[32]We only report the results from the most extensive specification, i.e. including the interactions between the individual's characteristics and the number of children present in the household.

[33]It is important though to notice that here we should also be careful given the fact that the likelihood to change job is negatively correlated with being married, see e.g. Table 12.

[34]An important caveat here is that we cannot, however, reject the (joint) null hypothesis that the marginal effects of being female or married are different across both groups, which is mainly due to the strong positive correlation between the estimated coefficients in the 2 groups.

likelihood to partake in self-financed OJT courses. [35]

Table 13: Training incidence and job mobility

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00794	0.0332	-0.00875	0.0196	0.0215**	0.0134
	(0.0153)	(0.0225)	(0.0148)	(0.0218)	(0.00728)	(0.00871)
# $Child_{i,t-1}$	0.000219	-0.0455	0.0157	-0.0474	-0.0166	0.00191
	(0.0277)	(0.0681)	(0.0291)	(0.0599)	(0.00906)	(0.0202)
$Female_i$ × # $Child_{i,t-1}$	-0.0124	0.00910	-0.0131	0.0162	-0.00494	-0.0119**
	(0.0177)	(0.0283)	(0.0161)	(0.0262)	(0.00494)	(0.00415)
$Married_{i,t-1}$	-0.00866	-0.0348	0.00546	-0.0137	-0.0144**	-0.0235*
	(0.0125)	(0.0314)	(0.00940)	(0.0271)	(0.00552)	(0.0108)
$Married_{i,t-1}$ × # $Child_{i,t-1}$	-0.00806	0.0492	-0.0211	0.0480	0.0115	-0.00328
	(0.0240)	(0.0590)	(0.0261)	(0.0503)	(0.00700)	(0.0234)
$\hat{\alpha}_i$	0.0727**	0.0665	0.0599*	0.0461	0.00158	0.0594
	(0.0247)	(0.0560)	(0.0291)	(0.0523)	(0.0150)	(0.0325)
Observations	0.098	0.112	0.087	0.104	0.026	0.051
Sample	no job change	job change	no job change	job change	no job change	job change
R-squared	0.099	0.110	0.088	0.102	0.027	0.052

Notes: estimation on the sample of workers in paid employment in waves $t-1$ and t, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

Time allocation. An important difference between singles and married individuals is that time use between both groups differ significantly in several ways. First, since married individuals are more likely to have children, more time is devoted to childcare. Second, married individuals also enjoy leisure from joint leisure with their

[35] This result is likely driven by the fact that the mean number of children for job changers is lower than those individuals who don't change jobs, and this difference is significant. Furthermore, women are also less likely to change jobs in the sample.

spouse.[36] All of these factors contribute to more restrictions faced by married individuals to use non-market time to participate in training courses, which can also contribute to the negative correlation between being married and the incidence of (self-financed) training. We do not observe (joint) leisure time directly, but we do have information about the average hours spent on work on household chores. Since the total time which is available to each individual can be allocated to either household work, time spent on children, market work, private leisure and joint leisure.[37] If we further assume that the allocation of residual time (net of market and non-market work) is more or less stable after controlling for further individual and household characteristics (e.g. age of the individual, number of young children present in the household, education etc.), we can plausibly assume that, by adding the total time spent on non-leisure time, i.e. the sum of both household and market work, to our regression framework, we are implicitly controlling for the time spent on leisure.

Table 14 shows the results where we control for time allocation. The main predictive effects remain unchanged: being married has a negatively and significant effect on the incidence to self-finance training, being female improves the likelihood to participate in training courses. More dependent children still are detrimental for the participation rates in self-financed OJT courses. The estimates are too noisy to find a significant effect on the interaction between marital status and number of dependent children, however it is still estimated to have a positive sign. We do not find any significant effects of (daily) non-leisure time on the likelihood to receive OJT (irrespective of its funding source).[38] Overall, Table 14 does not provide much evidence for the fact that differences in time allocations between married and single individuals drive the incidence of self-financed training.

[36] Though the temporal choice of time-use is not that broadly examined in the literature, noteworthy exceptions are the studies by Hamermesh (1998), Hamermesh (2000). Important results from these are that work schedules of spouses seem to be synchronized with each other, i.e. if one spouse is at work in an hour, it is more likely the other is also at work, which suggests that partners try to match the time during which they can enjoy leisure or be together.

[37] We assume here that for singles all leisure is private, or is spent caring for children alone.

[38] We also experimented with another specification in which we included daily hours spent in market work and household work as separate controls and there we did find an oppositie effect of market work on employer-sponsored versus self-financed OJT. In particular, we find a negative predicted effect of market hours on the incidence of self-financed OJT, whereas daily market hours have a positive predicted effect on employer-sponsored training. There is no evidence that hours spent on household work has an impact on the incidence of training, either firm-sponsored or self-financed.These results are available from the authors upon request.

Table 14: Training and time allocation

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.00888	0.0137	-0.00555	-0.00183	0.0170**	0.0202**
	(0.0135)	(0.0137)	(0.0116)	(0.0124)	(0.00660)	(0.00717)
# $Child_{i,t-1}$	-0.0119	-0.00885	-0.00843	0.00611	-0.00893***	-0.0162*
	(0.00857)	(0.0287)	(0.00784)	(0.0275)	(0.00232)	(0.00817)
$Female_i \times$ # $Child_{i,t-1}$		-0.0117		-0.0117		-0.00589
		(0.0160)		(0.0153)		(0.00391)
$Married_{i,t-1}$	-0.0169	-0.0190	-0.00656	-0.00540	-0.0116**	-0.0151**
	(0.0119)	(0.0138)	(0.00879)	(0.0105)	(0.00482)	(0.00571)
$Married_{i,t-1} \times$ # $Child_{i,t-1}$		0.00328		-0.0101		0.0119
		(0.0244)		(0.0238)		(0.00679)
log $NonLeisureHours_{i,t-1}$	0.00405	0.00600	0.00557	0.00721	-0.000600	0.000623
	(0.0201)	(0.0197)	(0.0169)	(0.0166)	(0.00751)	(0.00754)
$\hat{\alpha}_i$	0.0683**	0.0674**	0.0511	0.0498	0.0145	0.0143
	(0.0252)	(0.0255)	(0.0280)	(0.0281)	(0.0148)	(0.0151)
Observations	8,990	8,990	8,990	8,990	8,990	8,990
R-squared	0.096	0.096	0.085	0.085	0.023	0.023

Notes: estimation on the sample of workers in paid employment in waves $t-1$ and t, *** p<0.01, ** p<0.05, * p<0.1.Education consists of 5 categories, based on highest educational achievement reported by the respondent: Commercial or other qualifications, O level GCE, A level GCE, Other high qualification and higher degree. In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). $Markethours_{i,t}$ refer to the daily hours, including overtime spent on work at the job of the individual, whereas $Homehours_{i,t}$ is the amount of time (hours) spent daily on household work. All monetary values are deflated by the CPI with 2014 as reference year.

5.1 Discussion of the results

The empirical evidence has shown several robust findings. First, whereas employer-sponsored training seems to be mostly affected by labour force attachment and individual-specific effects, participation in self-financed OJT is strongly correlated with several

demographic characteristics. To be more precise, we found robust evidence that women and singles have higher average training rates than their male and married counterparts. The different robustness checks allowed us to take into account different mechanisms which might explain our observed correlation between gender, household composition and marital status. These include (i) differences in financial means (borrowing constraints) to finance OJT, (ii) differences in labour force attachment and (iii) differences in time use between individuals based on marital status.

Our key results on the effects of gender, household composition and marital status remain unchanged and seem to remain quite stable across the different specifications. This calls for deeper investigation into different sorts of mechanisms which might rationalise our empirical findings, particularly in relation to the differences in (self-financed) training rates between singles and married individuals. In the next section, we will present a mechanism which is able to rationalize our empirical findings.

6 A possible mechanism

There are several ways in which marriage might affect the ability of individuals to self-finance training courses. First, being married can generate more resources (both labour and non-labour income sources from the spouse), which should have a positive effect on the likelihood to participate in training. On the other hand, there is a large literature on household behavior which argues household members make joint decisions on resource allocations (consumption, time use) through some cooperative bargaining process. In these so-called *collective household* models household members, whatever the particular bargaining process they use to make decisions, will pick Pareto efficient resource allocations.[39] An important implication from these models is that the share of the total household resources each household member obtains will depend crucially on his/her bargaining power, which in its turn depends on a set of environmental variables pertaining to outside options for the spouses on the marriage market, the labour market etc.[40] As a consequence, depending on the relative

[39]The seminal contribution in this literature on collective household models is Chiappori (1988). The literature is by now rather vast and extensive in terms of applications to labour supply decisions, consumption decisions, risk sharing etc. we refer the reader to Chiappori and Mazzocco (2017) for a recent overview of the literature.

[40]Formally, Pareto efficiency can be decentralized through an appeal to the second welfare theorem. In this case, the household's Pareto program can be rewritten as a two stage process: in the first stage, household members split total non-labour income amongst themselves according to a particular *sharing rule*, which is related to the bargaining power of each spouse. In the second stage, each household member individually chooses consumption and/or time allocation choices, given the share in total

bargaining power within the household, a spouse might have more/less control over the total household resources, which in the latter case might impede on the ability of an individual to self-finance training courses.

6.1 A simple framework

In this section, we will formalize some of these ideas, using a very simple theoretical framework. In particular, consider a simple two-period model ($t = 1, 2$) in which a member of a household consisting of two decision makers, $i = 1, 2$ decides in the first period whether (s)he wants to participate in training ($T = 0$ indicates not participating in training and $T = 1$ denotes (s)he decides to participate). We will assume it is household member $i = 1$ who contemplates partaking in training. In period $t = 1$, in case 1 decides to train member i obtains an income equal to w^i and training takes place. The costs of training are equal to K and are paid in $t = 1$. The incomes of each household member in $t = 2$ depends on the training decision in $t = 1$, in particular we assume that:

Assumption A. $w^1(1) \geq w^1(0) = w^1$ and $w^2(1) \leq w^2(0) = w^2$.

Hence we assume that training has a nonnegative effect on the wage of the trained spouse, but a nonpositive effect on the other spouse. This assumption captures, in a simplified manner, a situation in which each spouse's outside option from marriage is a function of training, which either improves their human capital (for the trained spouse) and labour market position (in terms of new job offers), or negatively affects their human capital (e.g. the spouse not receiving training would also need to find a new job, or has to incur more commuting cost to arrive at his/her job.) The main implication of Assumption A is that training of one spouse imposes a negative externality on the other spouse.[41] Also notice that, in case no training takes place, the incomes for both spouses stay constant. Utilities are perfectly transferable within the household and therefore, the utility possibility frontiers are linear in both period $t = 1$ and period $t = 2$. More precisely, if we let u_t^i denote the utility of spouse i in period t, then the utility frontier for period $t = 1$ is given by:

household resources obtained in the first stage.

[41] An alternative interpretation of this penalty of training imposed on the other spouse is through a potential reallocation of time, in which the spouse desiring to participate in training courses has to outsource some home chores to their partner after making use of potentially new job offers or increased labour market attachment from the spouse who receives training. Note however, that as Table 14 suggests, this time-use channel might not be very significant.

$$u_1^1 + u_1^2 = w^1 + w^2 - T \times K, \tag{3}$$

whereas for period $t = 2$ we have:

$$u_2^1 + u_2^2 = w^1(T) + w^2(T). \tag{4}$$

We assume that the marital surplus is split each period t through Nash bargaining. To be more precise, the utilities for both spouses in period 1 are given by:

$$u_1^1 = w^1 + \alpha \left[w^1 + w^2 - K\right], \tag{5}$$
$$u_1^2 = w^2 + (1 - \alpha) \left[w^1 + w^2 - K\right]. \tag{6}$$

In period $t = 2$, in case spouse 1 chose to participate in training ($T = 1$), the income levels of both spouses change and, following assumption A, spouse 2 incurs a potential income loss. Given this change in relative income levels, it might be plausible to assume that spouse 1 might actually demand a revision of relative control over the marital surplus. This feature is typical in the context of so-called intertemporal collective household models[42], where spouses can't commit to a distribution of resources. We therefore allow for a revision of bargaining power in the second period, to be more precise,

Assumption B.

$$\alpha(1) > \alpha(0) = \alpha.$$

Hence, the relative bargaining power of the trained spouse increases in the second period, whereas there is no revision in bargaining power in case $T = 0$. In terms of the second-period utilities for both spouses, we have that these are equal to:

$$u_2^1 = w^2(T) + \alpha(T) \left[w^1(T) + w^2(T)\right], \text{ resp.} \tag{7}$$
$$u_2^2 = w^2(T) + (1 - \alpha(T)) \left[w^1(T) + w^2(T)\right]. \tag{8}$$

The last component of our simple model is that we assume that both spouses have to *agree jointly* on the training decision at the start of period $t = 1$. In effect, this

[42] In an intertemporal collective household model the bargaining power of each spouse is allowed to change whenever the outside option (typically taken to be the value in case of divorce) for at least one of the spouses becomes larger than sticking to the agreed distribution of household resources. For more details we refer the reader to the presentation of the limited commitment model in Chiappori and Mazzocco (2017).

assumption implies that spouse 2 has a veto power on the training decision of spouse 1.[43]

The latter has clear incentives to choose $T = 1$, first his/her income will increase post-training in the second period and furthermore, the bargaining power for spouse 1 will also improve in $t = 2$. However, spouse 2's might have an incentive to veto $T = 1$, in particular the overall utility $(u_1^2 + u_2^2)$ for spouse 2 in case $T = 1$ is given by:

$$w^2 + (1 - \alpha)\left[w^1 + w^2 - K\right] + w^2(1) + (1 - \alpha(1))\left[w^1(1) + w^2(1)\right], \tag{9}$$

whereas for $T = 0$ we have:

$$2\left(w^2 + (1 - \alpha)\left[w^1 + w^2\right]\right) - (1 - \alpha)K. \tag{10}$$

The sign of the difference between (9) and (10) determines whether or not spouse 2 allows for $T = 1$ to occur. This difference is given by:

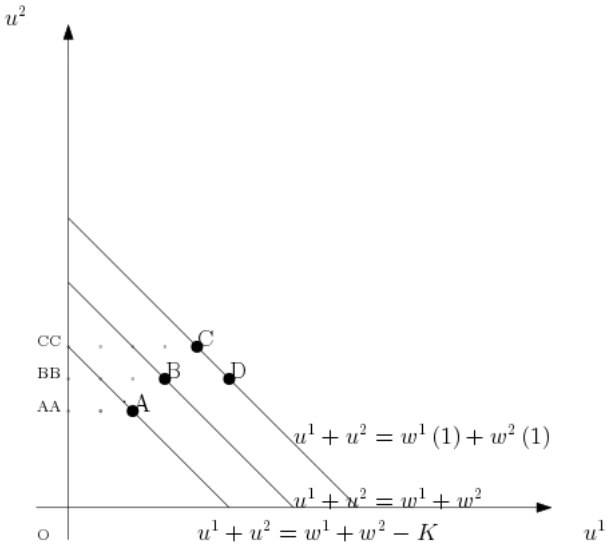
$$\underbrace{w^2(1) - w^2}_{(*)} + \underbrace{(1 - \alpha(1))\left[w^1(1) + w^2(1)\right] - (1 - \alpha)\left[w^1 + w^2\right]}_{(**)} + \underbrace{(1 - \alpha)K}_{(***)}. \tag{11}$$

The first term (*) in (11) is negative by Assumption A. The term (**) is the crucial term in terms of the ambiguous effects of training on the overall utility of spouse 2, in particular, even though we might assume that the overall marital surplus is larger post-training, i.e. $w^1(1) + w^2(1) > w^1 + w^2$, this does not imply that (**) is positive since the surplus post-training is pre-multiplied by the reduced bargaining power of spouse 2 (as a result of assumption B). Therefore, spouse 2 faces a fundamental trade-of between higher marital surplus and a lower share of these overall resources due to a loss in bargaining power, which might actually result in a non-efficient choice $T = 0$ at the household level. [44] To summarize, we can also illustrate household decisions and the trade-of facing the second spouse in the folowing figure:

[43] It is also important to notice that we do not allow spouses to jointly bargain over training and consumption. This rules out the trained spouse to concede part of his/her consumption share to pay for training and any negative externality imposed on the other spouse.

[44] This result is very similar to the analysis in Lundberg and Pollak (2003) and Basu (2006), where choices made by household members in a particular period affects future intra-household bargaining power, thereby allowing for inefficient outcomes.

Figure 1: Limited commitment and training



Notice in figure 1 that all utility possibility frontiers are linear and with slope -1, since we assume utilities are perfectly transferable. If no training takes place then the household is located at point B on the middle line. The average utility spouse 2 obtains in case spouse 1 does not receive training, i.e. $T = 0$, is given by the vertical distance from the origin to BB. In case spouse 1 participates training, then in $t = 1$ the utility possibilities frontier shifts inward and the household ends up at point A. In the second period, because of the increase in joint household resources due to OJT, the utilities possibility frontier expands and the household would be located at point C, in case there was no shift in intra-household bargaining power. However, because of limited commitment and the endogeneity of the intra-household bargaining power, the bargaining weights adapt in favour of spouse 1, hence the household reallocates along the outer utility possibility frontier from C to D. The average utility spouse 2 receives from $T = 1$ is given by the average between the distances from the origin to AA, resp BB (since B and D are at the same height on the figure). Hence, in this case spouse 2 would veto the possibility of spouse 1 using the joint surplus to participate in training, $T = 1$.

Effect of children? The empirical findings presented in the paper shows that the effect of children is mixed: whereas the direct predicted effect on (self-financed) OJT of having more (dependent) children is negative, for married individuals more dependent children make them more likely to participate in OJT courses. We could incorporate choice of children in an extended version of our model, by allowing a joint fertility and training choice in the first period, i.e. at $t = 1$ both spouses decide jointly on whether they want to have a child $C = 1$ (versus no child, $C = 0$) and whether or

not spouse 1, which we will consider to be the female spouse in order to correspond to the empirical case, will participate in training. In this setting, it's plausible to argue that the next period bargaining power will depend on both these decisions in $t = 1$, in particular we have that the bargaining weight in period 2 will now be a function $\alpha(C, T)$. Furthermore, we could adapt assumption B in the following way:

Assumption C.

$$\alpha(1,0) < \alpha \leq \alpha(1,1) < \alpha(0,1).$$

That is, we assume that having a child and training leads to an intermediate outcome in terms of bargaining power for the wife. The case where she participates in training but has no children improves her bargaining the most (which is similar to the baseline version of our model), whereas having a child and not participating in training decreases her bargaining power below her relative say in period $t = 1$. In effect, we are assuming a form of a motherhood penalty, which can be explained through a relative loss in (potential) earnings due to lower labour force attachment during fertility episodes. Consistent with the analysis contained in Blundell et al. (2019), participating in training is then a tool to (partially) offset the earnings losses of fertility episodes, which, in the context of our model, would imply stabilizing relative potential incomes, hence the intermediate outcome of bargaining power present in assumption C. Turning to the first period choice for training, we reconsider (11). Given assumption C, it is clear that in contrast to our restricted model, there is now more scope for spouse 2 to agree with $T = 1$, given that $\alpha \leq \alpha(1,1) < \alpha(0,1)$. In a sense, given that training only partially offsets relative earnings losses, it's possible that (11) is positive when $C = 1 = T$, but negative for $C = 0, T = 1$.

Initial bargaining power. Returning to (11), notice that the initial bargaining power of spouse 2 co-determines the sign of the difference between the overall utility of $T = 1$ vs the overall utility when $T = 0$. In particular, the higher the initial bargaining weight attached to the utility of spouse 2, $1 - \alpha$, the less likely (s)he is to agree with spouse 1 to use the joint household resources to participate in training, i.e. $T = 1$. This is very intuitive: higher levels of initial bargaining power means that spouse 2 has even more incentives to preserve this strong bargaining position, especially in case the relative increase in joint household resources due to $T = 1$ is lower. This result is also very useful from an empirical point of view, since it constitutes a testable implication of our model. Indeed, if we would extend our model to allow for observable variables to influence the (intial) bargaining weights[45], such as

[45]Variables which are assumed to impact the household decisions only through bargaining and not

for example relative potential wages. To be more precise, assume we know that the initial bargaining powerα is a function of a variable z and write $\alpha(z)$. Suppose that we further assume that $\frac{d\alpha(z)}{dz} < 0$, i.e. an increase in the variable z (e.g. the relative potential income of spouse 2 to the potential income of spouse 1) decreases the bargaining power of spouse 1. Then (11) is more likely to be negative, hence it's more likely that the household decision will be given by $T = 0$. This idea will form the basis of our empirical test of the model in the next subsection.

6.2 A test of the bargaining hypothesis

In this section, we return to our empirical analysis and provide some validation of the theoretical model as we sketched out in the previous section. The main testable implication of the theoretical framework is based on the fact that any variable affecting positively the bargaining power of a married individual, should have a positive effect on the likelihood to participate in self-financed training courses.

Therefore, we will first limit our sample to married individuals and analyze how intra-household bargaining power changes the incidence of self-financed training. The main empirical challenge then is to find a set of variables which can be reasonably interpreted as part of the set of factors determining intra-household bargaining power. The literature has offered several examples for such distribution factors, e.g. changes in divorce laws, the sex ratio in the (local) marriage market (Chiappori et al. (2002), Voena (2015)), the eligibility for a conditional cash transfer (e.g. PROGRESA in Mexico, as studied by Attanasio and Lechene (1994)). Another candidate as distribution factor is the *relative potential wage* between the household members (e.g. Aizer (2010)).

In the present paper, we will make use of relative potential wages. The main problem is to have a reasonable measure of the former. Notice that the observed relative wages are not a good alternative to capture bargaining power, as these don't properly capture outside options which affect reservation utilities. For example, consider the case where one of the two household members is not currently active on the labour market. In that case, (s)he does not earn a wage, which could underestimate the effective bargaining power of the particular household member. Indeed, once that household member chooses to become active again on the labour market, (s)he might again have access to a high wage. Therefore, we need some more exogenous source

directly through preferences or the budget constraint are usually referred to as *distribution factors*, see e.g. (Browning et al., 1994).

of relative outside offers in the labour market (i.e. relative potential wages).

We proceed as follows: first, we define groups ('types') of individuals based on a set of observable characteristics, in particular their (i) gender, (ii) age category and (iii) sector (first digit of the 1980 NACE classification).[46] Conditional on each type, say $\tau = g, a, s$ (g denotes gender, a refers to age and s to sector), we can compute the observed wage distribution for this type τ. For each individual i we then compute,

$$\bar{w}_{i,\tau,t} = \frac{\sum_j w_{j,\tau,t} - w_{i,\tau,t}}{N_\tau - 1}, \tag{12}$$

where $w_{i,\tau,t}$ denotes the (real) hourly wage level of individual i in wave t who is of type τ. Hence, $\bar{w}_{i,\tau,t}$ refers to the mean wage over all individuals of type τ, excluding individual i. Obviously, for any given household, we can compute the expression (12) for both spouses (say $\bar{w}_{i,\tau,t}$ and $\bar{w}_{-i,\tau',t}$). Next, let $Z_{i,t} = \frac{\bar{w}_{-i,\tau',t}}{\bar{w}_{i,\tau,t}+\bar{w}_{-i,\tau',t}}$, denote the average relative potential wages for the household of respondent i given that i's type is given by τ and his/her spouse's type is τ'. We then estimate the relative potential wage for the household of respondent i in year t, denoted by $\widehat{Rw}_{i,t}$, by regressing the effective relative wages within the household on a set of observable demographic characteristics and $Z_{i,t}$,

$$Rw_{i,t} = \mathbf{X}'_{i,t}\beta + \gamma Z_{i,t} + \alpha_r + \alpha_t + \varepsilon_{i,t}. \tag{13}$$

Notice that (13) can be interpreted as the first stage of a 2SLS estimation, where we instrument the effective relative wages by the average relative wage measure $Z_{i,t}$.[47] We can then test our theoretical model by regressing the training incidence $T^j_{i,t}$ on $\widehat{Rw}_{i,t}$,

$$T^j_{i,t} = \mathbf{X}'_{i,t-1}\beta_1 + \gamma\widehat{Rw}_{i,t-1} + \alpha_r + \alpha_t + \epsilon_{i,t}, \tag{14}$$

where we also control for our standard set of demographic controls, $\mathbf{X}$ as well as for region and time fixed effects. Before continuing, we first represent the densities of relative potential wages for men and women:

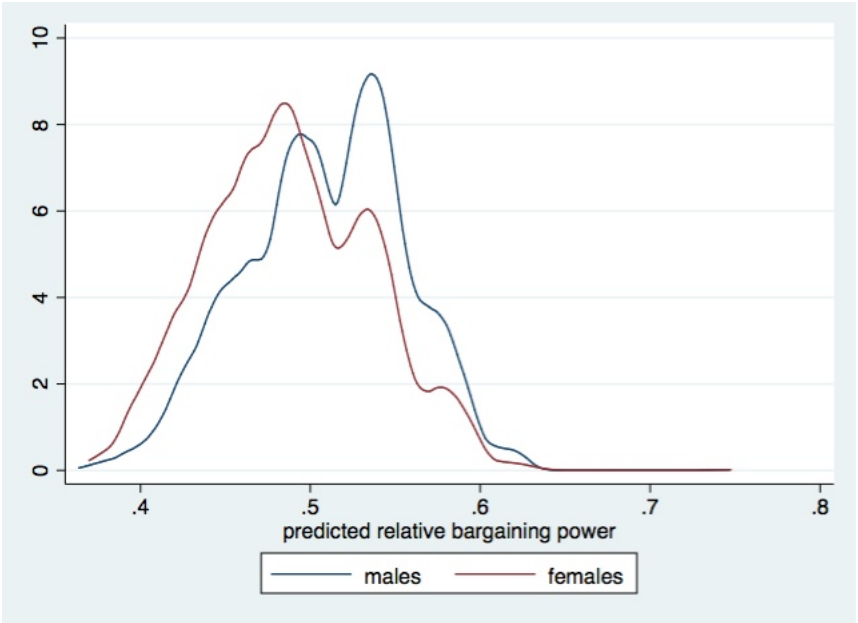
As we can see, predicted intra-household bargaining power for male workers seems to be shifted to the right, compared to their female counterparts.[48] Next, we present the estimation results of (14) in Table 15:

[46] We use 4 age categories: 25$\leq$ age $\leq$ 35, 35 $<$ age $\leq$ 45, 45$<$ age $\leq$ 55 and 55$\leq$ age $\leq$ 65.

[47] Importantly, exogeneity of $Z_{i,t}$ is obtained by computing this average for a household by leaving out the effective wage information from this household.

[48] This is also confirmed by a Kolmogorov-Smirnov test of difference in distributions.

Figure 2: Relative potential wages



Source: BHPS waves 1998-2008. Sample includes married or cohabiting couples. Predicted relative wages refer to $\widehat{Rw}_{i,t}$. All monetary values are deflated by the 2005 UK CPI.

Table 15: Training and intra-household bargaining power

	$Rw_{i,t}$ (1st stage)	$T^{SF}_{i,t}$	$T^{FF}_{i,t}$
$Z_{i,t}$	0.826***		
	(0.0413)		
Female$_i$		0.0219***	-0.0184*
		(0.00499)	(0.0112)
# Child$_{i,t-1}$		-0.00599**	-0.0133*
		(0.00241)	(0.00723)
$\widehat{Rw}_{i,t-1}$		-0.152*	0.289
		(0.0830)	(0.188)
Observations	8,982	5,510	5,510
R-squared	0.073	0.022	0.071
F-stat (1st stage)	28.73		

Notes: estimation on the sample of married workers in paid employment, *** p<0.01, ** p<0.05, * p<0.1. Set of controls include age of the individual, age squared, education level of the spouse, number of children in the household and the interaction between gender and number young children. Education consists of 5 categories, based on highest educational achievement reported by the respondent: Commercial or other qualifications, O level GCE, A level GCE, Other high qualification and higher degree. Further controls include: household income (including non-labour income sources), a dummy indicating union membership. Firm size refers to the number of employees working in the firm, as given in the answer to 'jbsize' in the survey. All monetary values are deflated by the CPI with 2014 as reference

First, the first stage results are reasonably good: we see that the effective relative wages are strongly positively correlated with, $Z_{i,t}$, with a coefficient equal to 0.826. Furthermore, the F-statistic of the regression is equal to 28.73, which is above the traditional cut off for detecting a weak instruments problem. We see that higher intra-household bargaining power, associated with a decrease in $\widehat{Rw}_{i,t-1}$, is predicted to have a positive effect (though rather with some imprecision) on the participation likelihood of self-financed training courses. In contrast, and consistent with the fact we didn't see a significant effect of being married to firm-financed training, we don't find any significant effect of relative potential wages on the probability to participate in firm-sponsored training courses.

7 Conclusion

In this paper, we used detailed training information from a British panel dataset (BHPS) to study how demographic characteristics of workers are related to their likelihood to participate in OJT courses. The BHPS allows us to distinguish between different funding sources for OJT, in particular whether the training was self-financed or employer-sponsored. The results in the paper shows that employer-sponsored training seems to be less correlated with participants' demographic characteristics, but more with participant-specific effects (e.g. productivity) and labour force attachment. In contrast, self-financed OJT incidence does seem to be related to gender, household composition and marital status. In particular, we find that women and singles have higher participation rates. The effect of having more (dependent) children is mixed: the direct effect is negative, however, for married individuals having more children increases the likelihood to participate in self-financed training courses. These results hold through all our robustness checks. The latter also seems to rule out more obvious mechanisms through which marriage could have a negative impact on the likelihood to participate in self-financed OJT.

Therefore, in the last part of the paper, we presented a very simple theoretical framework to show how marriage can impede on (self-financed) training incidence. The key feature of the model is that households are characterised by some form of sharing of resources and have to bargain over the joint household resources, in the spirit of the large literature on collective household models, and where the current decision to partake in training by one spouse affects the future bargaining power. This endogeneity of bargaining power clearly leaves open the possibility that households

take an inefficient training decision, since the spouse who loses bargaining power might try to block the opportunity of the other to participate in OJT. Finally, we test our simple simple model using a testable implication that married individuals with larger initial bargaining power within their household should have a higher likelihood to participate in (self-financed) OJT. To do this, we made use of the relative potential wage of an individual to his/her spouse.

The results in this paper complement those from Blundell et al. (2019) and highlight the need to better understand the heterogeneity in OJT rates between individuals based on marital status. Indeed, we have presented evidence that marital status might impact the likelihood to invest in OJT (as shown by the differential impact of the number of dependent children for married versus single individuals). Hence, even though a discussion on optimal policies is beyond the scope of the present paper and left for future work, the empirical results suggest that policies aimed at stimulating OJT should pay attention to the composition of households. In this sense, intra-household dynamics can be seen as an additional policy instrument in the toolkit of policy makers. Policies could be designed to strengthen the intra-household bargaining power of those workers who are more likely to engage in OJT activities, e.g. women post-motherhood that have lost some of their intra-household bargaining power. Indeed, similar types of targeted interventions have been used in several contexts and have been shown to affect intra-household outcomes, e.g. in the context of conditional cash transfers within PROGRESA targeted towards mothers in rural Mexico (e.g. Attanasio and Lechene (1994)) or child allowance in the UK (e.g. Lundberg et al. (1997)).

8 Appendix

A.1 Summary statistics of the dataset

We provide some summary statistics of certain demographic characteristics of the workers present in our sample. We also show how the average training rate evolves as a function of the individual's age. We notice that, whereas for males the training rate decreases monotonically as a function of age, the average training rate for females increases at their later thirties and early forties, which is consistent with the empirical results shown in Blundell et al. (2019). Similar patterns can be observed when comparing singles and married individuals, where the latter their average training rate seems to increase in the age range of later thirties and early forties. We can also decompose

the average training rate in employer-sponsored and self-financed training rates. For self-financed training rates, we observe that, across the working age range, both singles and women have higher average participation rates than resp. their married or male counterparts.

Table A1: Descriptive statistics

	Mean	St. dev.
Female	0.48	0.49
Married	0.56	0 .49
Age	35.82	11.86
# Child	0.44	0.81
Home ownership	0.77	0.42
Hourly wage male workers	13.72	9.73
Hourly wage female workers	10.65	9.42

Source: BHPS waves 1998-2008, main sample consisting of individuals, aged between 25 and 65. All monetary values are deflated by the CPI with 2014 as reference year.

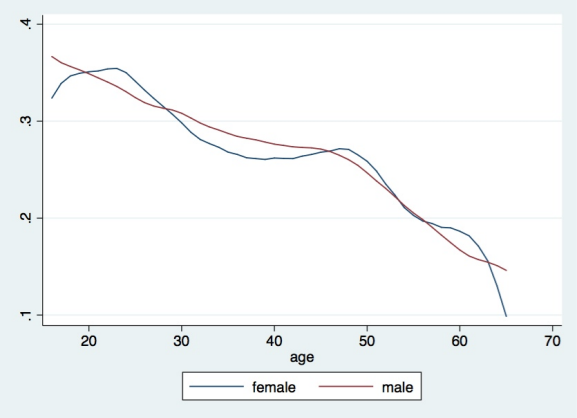
Table A2: Training and education in the BHPS

	Female	Male	Married	Single
Training firm-sponsored				
Low degree	0.0878	0.0747	0.0862	0.0740
O level	0.1859	0.1562	0.1594	0.1826
A level	0.1816	0.1480	0.1490	0.1809
Higher degree	0.3901	0.4256	0.4483	0.3618
Other higher qf.	0.1546	0.1956	0.1571	0.201
Training firm-sponsored				
low degree	0.0569	0.0588	0.0845	0.0291
O level	0.1801	0.1453	0.1580	0.1744
A level	0.171	0.1834	0.1635	0.1890
Higher degree	0.4171	0.3564	0.4033	0.381
Other higher qf.	0.1754	0.2561	0.1907	0.2267

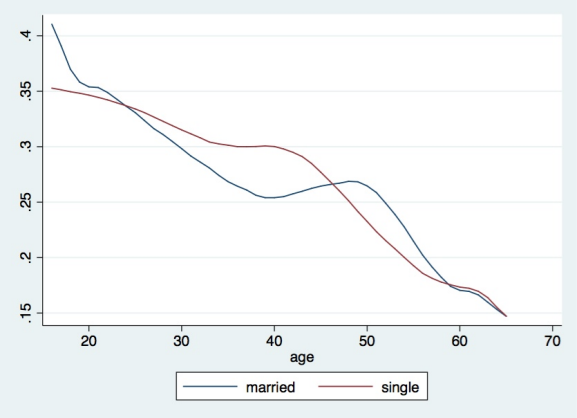
Source: BHPS waves 1998-2008, main subsample consists of individuals aged between 16 and 65. Firm-sponsored training is a dummy equal to one if the individual reports 'no fees paid' or 'employer paid fees'. Self-sponsored training is a dummy equal to one in case the respondent answers 'yes' to 'fees paid by self/family'. Intensity of self-financed and firm-sponsored training refers to the sum of the length (measured in days) of all reported self-financed, resp. firm-sponsored training courses. Education classes are defined using the highest degree reported in the survey, contained in the variable 'qfedhi'. Low degree refers to commercial qualification, apprenticeships, other or no qualifications. Higher degree refers to academic degree, first degree or teaching qualification.

Figure A1: Training and age

(a) Gender



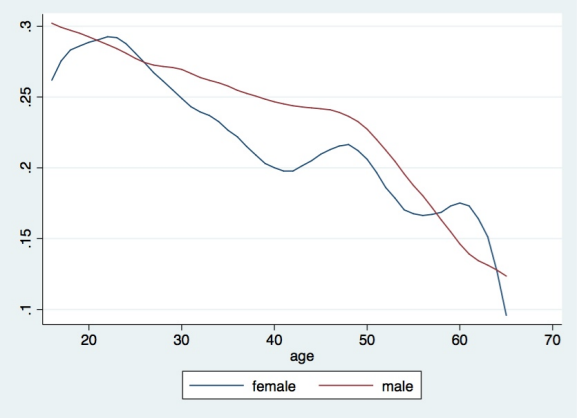
(b) Marital status



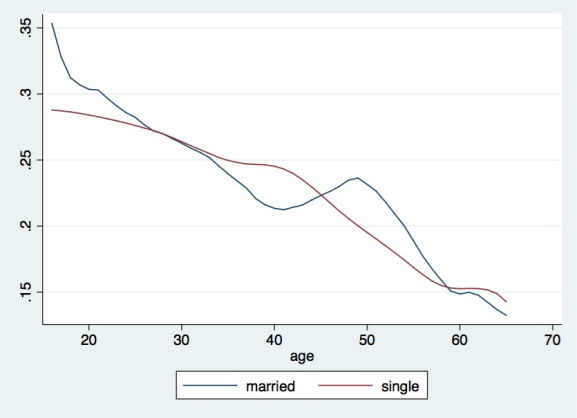
Source: BHPS waves 1998-2008. Main sample consists of individuals aged between 16 and 65

Figure A2: Employer-sponsored training and age

(a) Gender



(b) Marital status



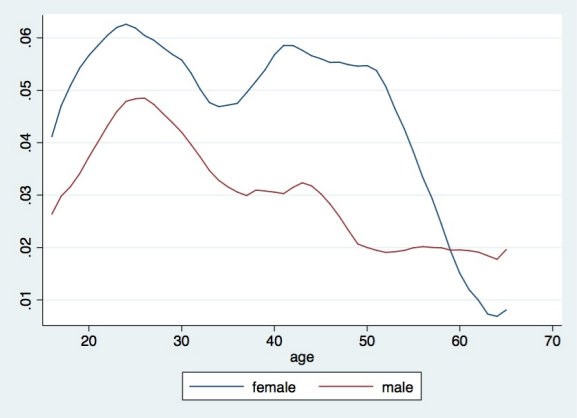
Source: BHPS waves 1998-2008. Main sample consists of individuals aged between 16 and 65

A.2 Firm size categories

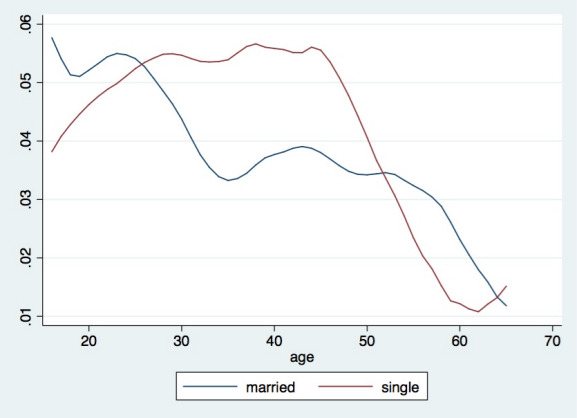
Firm size categories are defined by the range of employees at the workplace, as given by 'jbsize' in the BHPS survey, in particular (i)1-2, (ii) 3-9, (iii) 10-24, (iv) 25-49, (v) 50-99, (vi) 100-199, (vii) 200-499, (viii) 500-999, (ix) $\geq$ 1000. The distribution in the data across these categories is represented in figure A4:

Figure A3: Self-financed training and age

(a) Gender

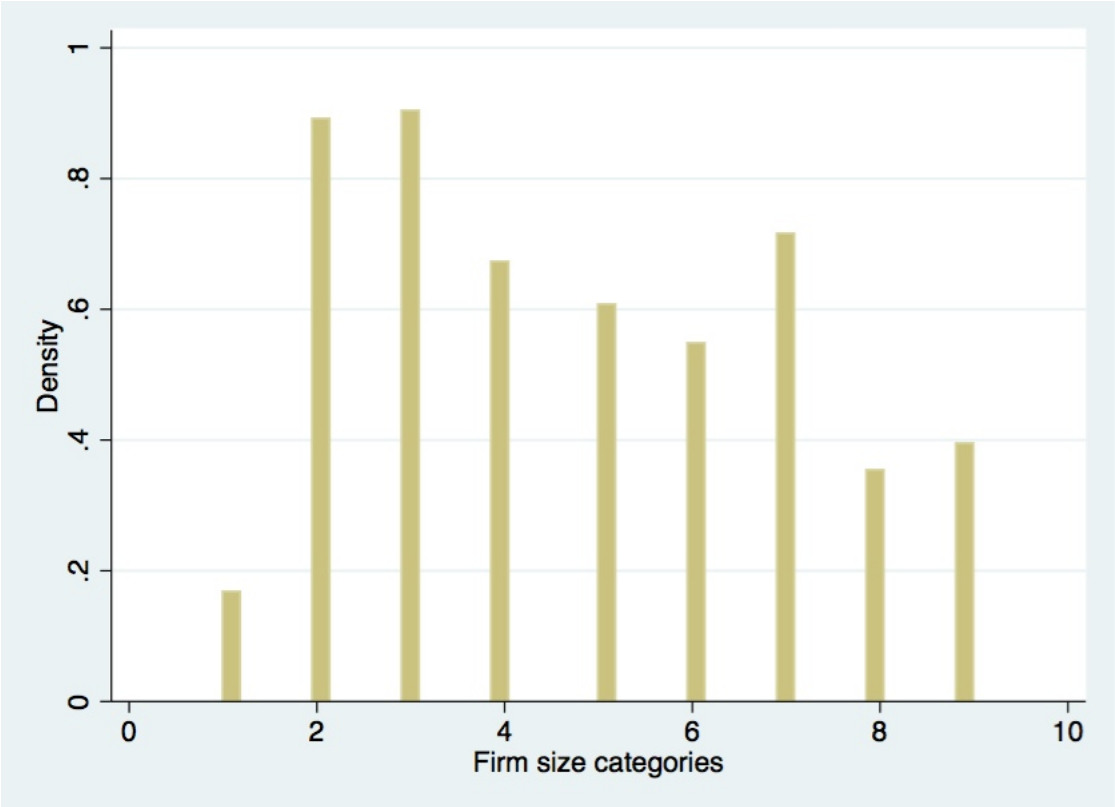


(b) Marital status



Source: BHPS waves 1998-2008. Main sample consists of individuals aged between 16 and 65

Figure A4: Firm size categories



Source: BHPS waves 1998-2008.

A.3 Intensive margin of training: counts

While we studied the extensive margin in the main text, we can also analyze the relationship of a measure of the intensive margin and demographic characteristics. As a measure for the intensive margin of training, we can distinguish between the following: (i) length of training (number of days), $Length\_T^j_{i,t}$ where $j = SF, (ii) FF$, (ii) $\#T^j_{i,t}$, which counts the number of courses in the year before the interview and (iii) $CountTr^j_{i,t}$, counting the total number of courses followed over the years before the current survey year (which we also used in the main text.) All regression results are contained in Tables A3

Table A3: Training: intensive margin (OLS)

	(1)		(2)
	$Length\_T^{FF}_{i,t-1}$		$Length\_T^{SF}_{i,t}$
$Female_i$	0.728		27.53
	(0.653)		(25.16)
$Age_{i,t-1}$	-1.263***		1.519
	(0.253)		(1.583)
$Age^2_{i,t-1}$	0.0143***		-0.0208
	(0.00302)		(0.0211)
# $Child_{i,t-1}$	-0.120		-7.048
	(0.843)		(7.476)
$Female_i$ × # $Child_{i,t-1}$	0.0902		-10.09
	(0.589)		(9.056)
$Married_{i,t-1}$	-1.679***		-9.624
	(0.624)		(8.274)
$Married_{i,t-1}$ × # $Child_{i,t-1}$	0.687		12.69
	(0.806)		(12.52)
Observations		9,979	9,979
R-squared	0.033		0.008

Notes: estimation on the full sample of workers in paid employment, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: "Commercial or other qualifications", "O level GCE, A level GCE", "Other high qualification and higher degree". Each specification includes wave fixed effects, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

A.3.1 Descriptive statistics for robustness checks

Table A4: Descriptive statistics: variables used in robustness checks

		Female	Male	Married	Single
# $Notwork_{i,t}$					
	Mean	8.18	6.75	4.53	11.09
	standard dev.	16.64	15.60	12.52	19.13
$Markethours_{i,t}$					
	Mean	6.89	8.88	7.84	8.08
	standard dev.	2.38	2.01	2.55	2.2
$Homehours_{i,t}$					
	Mean	2.36	0.91	1.88	1.21
	standard dev.	1.78	0.85	1.68	1.26

Source: BHPS waves 1998-2008, main subsample consists of individuals aged between 16 and 65.

A.3.2 Credit constraint

The BHPS asks respondents about problems related to housing payments (rents, mortgages etc.) In the main text, we made use of these answers to construct an indicator of possible financial constraints (. The latter might be very relevant for those individuals willing to participate in courses which they finance themselves. Table A5 gives an overview about some correlations we find in the data between our indicator of payment problems and the characteristics of the respondent.

Higher income levels are negatively correlated with having payments problems, as is being married, the latter showing that, ignoring potential payment problems or credit constraints might bias downwards the real causal effect of being married on the likelihood to follow self-financed training courses. Renters seem more likely to report problems with housing-related payments, which is probably due to the selection effect that respondents with less financial means are more likely to rent instead of buying their own home. Finally, we included several measures of recent unemployment incidence. First, $\text{Unempl}_{i,t-1}$ is a dummy indicating whether or not the respondent was in unemployment at the interview before the current survey year. # weeks $\text{Unempl.}_{i,t}$ and # Spells $\text{Unempl.}_{i,t}$ are measures of the intensive margin of unemployment experience in the year before the current interview. The former measures

the total number of weeks in unemployment, the latter the number of unemployment events (spells). we observe that having been in unemployment and the number of unemployment spells are positively correlated with payments problems, which shows some reasonable validation of the answers to payment problems in the data.

Table A5: Credit constraints and characteristics

	$CC_{i,t}$	$CC_{i,t}$	$CC_{i,t}$	$CC_{i,t}$
$Female_i$	0.00428	0.00568	0.00695	0.00700
	(0.00420)	(0.00470)	(0.00459)	(0.00459)
$Age_{i,t}$	-3.61e-05	-0.000141	-0.000156	-0.000161
	(0.000182)	(0.000184)	(0.000182)	(0.000183)
# $Child_{i,t}$	0.0494***	0.0495***	0.0510***	0.0509***
	(0.0111)	(0.0111)	(0.0102)	(0.0101)
$Married_{i,t}$	0.00288	-0.000923	-0.0106**	-0.00892*
	(0.00583)	(0.00593)	(0.00538)	(0.00536)
$Married_{i,t} \times$ # $Child_{i,t}$	-0.0301***	-0.0301***	-0.0300***	-0.0299***
	(0.0109)	(0.0109)	(0.00989)	(0.00985)
$Female_i \times$ # $Child_{i,t}$	-0.00304	-0.00349	-0.00365	-0.00413
	(0.00564)	(0.00565)	(0.00550)	(0.00550)
$HH.Income_{i,t}$	-0.0306***	-0.0247***	-0.00920***	-0.0121***
	(0.00423)	(0.00455)	(0.00325)	(0.00320)
$Renter_{i,t}$	0.0795***	0.0770***	0.0834***	0.0844***
	(0.00640)	(0.00641)	(0.00604)	(0.00605)
$Unempl_{i,t-1}$				0.0658***
				(0.0191)
# *weeks Unempl.*$_{i,t}$			0.000361	
			(0.00104)	
# *Spells Unempl.*$_{i,t}$			0.0554***	
			(0.0175)	
Observations	14,729	14,729	16,443	16,472
Sample	In paid empl.	In paid empl.	In paid empl.	Full sample
R-squared	0.042	0.041	0.041	0.041

Notes: Estimation in the first 3 columns is on the sample of workers in paid employment, last column on the full sample, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: Commercial or other qualifications, O level GCE, A level GCE, Other high qualification and higher degree. CredCons$_{i,t}$ is a dummy variable equal to one in case the respondent reports any problem paying for housing, has delay in paying for housing for more than 2 months, whether payments pertaining to housing required cutbacks etc. All monetary values are deflated by the CPI with 2014 as reference year.

In terms of childcare activities, we can exploit a survey question in the BHPS, which asks respondents about who is mainly responsible for childcare. Using the answers to this question, we construct a new dummy variable $ChildCare_{i,t}$, which takes

the value of 1 in case either the respondent indicates (s)he is mainly responsible for childcare or both parents are both sharing childcare responsibilities. Table A6 shows the results of adding childcare responsibilities as an extra control. We again observe no changes in our main results. Furthermore, the predicted effect of $ChildCare_{i,t-1}$ on the likelihood to participate in self-financed OJT is positive, though close to zero (and statistically insignificant). A positive sign is in accordance with the findings from Blundell et al. (2019), in the sense that individuals who take up childcare responsibilities have incentives to use OJT in order to compensate earnings losses due to these childcare activities (and hence less continuous labour force attachment.)

Table A6: Training and childcare responsibilities

	Any		Employer-sponsored		Self-financed	
	(1)	(2)	(3)	(4)	(5)	(6)
	$T_{i,t}$	$T_{i,t}$	$T^{FF}_{i,t}$	$T^{FF}_{i,t}$	$T^{SF}_{i,t}$	$T^{SF}_{i,t}$
$Female_i$	0.0138	0.0178	0.00111	0.00424	0.0144***	0.0173***
	(0.0109)	(0.0134)	(0.0106)	(0.0117)	(0.00498)	(0.00535)
$\#\ Child_{i,t-1}$	-0.0161**	-0.00111	-0.0134*	0.0178	-0.00860***	-0.0169**
	(0.00720)	(0.0205)	(0.00768)	(0.0228)	(0.00260)	(0.00700)
$Female_i \times \#\ Child_{i,t-1}$		-0.0129		-0.0159		-0.00376
		(0.0122)		(0.0121)		(0.00496)
$Married_{i,t-1}$	-0.00985	-0.00912	-0.000239	0.00393	-0.0128***	-0.0159***
	(0.0132)	(0.0118)	(0.0117)	(0.0136)	(0.00466)	(0.00523)
$Married_{i,t-1} \times Child_{i,t-1}$		-0.0127		-0.0317		0.0124*
		(0.0208)		(0.0224)		(0.00748)
$ChildCare_{i,t-1}$	0.0164	0.0255	0.0179	0.0342*	0.00378	0.00140
	(0.0157)	(0.0221)	(0.0168)	(0.0189)	(0.00629)	(0.00656)
$\hat{\alpha}_i$	0.0278***	0.0278***	0.0217***	0.0219***	0.00460	0.00443
	(0.00689)	(0.00721)	(0.00751)	(0.00610)	(0.00287)	(0.00306)
Observations	8,030	8,030	8,030	8,030	8,030	8,030
R-squared	0.102	0.102	0.091	0.091	0.023	0.023

Notes: Estimation on the sample of workers in paid employment, *** p<0.01, ** p<0.05, * p<0.1. Education consists of 5 categories, based on highest educational achievement reported by the respondent: Commercial or other qualifications, O level GCE, A level GCE, Other high qualification and higher degree.In each specification we control for individual's age, age squared and include wave fixed effects, region fixed effect, 1-digit industry fixed effects (based on the first digit of the 1980 NACE classification of industrial sectors), 1-digit occupation fixed effects (based on the first digit of the Standard Occupational Classification), household income (including non-labour income sources), a dummy indicating union membership and firm size, i.e. the number of employees working in the firm, as given in the answer to 'jbsize' in the survey). All monetary values are deflated by the CPI with 2014 as reference year.

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