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Till Evasion Does Us Part: Marriage as a Determinant for Tax Evasion

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Till evasion does us part: Marriage as a determinant for tax evasion

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Abstract

This paper studies whether the landmark ruling “Radmacher v Granatino 2010” changed individual tax avoidance in the UK through an increase in the enforceability of marriage contracts. I argue that the probability of divorce and the probability of marriage contracts being enforceable influence married individuals’ tax evasion behaviour as they try to divert income from their spouses. In a model, I show that when the probability that a marriage contract is enforceable increases, married individuals divert less of their income, and that when the probability of divorce increases, married individuals divert more of their income. In addition, when the applicable tax rate increases, I show that married individuals divert more of their income. In a difference-in-difference setting comparing married self-employed and married employed households in the UK and extending Pissarides and Weber’s (1989) traces of true income procedure, I show that “Radmacher v Granatino 2010” however did not seem to significantly reduce income misreporting by married self-employed households.

JEL: H26, J12

Keywords: tax evasion, marriage, divorce, marriage contract, family

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1. Introduction

This paper studies whether the landmark ruling “Radmacher v Granatino 2010” changed individual tax avoidance in the UK by increasing the probability that marriage contracts are enforceable in the UK. Historically, marriage contracts were not recognised in the UK due to public policy reasons. “Radmacher v Granatino 2010” changed this and allowed British courts to enforce prenuptial agreements (Vardags Limited, 2020).

I provide a simple reason for integrating the spouse into the standard analysis of individual tax evasion decisions. Married individuals have to split income according to a given rule in the case of divorce. This means that a spouse can de facto impose taxes on the other individual’s income when marital income is split, and has an incentive to detect and punish any tax evasion. Thus, the tax authority and the spouse have a common goal, namely to reduce income diversion by the individual. Yet, in a standard tax evasion setting, the individual’s decision to divert income is assumed to be influenced only by the state’s ability to detect and punish tax evasion.

The spouse’s ability to de facto tax any reported income influences the individual’s income in the case of divorce and therefore influences the individual’s decision to divert income as she tries to hide income from the spouse. Given this procedure, signing an enforceable marriage contract allows the spouses to control how much of their individual incomes will be given to the respective other spouse in the event of divorce, reducing the de facto taxation by the spouse. Without an enforceable marriage contract, a divorce imposes an effective 50% tax on an individual’s income as marital income is shared equally between the spouses. My claim is that the probabilities of divorce and of the enforceability of a marriage contract influence the individual’s tax evasion decision as she tries to hide her income from the spouse in an effort to maximize expected income.

In a model which incorporates this insight, I show that when the probability that a marriage contract is enforceable increases, married individuals divert less of their income, and that when the probability of divorce increases, married individuals divert more of their income. In addition, when the applicable tax rate increases, I show that married individuals divert more of their income.

Empirically, I analyse whether “Radmacher v Granatino 2010” increased income misreporting by married households through an increase in the enforceability of marriage contracts in the UK. I estimate this effect in a two-step procedure. First, I estimate a difference-in-difference model comparing married self-employed and married employed households’ food expenditure.

“Radmacher v Granatino 2010” serves as an exogenous jump in marriage contract enforceability. I use data from the UK Family Expenditure Survey and Living Costs and Food Survey between 2001 and 2017. My main sample comprises 28,955 households, 20% of which are self-employed.

Since the main outcome of interest is not the change in food expenditure but the change in income misreporting, in a second step I extend Pissarides and Weber’s (1989) traces of true income procedure. This allows me to use my difference-in-difference results to derive the change in income misreporting by married households following the introduction of “Radmacher v Granatino 2010”. Pissarides and Weber’s (1989) traces of true income procedure essentially rests on the assumption that only the self-employed households can misreport income while both self-employed and employed households report food expenditure correctly.

I conclude from my empirical analysis that “Radmacher v Granatino 2010” did not seem to significantly reduce income misreporting by married self-employed households. This might be due to the following three reasons: First, there might be an issue of time dependency: If an individual misreported income in the past, “Radmacher v Granatino 2010” might not change this. The reasons for this might be that the probability of divorce as well as the probability of getting detected by the wife for past misreporting might rise. Second, Pissarides and Weber’s (1989) method relies on the fact that the truthfulness of reporting income and reporting food expenditures differ. However, this might not be the case. Third, “Radmacher v Granatino 2010” might not have led to a sufficiently high rise in marriage contract enforceability. Marriage contracts might need to surpass a certain enforceability threshold in order to have a significant effect on income misreporting by married self-employed households.

My paper contributes to the literature in two ways. First, I contribute by analysing the extent to which the enforceability of marriage contracts influences individual tax evasion. To the best of my knowledge, I am the first to analyse this relationship. In this respect, this paper has important tax policy implications. Incorporating marriage law into the fight against tax evasion and the monitoring of tax haven activities by individuals seems to be a worthwhile avenue for tax policy makers. Second, this paper is the first to extend Pissarides and Weber (1989)’s traces of true income procedure to a difference-in-difference setting and thus allows to analyse differential effects from policy changes on income misreporting.

The remainder of this paper is structured as follows. Section 2 presents a model of tax evasion considering marriages. Section 3 introduces the institutional details and explains the role of the landmark ruling “Radmacher v Granatino 2010” in the UK. Section 4 introduces the data used

in this study. Section 5 presents the empirical results and section 6 presents robustness checks. Finally, section 7 concludes.

2. Theoretical framework

To examine the relationship between marriage and individual tax evasion, I consider a model in which an individual's tax evasion decision is influenced by the probability of divorce, the probability that a marriage contract is enforceable and the tax rate.

2.1. The optimal amount of diversion

Assume that a married household consists of individual 1 and individual 2. Let W_1 be the true income of individual 1 and X_1 be the diverted income of individual 1 (analogously, let W_2 be the true income of individual 2 and X_2 be the diverted income of individual 2). As a consequence, household reported income is $W_{HH} = W_1 - X_1 + W_2 - X_2$.

Individual 1's (analogously, individual 2's) income depends on whether or not he gets divorced (probability q), whether or not a marriage contract is enforceable (probability r), and the tax rate t . If she diverts income, she might be caught and penalized. We model this cost with the following quadratic cost function:

$$C(X_1) = \frac{\alpha + \gamma}{2} X_1^2$$

Where α is a parameter capturing the quality of government tax monitoring, with a higher α indicating a better governance system. γ is a parameter capturing the quality of "spouse governance", i.e. how well the spouse is able to detect and punish diversion. A higher γ indicates a better "spouse governance".

Individual 1's income without divorce is given by

$$(W_1 - X_1)(1 - t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2$$

If individual 1 gets divorced, her income depends on whether or not a marriage contract is enforceable. Without an enforceable marriage contract, household income is split evenly and her income is

$$\frac{1}{2} W_{HH}(1 - t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2 = \frac{1}{2} (W_1 - X_1 + W_2 - X_2)(1 - t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2$$

In case of divorce with an enforceable marriage contract, household income is split according to the terms in the marriage contract. I assume that individuals set up marriage contracts such that they do not lose income to their spouse in case of divorce. Therefore, her income is

$$W_{d1}(1-t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2$$

Where $W_{d1} = W_1 - X_1$ is the reported divorcee income of individual 1 in case of divorce with an enforceable marriage contract.

Therefore, individual 1 determines her optimal diverted income following

$$\begin{aligned} \max_{X_1} \quad & q \left[\underbrace{\left(\frac{1-r}{2} W_{HH}(1-t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2 \right)}_{\text{no enforceable contract}} \right. \\ & + \underbrace{r}_{\text{enforceable contract}} \left\{ W_{d1}(1-t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2 \right\} + \underbrace{(1-q)}_{\text{no divorce}} [(W_1 \\ & \left. - X_1(1-t) + X_1 - \frac{\alpha + \gamma}{2} X_1^2)] \right] \end{aligned}$$

It follows that the optimal diverted income of individual 1 is

$$X_1^* = \frac{1}{\alpha + \gamma} (1 + (1-t) \left(-1 + \frac{1}{2} q - \frac{1}{2} qr \right)).$$

2.2. Comparative statics results

I now determine how optimal diverted income depends on the parameters of the model, r , q , and t .

Differentiating the optimal diverted income with respect to r , we have

$$\frac{\partial X_1^*}{\partial r} = \frac{1}{\alpha + \gamma} (1-t) \left(-\frac{1}{2} q \right) < 0.$$

It follows that when the probability of a marriage contract being enforceable increases, then the optimal diverted income decreases.

Differentiating the optimal diverted income with respect to q , we have

$$\frac{\partial X_1^*}{\partial q} = \frac{1}{\alpha + \gamma} (1-t) \left(\frac{1}{2} - \frac{1}{2} r \right) > 0.$$

Hence, when the probability of divorce increases, the optimal diverted income increases.

Differentiating the optimal diverted income with respect to t , we have

$$\frac{\partial X_1^*}{\partial t} = -\frac{1}{\alpha+\gamma} \left(-1 + \frac{1}{2}q - \frac{1}{2}qr \right) > 0.$$

When the tax rate increases, then the optimal diverted income increases.

All of the above comparative statics results seem very intuitive.

2.3. The dynamic case

I now turn to the case where an individual's decision to divert income is not independent across time periods. Revealing assets now might cause suspicion from the government and/or the spouse concerning previous assets. In order to incorporate this aspect into my analysis, I now turn to the dynamic case in which individual 1's (analogously, individual 2's) decision on how much income to divert depends additionally on the following 2 conditions:

1. Today's decision are influenced by past declarations because these determine the penalty if caught.
2. Today's decision influences the future because the stochastic penalty is in effect delayed.

I consider a myopic and a consistent individual in turn. A myopic individual only considers condition 1, whereas a consistent individual considers both condition 1 and 2.

2.3.1. Myopic individual

If individual 1 is myopic, she determines her optimal diverted income in period t following

$$\begin{aligned} \max_{X_{1t}} \quad & \underbrace{q}_{\text{divorce}} \left[\underbrace{(1-r)}_{\text{no enforceable contract}} \left\{ \frac{1}{2} W_{HHt}(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2 \right\} \right. \\ & + \underbrace{r}_{\text{enforceable contract}} \left\{ W_{d1t}(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2 \right\} \\ & \left. + \underbrace{(1-q)}_{\text{no divorce}} [(W_{1t} - X_{1t})(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2] \right] \end{aligned}$$

The only term which is different to the static case is the dynamic penalty term. Since X_{1t} only enters the dynamic penalty term in one period, the results are the same as in the static case. The optimal diverted income in period t is

$$X_{1t}^* = \frac{1}{\alpha+\gamma} (1 + (1-t) \left(-1 + \frac{1}{2}q - \frac{1}{2}qr \right)).$$

2.3.2. Consistent individual

If individual 1 is consistent, she maximizes her lifetime utility to determine the optimal diverted income in period t :

$$\begin{aligned} \max_{X_{1t}} \frac{1}{T} \sum_1^T \{ & q \left[(1-r) \left\{ \frac{1}{2} W_{HHt}(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2 \right\} \right. \\ & \left. + r \left\{ W_{d1t}(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2 \right\} \right] \\ & \left. + (1-q) \left[(W_{1t} - X_{1t})(1-t) + X_{1t} - \sum_{\tau=1}^t \frac{\alpha+\gamma}{2} X_{1\tau}^2 \right] \right\} \end{aligned}$$

The optimal diverted income in period t is thus

$$X_{1t}^* = \frac{1}{(T-t)(\alpha+\gamma)} (1 + (1-t) \left(-1 + \frac{1}{2}q - \frac{1}{2}qr \right)).$$

Compared with the static case, only the term $\frac{1}{(T-t)(\alpha+\gamma)}$ has changed. Therefore, interpretations stay similar as in the static case.

Since $\frac{1}{(T-t)(\alpha+\gamma)} < \frac{1}{\alpha+\gamma}$, we can conclude that a consistent individual will divert less than a myopic individual. It is therefore short-sighted to evade taxes!

3. Institutional background

Most developed countries around the world recognise marriage contracts (Rosen, 2020). In England and Wales, however, marriage contracts historically were not legally enforceable for public policy reasons: Historically, women were not able to bargain on equal terms. In addition, it was feared that marriage contracts would encourage divorce (Vardags Limited, 2020). However, in the landmark ruling “Radmacher v Granatino 2010”, the validity of marriage contracts was reconsidered: Marriage contracts became legally enforceable and thus changing societal and judicial views on the personal autonomy of married partners were recognised (Vardags Limited, 2020).

Katrin Radmacher, a German heiress to a paper company, and Nicolas Granatino, then a French banker, married in London in 1998. Three months before the marriage, they signed a marriage contract in Germany at the instigation of the wife. The contracts stated that neither party would

benefit from the property of the other during or after the marriage. Radmacher and Granatino separated in 2006. By this time, they had two children and the Granatino had left banking to pursue research studies at Oxford. The husband was granted more than £5.5m by High Court in order to give him an annual income of £100,000 for life and enable him to buy a home in London where his children could visit him. At High Court, the marriage contract was taken into account but its importance was reduced due to the circumstances in which it was signed. The wife then appealed successfully to the Court of Appeal where the marriage contract was given decisive weight. The Court of Appeal argued that the husband should only be granted provision for his role as the father of the two children and not for his own long-term needs. The husband then appealed to the Supreme Court which dismissed his appeal (UK Supreme Court, 2009). The Supreme Court argued that, if freely entered into, with all information available to both parties and in the absence of pressure, marriage contracts should be upheld.

After 2010, prenuptial agreements can be enforced by the British courts as long as the three stage Radmacher test³ is met and it is considered fair to do so, keeping in mind the interests of any child of the family (Vardags Limited, 2020). Therefore, since 2010 marriage contracts have a higher likelihood of being enforceable in court in the UK than before. However, the enforceability of marriage contracts is still not anchored in the British law and it is therefore up to the British courts to decide on individual divorce cases (Vardags Limited, 2020).

The introduction of “Radmacher v Granatino 2010” acts as a natural experiment providing a plausibly exogenous increase in the probability that marriage contracts are enforceable. I exploit this exogenous shift in a difference-in-difference setting with married self-employed as the treated group and married employees as the control group.

4. Data

To analyse the effect of an increase in marriage contract enforceability, I use data from the UK Family Expenditure Survey and Living Costs and Food Survey between 2001 and 2017. This is a nationally representative repeated cross-sectional survey on individuals, conducted by the UK Office for National Statistics. It enables me to observe the development of food expenditure in UK households both before and after “Radmacher v Granatino 2010”.

³ Following the Radmacher test, three questions need to be answered: “Were there circumstances attending the making of the agreement which should detract from the weight which should be accorded to it?”, “Did the foreign elements of the case enhance the weight that should be accorded to the agreement?” and “Did the circumstances prevailing at the time the court made its order make it fair or just to depart from the agreement?” (The Supreme Court of the United Kingdom, 2010).

I include only married households with two adults to ensure comparability of the treatment and control groups. Further, I only include households which are either self-employed or employed (no retired or unemployed households). A household is defined to be self-employed if at least one adult is self-employed⁴. My main sample comprises 28,955 households, 20% of which are self-employed.

Self-employed households do not systematically earn more than employees, although the variation in income is higher. In addition, food consumption expenditures are similar for self-employed and employed households (see table 1). The size of the sample is distributed evenly across years (see table 2). Similarly, the distribution of self-employed/ employees stays constant across observation years (see figures 1 and 2). Therefore, we do not need to worry about the stable unit treatment variation assumption. Further descriptive statistics can be found in Appendix A.1. I account for group differences by including a rich set of control variables in the regression equation.

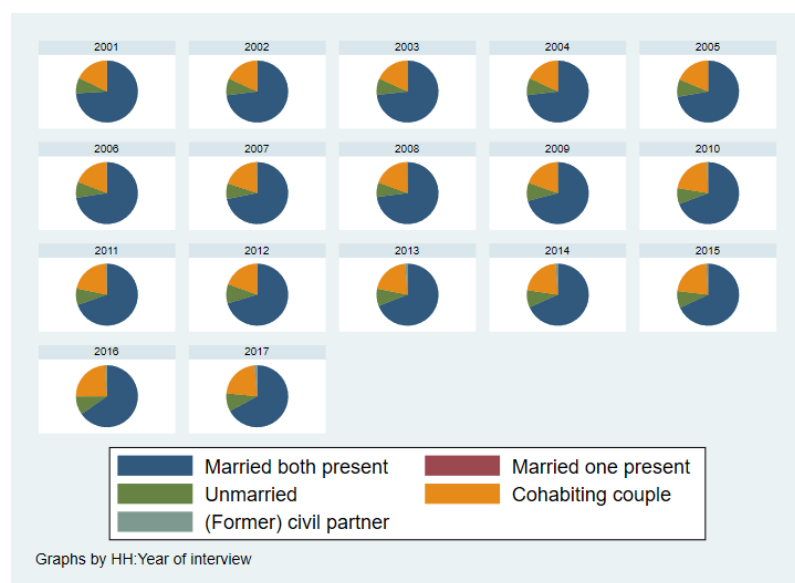


Figure 1: Distribution of marital status by year, 2001-2017. I include only households with two adults. “Married both present” means that the two adults in the household are married. “Married one present” means that at least one of the two adults is married, without her spouse living in the same household. “Unmarried” means that the two adults are not married. “Cohabiting couple” means that the two adults are a cohabiting couple without being married. “(Former) civil partner” means that the two adults are (former) civil partners.

⁴ In robustness checks, I use different definitions for self-employment, which leave results basically unchanged. See Appendix A.2.



Figure 2: Distribution of self-employed and employed households by year, 2001-2017.

Self-employment	Freq.	Mean(inc)	Sd(inc)	Mean(FOOD)	Sd(FOOD)
0	23058	729.246	452.518	58.666	30.348
1	5897	733.418	510.425	62.864	33.459

Table 1: Summary statistics of households in the sample, 2001-2017. Pre-tax income and food expenditures are given on a weekly basis.

HH:Year of interview	Freq.	Percent	Cum.
2001	1679	5.80	5.80
2002	2147	7.41	13.21
2003	2137	7.38	20.59
2004	2101	7.26	27.85
2005	2026	7.00	34.85
2006	2008	6.93	41.78
2007	1782	6.15	47.94
2008	1665	5.75	53.69
2009	1641	5.67	59.35
2010	1443	4.98	64.34
2011	1597	5.52	69.85
2012	1590	5.49	75.34
2013	1416	4.89	80.23
2014	1421	4.91	85.14
2015	1388	4.79	89.94
2016	1379	4.76	94.70
2017	1535	5.30	100.00
Total	28955	100.00	

Table 2: Tabulation of number of households by year of interview, 2001-2017.

5. Empirical analysis

5.1. Empirical method

To analyse whether “Radmacher v Granatino 2010” led to a change in income misreporting through increasing the likelihood of marriage contract enforceability, I first estimate a difference-in-difference model with the change in food expenditure as an outcome variable, comparing married self-employed households and married employed households. However, the main outcome of interest is not the change in food expenditure but the change in income misreporting after the introduction of “Radmacher v Granatino 2010”. Hence, in a second step I extend Pissarides and Weber (1989)’s traces of true income procedure⁵ and use the change in food expenditure to derive the change in income misreporting.

Using the change in food expenditure to derive the change in income misreporting (Pissarides and Weber, 1989) is suitable to estimate the effect of “Radmacher v Granatino 2010” on married households’ income misreporting under the following four Pissarides and Weber (1989) assumptions:

1. All income groups report expenditure on food⁶ correctly.
2. Employees report income correctly. Their taxes are filed directly by the employer, leaving them with no opportunity to misreport their incomes.
3. Some self-employed under-report their income. Compared with employees, self-employed have much more opportunity to under-report their incomes since they file taxes independently of an employer.
4. The relationship between income and food expenditure is the same for employees and self-employed⁷.

⁵ Traces of true income procedures are used to estimate income misreporting. They compare an indicator of the true tax base such as expenditure to reported income. This gives an estimation of income misreporting when the true tax base (e.g. expenditure) diverges from reported income (Slemrod, 2019).

⁶ Following Pissarides and Weber (1989) and Schuetze (2002), I assume that food is the most accurately reported expenditure. It is recorded daily from a diary which one of the members of the household keeps for one week. It is unlikely that the person who fills out the diary misreports food expenditure for tax reasons because food is seemingly small. On top of this, the person filling in the diary usually does not earn the income in families with only one income (Pissarides and Weber, 1989).

⁷ Food tastes are likely to be uniformly distributed across employees and self-employed because food is a necessity. In addition, households typically cannot postpone food consumption and therefore food expenditures due to transitory shocks.

5.1.1. Difference-in-difference estimation method

To estimate the change in log food expenditure by married self-employed households after the introduction of “Radmacher v Granatino 2010”, I use a difference-in-difference regression, comparing married self-employed households with married employed households.

In my dataset, under the Pissarides and Weber (1989) assumptions, only married self-employed households are able to misreport income. Therefore, they form the treated group: Their income misreporting might be affected by a change in the enforceability of marriage contracts. Married employed households are not able to misreport income: they file taxes directly with the employer. Hence, they form the control group: Their income misreporting behaviour remains unaffected by a change in the enforceability of marriage contracts.

I run a regression of the following form:

$$\ln FOOD_{ist} = \alpha + \beta SelfEmpl_s + \delta PostRadmacher_t SelfEmpl_s + \lambda Controls_{ist} + \alpha_2 \ln ReportedIncome_{ist} + \lambda_t + u_{ist} \quad (1)$$

$\ln FOOD_{ist}$ is log household food expenditure. $SelfEmpl_s$ is a dummy which is 0 for employed households and 1 for self-employed households. $PostRadmacher_t$ is a dummy which is 0 in periods before the introduction of “Radmacher v Granatino 2010” and 1 thereafter. $\ln ReportedIncome_{ist}$ is log after-tax income. The year-fixed effects allow to control for common time trends affecting the dependent variables such as economic and social shocks. I include the following control variables to account for potential omitted variables: age of head of household (squared), number of kids in the household (squared), number of kids aged 1-4, number of kids aged 5-17, region, quarter of interview.

I assume that after-tax income is measured with an error and I assume that the error is heteroscedastic. Therefore, I use an instrumental variable approach, where reported income is treated as endogenous. Specifically, I estimate the following first-stage regression:

$$\ln ReportedIncome_{sgt} = \delta_1 Controls + \zeta X_{sgt} + \theta_{sgt} \quad (2)$$

Where X_{sgt} are the instruments: head of household’s education level, number of cars, and self-employment indicator interacted with, respectively, age of head of household (squared), number of kids in the household (squared), number of kids aged 1-4, number of kids aged 5-17, region, quarter of interview.

5.1.2. Traces of true income method

The difference-in-difference estimation allows to estimate the change in log food expenditure after the introduction of “Radmacher v Granatino 2010”. However, the true variable of interest is the change in log income misreporting. In order to derive this, I extend Pissarides and Weber (1989)’s traces of true income procedure. Using the change in food expenditure after the introduction of “Radmacher v Granatino 2010” for married self-employed households allows to calculate the change in non-compliance by married self-employed after the introduction of “Radmacher v Granatino 2010”.

The food expenditure function is modelled as

$$\ln FOOD_{sgt} = \alpha_1 Controls_{sgt} + \alpha_2 \ln Y_{sgt}^P + \varepsilon_{sgt} \quad (3)$$

where α_1 is a vector of parameters and α_2 is a scalar “marginal propensity to consume” food. ε_{sgt} is white noise. I assume that food consumption decisions are influenced by permanent income⁸ Y_{sgt}^P . It is likely to be less variable than observed income (Pissarides and Weber, 1989). Following Pissarides and Weber (1989), I refer to this as permanent income.

Following Pissarides and Weber (1989), reported income Y_{sgt}^R differs from permanent income Y_{sgt}^P for the following two reasons:

1. There is non-compliance by the self-employed:

$$Y_{sgt}^T = k_{sgt} Y_{sgt}^R \quad (4)$$

where Y_{sgt}^T is true income. k_{sgt} is a random variable which shows the extent of under-reporting of income by the household. The bigger k_{sgt} , the more under-reporting there is by the household.

2. True and reported income differ due to transitory shocks:

$$Y_{sgt}^T = p_{sgt} Y_{sgt}^P \Leftrightarrow Y_{sgt}^P = \frac{Y_{sgt}^T}{p_{sgt}} \quad (5)$$

where p_{sgt} is a random variable. The expected value of p_{sgt} of each household depends on aggregate events: in a “good” year, p_{sgt} has a mean above unity.

Following Pissarides and Weber (1989), equations (4) and (5) imply that

⁸ Following Pissarides and Weber (1989), I do not require that the expenditure function conforms to the permanent income hypothesis.

$$\ln(Y_{sgt}^P) = \ln(Y_{sgt}^R) + \ln(k_{sgt}) - \ln(p_{sgt}) \quad (6)$$

The underlying assumptions of equations (4) and (5) imply that using reported income in place of unobserved permanent income in equation (3), two additional random regressors, namely $+\ln(k_{sgt})$ and $-\ln(p_{sgt})$, enter the equation with coefficient α_2 (Pissarides and Weber, 1989).

Because both k_{sgt} and p_{sgt} are unobserved, I follow Pissarides and Weber (1989) and make assumptions on their distribution over households. This allows estimations to be tractable. I assume that both k_{sgt} and p_{sgt} are log-normally distributed as follows:

$$\ln(p_{sgt}) = \mu_p + u_{sgt} \quad (7)$$

$$\ln(k_{sgt}) = \mu_k + v_{sgt} \quad (8)$$

u_{sgt} and v_{sgt} are random variables with mean zero and constant variances σ_u^2 and σ_v^2 within each of the groups (self-employed and employees). At this point, assumptions about covariation between u_{sgt} , v_{sgt} and ε_{sgt} are not necessary (Pissarides and Weber, 1989).

Following Pissarides and Weber (1989) I argue that

1. Employees report incomes correctly, hence $k_{sgt} = 1$ and $\sigma_v^2 = 0$ for employees. For self-employed, $k_{sgt} > 1$ and $\sigma_v^2 > 0$.
2. The mean of p_{sgt} is the same for employees and self-employed, but the measured income of the self-employed may be more variable than the measured income of the employees, i.e. $\overline{p_{EE}} = \overline{p_{SE}}$ but $\sigma_{uSE}^2 > \sigma_{uEE}^2$ with subscripts EE for employees and SE for self-employed.

By the log-normality of p_{sgt} , it holds that

$$\ln(\bar{p}) = \mu_p + \frac{1}{2}\sigma_u^2 \Leftrightarrow \mu_p = \ln(\bar{p}) - \frac{1}{2}\sigma_u^2 \quad (9)$$

And hence that

$$\mu_{pSE} - \mu_{pEE} = -\frac{1}{2}(\sigma_{uSE}^2 - \sigma_{uEE}^2) \leq 0 \quad (10)$$

where subscripts EE are for employees and subscripts SE are for self-employed (Pissarides and Weber (1989)).

Substituting (6), (7) and (8) into (3), we have

$$\begin{aligned}
\ln FOOD_{sgt} &= \alpha_1 Controls + \alpha_2 \ln Y_{sgt}^R + \alpha_2 \ln k_{sgt} - \alpha_2 \ln p_{sgt} + \varepsilon_{sgt} \\
&= \alpha_1 Controls + \alpha_2 \ln Y_{sgt}^R - \alpha_2 (\mu_p - \mu_k) - \alpha_2 (u_{sgt} - v_{sgt}) + \varepsilon_{sgt} \quad (11)
\end{aligned}$$

If I estimate equation (11) separately for the self-employed and for employees, but impose the restriction that α_1 and α_2 must be common, then the intercepts of the equations differ since $\mu_p - \mu_k$ are not the same for self-employed and employees. In addition, the variance of the errors of each equation should differ because the self-employed generally have a bigger variance. The difference in estimates can be used to obtain an estimate of income under-reporting for the married self-employed (Pissarides and Weber, 1989).

Specifically, I make use of the difference-in-difference estimation results from table 4. We can conclude from the discussion of equation (11), that δ in equation (1) estimates

$$\begin{aligned}
\delta &= \left\{ \left[\left(-\alpha_2 (\mu_p^{SEMarrPost} - \mu_k^{SEMarrPost}) \right) - \left(-\alpha_2 (\mu_p^{SEMarrPre} - \mu_k^{SEMarrPre}) \right) \right] \right. \\
&\quad \left. - \left[\left(-\alpha_2 (\mu_p^{EEMarrPost} - \mu_k^{EEMarrPost}) \right) \right. \right. \\
&\quad \left. \left. - \left(-\alpha_2 (\mu_p^{EEMarrPre} - \mu_k^{EEMarrPre}) \right) \right] \right\} \\
&= \alpha_2 \left(\mu_k^{SEMarrPost} - \mu_k^{SEMarrPre} + \frac{1}{2} (\sigma_{uSEMarrPost}^2 - \sigma_{uEEMarrPost}^2) \right. \\
&\quad \left. - \frac{1}{2} (\sigma_{uSEMarrPre}^2 - \sigma_{uEEMarrPre}^2) \right) \quad (12)
\end{aligned}$$

$$\begin{aligned}
&\Leftrightarrow (\mu_k^{SEMarrPost} - \mu_k^{SEMarrPre}) \\
&= \frac{\delta}{\alpha_2} - \frac{1}{2} (\sigma_{uSEMarrPost}^2 - \sigma_{uEEMarrPost}^2) \\
&\quad + \frac{1}{2} (\sigma_{uSEMarrPre}^2 - \sigma_{uEEMarrPre}^2) \quad (13)
\end{aligned}$$

From the estimate of δ one cannot isolate μ_k because of the difference in the variance of $\ln(p_{sgt})$. However, under the assumption of log normality I can write

$$\ln \bar{k} = \mu_k + \frac{1}{2} \sigma_{vSE}^2$$

Where \bar{k} is the mean value of k_{sgt} , i.e. the number by which average reported self-employment income has to be multiplied to give average true income (Pissarides and Weber, 1989).

From this, it follows that equation (13) can be transformed to

$$\begin{aligned}
\ln \bar{k}_{dd} &= (\ln \bar{k}_{SEMarrPost} - \ln \bar{k}_{SEMarrPre}) \\
&= \frac{\delta}{\alpha_2} - \frac{1}{2} (-\sigma_{vSEMarrPost}^2 + \sigma_{uSEMarrPost}^2 - \sigma_{uEEMarrPost}^2) \\
&\quad + \frac{1}{2} (-\sigma_{vSEMarrPre}^2 + \sigma_{uSEMarrPre}^2 - \sigma_{uEEMarrPre}^2) \quad (14)
\end{aligned}$$

Importantly, p_{sgt} and k_{sgt} are unobserved. Hence, it is not possible to obtain estimates of their variances and no single estimate of the degree of non-compliance can be calculated as suggested in equation (14) (Pissarides and Weber, 1989).

Instead, I calculate an income equation to obtain estimates of the income variances of errors for the self-employed ($\sigma_{\lambda SE}^2$) and for employees ($\sigma_{\lambda EE}^2$), separately (Pissarides and Weber, 1989). This allows to draw inferences on $\ln \bar{k}_{dd}$.

The income equation can be written as in equation (2) where X_{sgt} are a set of identifying instruments. θ_{sgt} is a composite of the following errors: unexplained variations in permanent income, deviations of actual from permanent income, u_{sgt} , and deviations of actual from reported income, v_{sgt} . By the properties of u_{sgt} and v_{sgt} for self-employed and employees, the residual income variance of the self-employed should exceed the residual income variance of the employees (Pissarides and Weber, 1989). This is confirmed in my data.

Assuming that the unexplained variations in permanent income in equation (2) have the same variance for employees and self-employed and that employees do not under-report their incomes, the difference between the residual variances of reported income can then be written as

$$\sigma_{\lambda SE}^2 - \sigma_{\lambda EE}^2 = \sigma^2(u - v)_{SE} - \sigma_{uEE}^2 = \sigma_{uSE}^2 + \sigma_{vSE}^2 - 2cov(u, v)_{SE} - \sigma_{uEE}^2 \quad (15)$$

Comparing equations (14) and (15), we see that we need additional information in order to calculate a range for mean under-reporting (Pissarides and Weber, 1989).

Let's consider variations in the variances σ_{vSE}^2 and σ_{uSE}^2 satisfying equation (15) for given values of the other variances (which I treat as parametric) and given $cov(u, v)_{SE}$. I can show that for $cov(u, v)_{SE} = 0$, there is a small well-determined range for mean under-reporting⁹ (Pissarides and Weber, 1989).

⁹ If $cov(u, v)_{SE} \neq 0$, then one needs further information on the distribution of u and v in order to be able to calculate a range for under-reporting. However, it is possible to show by example that even high $cov(u, v)_{SE}$ do not affect the previously estimated range by much. The covariance might be non-zero if self-employed do not equally under-report when they have a particularly good or a particularly bad earnings situation compared to their

For $cov(u, v)_{SE} = 0$, σ_{vSE}^2 and σ_{uSE}^2 are negatively related in equation (15). Therefore, equation (14) gives a lower bound for mean under-reporting when σ_{vSE}^2 takes its lowest value and an upper bound when σ_{uSE}^2 takes its lowest value (Pissarides and Weber, 1989).

The lowest possible value for σ_{vSE}^2 is 0 (Pissarides and Weber, 1989). Equation (14) and (15) imply that the lower bound satisfies

$$\ln \bar{k}_{dd}^L = \frac{\delta}{\alpha_2} - \frac{1}{2}(\sigma_{\lambda SEMarrPost}^2 - \sigma_{\lambda EEMarrPost}^2) + \frac{1}{2}(\sigma_{\lambda SEMarrPre}^2 - \sigma_{\lambda EEMarrPre}^2) \quad (16)$$

The lowest possible value for σ_{uSE}^2 is σ_{uEE}^2 because we have argued that self-employed incomes have at least as much variance as employed incomes (Pissarides and Weber, 1989). Therefore, equations (14) and (15) imply that the upper bound is

$$\ln \bar{k}_{dd}^U = \frac{\delta}{\alpha_2} + \frac{1}{2}(\sigma_{\lambda SEMarrPost}^2 - \sigma_{\lambda EEMarrPost}^2) - \frac{1}{2}(\sigma_{\lambda SEMarrPre}^2 - \sigma_{\lambda EEMarrPre}^2) \quad (17)$$

Equations (16) and (17) are subject to variables which are known and therefore yield solutions to the variable of interest $\ln \bar{k}_{dd}$.

5.2. Empirical results

5.2.1 Differences-in-differences results

I estimate a differences-in-differences model with the change in food expenditure as the dependent variable and using “Radmacher v Granatino 2010” as an exogenous cut-off. Married self-employed households serve as the treated group and married employed households form the control group.

Figure 3 shows the evolution of the average log food expenditure across households in the treatment and control group. It becomes apparent that, while married self-employed households had on average larger log food expenditure than married employed households, their time trends were quite similar before the introduction of “Radmacher v Granatino 2010”.

To test the parallel trends assumption and the evolution of coefficients over time, I employ a regression with leads and lags similar to Autor (2003):

average income. The covariance is only zero if the self-employed under-reports no matter how the income turned out in a particular year (Pissarides and Weber, 1989).

$$\ln FOOD_{ist} = \sum_{k=-10}^6 \alpha_k D_{ist}^k SelfEmpl_s + \beta SelfEmpl_s + \lambda_t + \lambda Controls_{ist} + \alpha_2 \ln ReportedIncome_{ist} + u_{ist}$$

The variables of interest are the dummies D_{ist}^k which indicate points in time k periods from the introduction of “Radmacher v Granatino 2010” and are interacted with the $SelfEmpl_s$ dummy. As is standard in the event studies literature, we omit the indicator for period $t-1$, which hence serves as the benchmark year. λ_t are year-fixed effects. Figure 4 plots the difference-in-difference coefficients and confidence intervals using leads and lags of treatment following equation x. The year 2010 is left out and not interacted with the $SelfEmpl_s$ dummy, leaving us with sixteen yearly estimates of interaction terms. As can be seen, the coefficients before the introduction of “Radmacher v Granatino 2010” are statistically insignificant and relatively constant. These coefficient estimates are depicted using event study tests in Figure 4, along with their 95% confidence interval. This confirms that there is no significantly different development of log food expenditure between married self-employed and married employed households before the introduction of “Radmacher v Granatino 2010”.

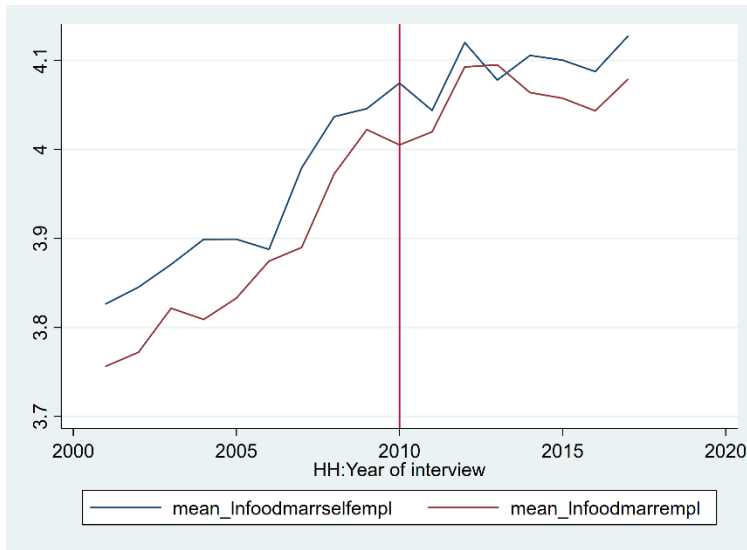


Figure 3: Log food expenditure over time, married self-employed vs. married employees.

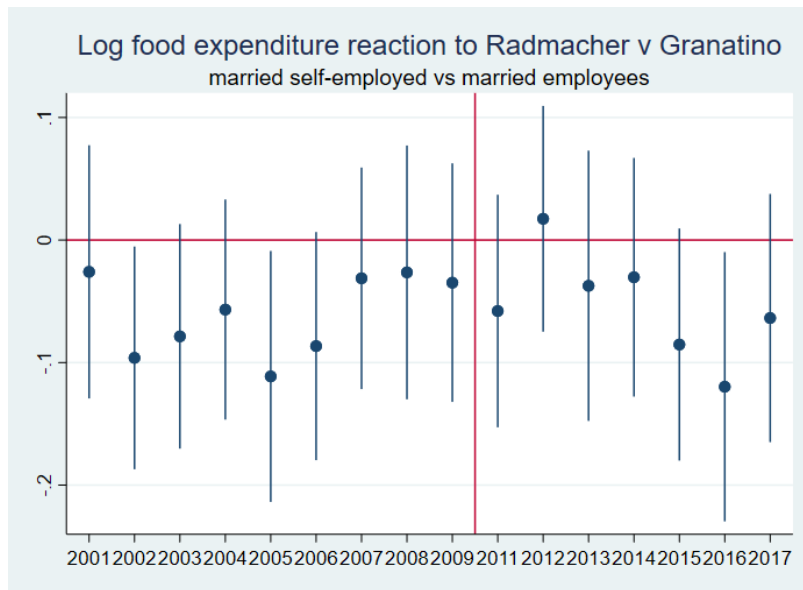


Figure 4: Leads and lags for log food expenditure, married self-employed vs married employees.

The results from estimating equation (1) are shown in table 4. Column (1) reports the regression results without controls and column (2) includes control variables. As might be expected, log reported income (*lninc*) has a strongly significantly positive effect on log food expenditure both with and without controls. The variable of interest is the interaction term (*interactionselfempl*) of the post-“Radmacher v Granatino 2010” dummy and the self-employment dummy. It is an indicator for whether “Radmacher v Granatino 2010” induced married self-employed households to change their food expenditure. We observe a negative effect of -0.5%. However, this result has to be taken with a grain of salt because it is not significant.

VARIABLES	(1) baseline	(2) controls
lninc	0.495*** (0.0161)	0.320*** (0.0482)
has_selfempltot	0.0895*** (0.0127)	0.0393*** (0.0126)
interactionselfempl	0.00388 (0.0204)	-0.00510 (0.0193)
year	0.00952*** (0.000970)	0.0131*** (0.00154)
Constant	-18.42*** (1.901)	-24.71*** (2.880)
Observations	28,467	28,467
R-squared	0.033	0.164

Table 3: Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

*Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

5.2.2. Traces of true income results

Since the main variable of interest is not food expenditure but the change in income misreporting, I use my difference-in-difference results (see section 5.2.1) to extend Pissarides and Weber’s (1989) traces of true income procedure and derive the change in misreporting following the introduction of “Radmacher v Granatino 2010”.

From the regression results of equation (1), we know that $\delta = -0.00510$ and that $\alpha_2 = 0.320$. Running regression equation (2) separately for married self-employed and employees pre- and post-“Radmacher v Granatino 2010”, respectively, gives $\sigma_{\lambda SEMarrPost}^2 = 0.3037$, $\sigma_{\lambda SEMarrPre}^2 = 0.4564$, $\sigma_{\lambda EEMarrPost}^2 = 0.2042$, and $\sigma_{\lambda EEMarrPre}^2 = 0.2036$. We plug in the respective regression results into equations (16) and (17) and obtain $\ln \bar{k} \in [-0.09; 0.06]$. This means that the introduction of “Radmacher v Granatino 2010” seems to have led to an on average -9% to 6% change in non-compliance by married self-employed households.

Therefore, one can conclude that the introduction of “Radmacher v Granatino 2010” did not lead to a significant change in income noncompliance by married self-employed households in the UK.

This might be due to the following three reasons: First, there might be an issue of time dependency: If an individual misreported income in the past, “Radmacher v Granatino 2010” might not change this. The reasons for this might be that the probability of divorce as well as the probability of getting detected by the wife for past misreporting might rise. Second, Pissarides and Weber’s (1989) method relies on the fact that the truthfulness of reporting income and reporting food expenditures differ. However, this might not be the case: Why should people lie about reported income but tell the truth about food expenditures? Third, “Radmacher v Granatino 2010” might not have led to a sufficiently high rise in marriage contract enforceability. “Radmacher v Granatino 2010” enabled courts to enforce marriage contracts. However, it might be the case that only anchoring them in national law leads to a sufficiently large increase in the enforceability of marriage contracts in order to significantly change income misreporting. Marriage contracts might need to surpass a certain enforceability threshold in order to have a significant effect on income misreporting by married self-employed households.

6. Robustness Tests

The main message of the baseline regression result is that “Radmacher v Granatino 2010” did not seem to lead to significant change in income misreporting by married self-employed households in the UK. To check for the robustness of my empirical results, I run several different specifications of equation (1).

First, I estimate equation (1) with alternative definitions of self-employment. I classify a household to be self-employed if self-employment is its main source of income in table 7 in appendix A.2. In addition, Table 9 in appendix A.2 defines a self-employed household as one where both adults are self-employed. Further, I exclude households with 2 self-employed adults and define a self-employed household as one where one adult is self-employed in table 10 in appendix A.2. Results do not change materially.

In addition, I replicate the analysis on winsorized samples. Winsorizing the sample at the 99th percentile (table 11 in appendix A.3) and at the 95th percentile (table 12 in appendix A.3) leaves the results basically unchanged.

Moreover, I re-run equation (1) using other items of expenditure to check the consistency with our estimates with food expenditures. Specifically, I use clothing expenditure, maintenance services expenditures, housings expenditures, and rent expenditures as alternative left-hand variables. Table 12 in appendix A.4 shows that results remain robust for housings expenditures, clothing expenditures and maintenance expenditures. For rent expenditure, results become significantly negative. It might be hypothesized that rent expenditures do not fulfil the Pissarides and Weber (1989) assumptions discussed previously and thus are not suitable to measure non-compliance behaviour.

Finally, I exclude households with non-positive incomes in table 13 in appendix A.5. Results remain unchanged.

7. Conclusion

This paper studies whether the landmark ruling “Radmacher v Granatino 2010” changed individual tax avoidance in the UK. “Radmacher v Granatino 2010” led to an increase in the probability that marriage contracts are enforceable in the UK: Since 2010, prenuptial agreements can be enforced by the British courts.

The reason for which the spouse should be incorporated into the standard tax evasion analysis lies in the simple observation that the tax authority and the spouse have a common goal, namely to reduce income diversion by the individual. The spouse's ability to de facto tax any reported income influences the individual's income in the case of divorce and therefore influences the individual's decision to divert income as she tries to hide income from the spouse. Without an enforceable marriage contract, a divorce imposes an effective 50% tax on an individual's income as marital income is shared equally between the spouses. Signing an enforceable marriage contract allows the spouses to control how much of individual incomes will be given to the respective other spouse in the event of divorce, reducing the de facto taxation by the spouse.

In a model which incorporates this insight, I show that when the probability that a marriage contract is enforceable increases, married individuals divert less of their income, and that when the probability of divorce increases, married individuals divert more of their income. In addition, when the applicable tax rate increases, I show that married individuals divert more of their income.

Empirically, I analyse the effect of "Radmacher v Granatino 2010" on married income misreporting. I estimate a difference-in-difference model with married self-employed households as the treated group and married employed households as the control group. I then use Pissarides and Weber's (1989) traces of true income procedure to derive the change in income misreporting. I show that "Radmacher v Granatino 2010" did not seem to significantly reduce income misreporting by married self-employed households. This might be due to the following three reasons: First, there might be an issue of time dependency: coming clean about income misreporting now might be connected with increased probabilities of divorce and of the spouse increasingly questioning previous income periods. In addition, Pissarides and Weber's (1989) assumptions on food being reported correctly and income potentially being reported incorrectly might not be entirely valid in my dataset. Finally, it might be the case that "Radmacher v Granatino 2010" did not lead to a sufficiently large change in marriage contract enforceability in the UK. "Radmacher v Granatino 2010" allowed British courts to enforce marriage contracts, but it did not yet anchor marriage contracts in the British law.

Despite these possible caveats, this paper suggests that incorporating the spouse into the fight against tax evasion and the monitoring of tax haven activities by individuals might be worthwhile for tax policy makers.

8. Appendix

Appendix A.1 Additional descriptive statistics

Married households

	mean	sd	min	max	N
lninc	6.463	.529	-3.219	10.564	28929
lnFOOD	3.941	.603	-1.609	6.307	28861
agehd min40	6.707	11.919	-24	50	28955
agehd min40sq	187.045	258.043	0	2500	28955
numhhkid	1.008	1.121	0	7	28955
numhhkidsq	2.274	3.617	0	49	28955
GLC	.082	.275	0	1	28955
NOR	.301	.459	0	1	28955
KIDS1	.238	.512	0	3	28955
KIDS2	.672	.96	0	6	28955
S1	.244	.429	0	1	28955
S2	.419	.493	0	1	28955
S3	.082	.274	0	1	28955

Table 4: Summary statistics for married households, 2001-2017.

Employed households

	mean	sd	min	max	N
lninc	6.474	.491	.658	10.564	23049
lnFOOD	3.928	.599	-1.291	6.112	22990
agehd min40	6.117	11.803	-24	50	23058
agehd min40sq	176.719	245.329	0	2500	23058
numhhkid	1.002	1.104	0	7	23058
numhhkidsq	2.223	3.474	0	49	23058
GLC	.079	.27	0	1	23058
NOR	.312	.463	0	1	23058
KIDS1	.242	.514	0	3	23058
KIDS2	.659	.947	0	6	23058
S1	.244	.429	0	1	23058
S2	.419	.493	0	1	23058
S3	.081	.272	0	1	23058

Self-employed households

lninc	6.417	.657	-3.219	9.433	5880
lnFOOD	3.992	.618	-1.609	6.307	5871
agehd min40	9.014	12.091	-20	46	5897
agehd min40sq	227.421	299.294	0	2116	5897
numhhkid	1.034	1.184	0	7	5897
numhhkidsq	2.471	4.121	0	49	5897
GLC	.094	.292	0	1	5897
NOR	.256	.436	0	1	5897
KIDS1	.223	.501	0	3	5897
KIDS2	.721	1.01	0	6	5897
S1	.244	.429	0	1	5897
S2	.418	.493	0	1	5897
S3	.087	.282	0	1	5897

Table 5: Summary statistics for self-employed and employed households, 2001-2017.

Appendix A.2 Robustness to alternative definitions of self-employment

VARIABLES	(1) baseline	(2) controls
lninc	0.544*** (0.0181)	0.334*** (0.0462)
has_selfempltot	0.0943*** (0.0165)	0.0420*** (0.0153)
interactionselfempl	0.0164 (0.0288)	0.00598 (0.0269)
year	0.00859*** (0.00102)	0.0131*** (0.00149)
Constant	-16.88*** (1.991)	-24.84*** (2.773)
Observations	25,786	25,786
R-squared	0.029	0.170

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness to defining a household as self-employed if self-employment is the main source of income - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	(1) baseline	(2) controls
lninc	0.501*** (0.0161)	0.316*** (0.0498)
has_selfempltot	0.0682* (0.0388)	0.0199 (0.0353)
interactionselfempl	0.0672 (0.0546)	0.0591 (0.0496)
year	0.00957*** (0.000917)	0.0130*** (0.00152)
Constant	-18.54*** (1.792)	-24.66*** (2.813)
Observations	28,823	28,823
R-squared	0.029	0.165

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Robustness to defining a household as self-employed if both adults are self-employed - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	(1) baseline	(2) controls
lninc	0.491*** (0.0160)	0.335*** (0.0502)
has_selfempltot	0.0901*** (0.0131)	0.0419*** (0.0131)
interactionselfempl	-0.00423 (0.0212)	-0.0113 (0.0202)
year	0.00974*** (0.000960)	0.0127*** (0.00158)
Constant	-18.83*** (1.881)	-24.06*** (2.949)
Observations	28,065	28,065
R-squared	0.041	0.167

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Robustness to defining a household as self-employed if 1 of the adults are self-employed (dropping households with 2 self-employed adults) - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.3 Robustness to winsorizing

VARIABLES	(1) baseline	(2) controls
lninc	0.488*** (0.0148)	0.316*** (0.0468)
has_selfempltot	0.0841*** (0.0112)	0.0383*** (0.0111)
interactionselfempl	0.00465 (0.0184)	-0.00588 (0.0175)
year	0.00934*** (0.000894)	0.0129*** (0.00148)
Constant	-18.00*** (1.754)	-24.33*** (2.759)
Observations	28,467	28,467
R-squared	0.055	0.187

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness to winsorizing at the 99th percentile - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	(1) baseline	(2) controls
lninc	0.458*** (0.0131)	0.281*** (0.0414)
has_selfempltot	0.0708*** (0.00953)	0.0315*** (0.00930)
interactionselfempl	0.00761 (0.0156)	-0.00425 (0.0148)
year	0.00896*** (0.000762)	0.0126*** (0.00125)
Constant	-17.02*** (1.494)	-23.46*** (2.314)
Observations	28,467	28,467
R-squared	0.070	0.208

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Robustness to winsorizing at the 95th percentile - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.4 Robustness to other items of expenditure

VARIABLES	(1) lnCLOTHING	(2) lnmaintservices	(3) lnHOUSING	(4) lnRENT
lninc	0.556*** (0.121)	1.002*** (0.201)	0.442*** (0.0692)	1.041*** (0.141)
interactionselfempl	0.0132 (0.0442)	-0.115 (0.0724)	-0.0327 (0.0246)	-0.158** (0.0726)
year	-0.00508 (0.00374)	-0.00867 (0.00649)	0.0383*** (0.00216)	0.0202*** (0.00459)
Constant	8.911 (6.955)	13.85 (12.09)	-75.01*** (4.028)	-42.22*** (8.557)
Observations	21,568	12,361	28,510	4,150
R-squared	0.069	0.023	0.091	0.205

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Robustness to using other items of expenditure as left-hand variable - Change after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log clothing expenditure (column 1), log maintenance services expenditure (column 2), log housing expenditure (column 3), and log rent expenditure (column 4). All columns are estimated with controls. Observations are number of households. Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.5 Robustness to excluding households with non-positive incomes

VARIABLES	(1) baseline	(2) controls
lninc	0.495*** (0.0161)	0.320*** (0.0482)
has_selfempltot	0.0895*** (0.0127)	0.0393*** (0.0126)
interactionselfempl	0.00388 (0.0204)	-0.00510 (0.0193)
year	0.00952*** (0.000970)	0.0131*** (0.00154)
Constant	-18.42*** (1.901)	-24.71*** (2.880)
Observations	28,467	28,467
R-squared	0.033	0.164

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 12: Robustness to excluding households with non-positive incomes - Change in log food expenditure after the introduction of “Radmacher v Granatino 2010”, 2001-2017.

Notes: This table reports difference-in-difference estimates of the effect of “Radmacher v Granatino 2010” on log food expenditure without controls (column 1) and with controls (column 2). Interactionselfempl is the interaction term of the self-employment dummy and the post-“Radmacher v Granatino 2010” dummy. Robust standard errors are in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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