Inheritance Taxation and Wealth Effects on the Labor Supply of Heirs

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Abstract

Taxing bequests not only generates direct tax revenue, but can have a positive impact on the labor supply of heirs through wealth effects. This leads to an increase in future labor income tax revenue. How large is this effect? We use a state of the art life-cycle model that we calibrate to the German economy to answer this question. Our model successfully matches quasi-experimental evidence regarding the size of wealth effects on labor supply. Using this evidence directly for a back of the envelope calculation fails because (i) heirs anticipate the reduction in bequests through taxation and adjust their labor supply already prior to the actual act of bequeathing, and (ii) when bequest receipt is stochastic, even those who ex post end up not inheriting anything respond ex ante to a change in the expected size of bequests. We find that for each Euro of bequest tax revenue the government mechanically generates, it obtains an additional 9 Cents of labor income tax revenue (in net present value) through a higher labor supply of (non-)heirs.

JEL Classifications: C68, D91, E21, R21

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1 Introduction

Inheritances are of growing importance for Western economies. Using data from France, Piketty (2011) shows that since the 1950s the annual flow of inheritances has been ever increasing, so that in 2010 it amounted to roughly 15 percent of national income. He also predicts that this share could become as large as 25 percent in the mid 21st century. Following his theoretical arguments, it is quite likely that a similar (and potentially even stronger) trend should be observed in other countries with low economic and population growth such as Spain, Italy and Germany (Piketty, 2011, p.1077). This development clearly highlights the incresing power of an inheritance tax in raising revenue.[1]

Despite the apparent importance of the topic, the incentive costs of inheritance taxation are not very well understood (Kopczuk, 2013). Measuring them empirically is a complicated task, because wealth transfers "are infrequent (at the extreme, occurring just at death), thereby allowing for a long period of planning, making expectations about future tax policy critical and empirical identification of the effect of incentives particularly hard" (Kopczuk, 2013, p.330). Furthermore, inheritances shape incentives along various dimensions, like wealth accumulation, labor supply and entrepreneurship.

In this paper we make progress on the incidence of inheritance taxation by elaborating one particular channel, the labor supply of heirs. To this end, we calibrate a state of the art life-cycle model of labor supply to match quasi-experimental evidence on wealth effects. Using this model, we ask the following question: For any Euro of revenue raised directly through an increase in inheritance taxes, how many cents of additional labor income tax revenue from heirs can the government expect to obtain in the future? We find that for Germany this number is around 9 Cent.

Empirically it is difficult to identify the impact of inheritances on the earnings of heirs. Papers along these lines include Holtz-Eakin et al. (1993), who document the effect of bequests on labor force participation, and Brown et al. (2010), who investigate retirement choices. A clear assessment of the impact inheritances have on the earnings of heirs more generally is however missing. A reason for this is that inheritances can be (imperfectly) anticipated and therefore already shape labor earnings prior to receipt, potentially even from the very beginning of a person's working life. This effect makes identification a complicated task. Nevertheless, there is good quasi-experimental evidence regarding the wealth effect of lottery gains on labor income. As the likelihood of winning the lottery is typically tiny, anticipation effects should hardly stand in the way of a clear identification strategy. Imbens et al. (2001) and Cesarini et al. (2015) quantify the impact of winning the lottery on successive labor income using data from

[1] We use the notions bequest taxes and inheritance taxes interchangeably in this paper albeit the fact that they might have different effects once an individual bequeathes to more than one heir and tax schedules are not proportional. For the experiments carried out in this paper, such a distinction will however play no role.

the U.S. and Sweden, respectively. While being a first rough estimate for the wealth effect on labor supply, these results cannot be taken as a direct measure for the effect of bequests on heirs' labor earnings. For a more precise assessment, one needs to account for exactly those peculiarities of inheritances compared to other forms of unearned income that we just discussed. In fact, accounting for expectations, that is the fact that inheritances are at least to some extend foreseeable, turn out quantitatively important.

To be able to capture the peculiarities of bequests, we build a state of the art life-cycle model that features consumption, labor supply and savings decisions, heterogeneous labor productivity profiles, borrowing constraints, labor income taxes and realistic expectations about the size and timing of bequests. We calibrate our model such that it replicates the quasi-experimental evidence provided by Imbens et al. (2001) and Cesarini et al. (2015). Specifically, we distribute lottery gains among the population of our model in the same size and distribution as in Cesarini et al. (2015) and measure the resulting impulse response function for labor earnings. We then vary preference parameters until the model predicted impulse response matches the empirical one.

In this calibrated model we conduct the following thought experiment: We let the government levy a proportional tax of 1 percent on all bequests and calculate the resulting change in lifetime income and income tax payments for the total population of our model. We find that any Euro of bequests that is taken away from heirs increases their lifetime income by around 20 cent in net present value, that is discounted to the year of inheritance receipt. In terms of income tax payments this means that any Euro of revenue directly obtained through bequest taxes leads to additional tax revenues of around 9 cents (in net present value). Putting this number into perspective, Saez et al. (2012, p.42) find that the marginal excess burden per dollar of federal income tax raised is below 20 cents.

Related Literature. The paper is motivated by a small but growing empirical literature of wealth effects on labor supply. Holtz-Eakin et al. (1993) use IRS data to estimate the effect of inheritances on labor supply. They find strong responses along the extensive margin and smaller effects along the intensive margin. Imbens et al. (2001) is the first paper to use lottery data to estimate the impact of wealth on labor supply. They document that on average a one dollar wealth increase triggers a decrease in earnings of 11 Cents. Cesarini et al. (2015) use a similar setting in Sweden and obtain surprisingly similar numbers. Picchio et al. (2015) study lottery winners in the Netherlands. While they find no effects along the extensive margin, the impact along the intensive margin is a bit smaller than in Imbens et al. (2001) and Cesarini et al. (2015).

Gelber et al. (2016) analyze the wealth effect for individuals who receive disability insurance. The individuals they consider receive around $1,700 of DI benefits per month. The sample is quite particular in the sense that monthly income among the studied subjects is very low, on average around $200 per month. For this particular sample, however, the authors have a very clean identification strategy and find an income effect from one dollar of additional unearned income of about 20 Cents. Bick

et al. (2016) document differences in hours worked across countries at different development stages. They find that both labor force participation (extensive margin) and hours worked conditional on employment (intensive margin) are lower in high income countries. This pattern is very much in line with wealth effects on labor supply.

In a recent study Doorley and Pestel (2016) use the German Socio-Economic Panel (SOEP) to analyze the effect of inheritances on (actual and desired) hours worked, self-employment and hiring of entrepreneurs. The authors find that women who receive an inheritance reduce their labor supply by about 1.5 hours a week, while men's labor supply is by and large unaffected. Furthermore, both men and women are more likely to stay self-employed and male entrepreneurs are more likely to recruit after the receipt of a large inheritance, indicating that the interaction of bequests with borrowing constraints of entrepreneurs is an important channel.

As – owing to the problems mentioned before – it is difficult to empirically identify the effect of inheritances on heirs' labor supply, we follow a different approach. In particular, we build a structural model that is able to (i) replicate wealth effects that are measured in the cleanest experimental studies one can think of, and to (ii) account for the specifics of bequests and gifts. Such a model allows us to perform robustness checks regarding the extent to which agents are able to forecast the receipt of inheritances. We find that the answer to our question is hardly affected by differences in forecasting ability. In particular, any Euro directly raised through bequest taxes leads to an additional 8-10 Cent of labor income tax revenues from heirs and non-heirs. Nevertheless, how much heirs and non-heirs contribute to this overall revenue gain is highly sensitive to the structure of expectations used in the model.

Finally, in a recent paper Koeniger and Prat (2014) analyze the policy implications of wealth effects. In a dynastic Mirrleesian environment, they find that such wealth effects create a force for less educational investment of children from wealthy families.

The remainder of this paper is organized as follows. In section 2 we illustrate the main mechanisms within a tractable two-period model. In particular this section illustrates the difference of inheritances and (unexpected) lottery wins. In section 3 we present the full life-cycle model, the calibration of which is explained in section 4. In section 5 we summarize the results and perform several robustness checks. Section 6 concludes.

2 Two-Period Model

In this section, we illustrate our general idea with the help of a simple two-period model. Individuals make a labor-leisure decision in both periods. With probability p, individuals receive an inheritance of size b. With probability $1-p$, they do not receive an inheritance. Lifetime-utility is given by

$$u(c_1, l_1) + \beta \Big[p u(c_{2b}, l_{2b}) + (1-p) u(c_{2n}, l_{2n}) \Big],$$

where the utility function $u(c,l)$ is assumed to be continuously differentiable, strictly increasing and concave in consumption c, and strictly decreasing and convex in labor l.

The budget constraint in the first period is

$$c_1 + a \leq w_1 l_1 (1 - \tau_l) + T_1.$$

The budget constraint in the second period depends on whether the agent receives a bequest or not (b for bequest, n for no bequest) and is given by

$$c_{2b} \leq w_2 l_{2b} (1 - \tau_l) + (1 + r)a + b (1 - \tau_b) + T_2,$$

respectively

$$c_{2n} \leq w_2 l_{2n} (1 - \tau_l) + (1 + r)a + T_2.$$

In the first period individuals finance their consumption c_1 and savings a by their net labor earnings and lump sum transfers T_1. We assume that labor earnings (i.e. the product of gross wage w and labor effort l) are taxed at a linear rate τ_l. In the second period agents finance their consumption c_{2i} by their return on savings, their net labor earnings and the lump sum transfer T_2. Further, in case the agent inherits, i.e. if $i = b$, she receives a bequest of size b, which is taxed at the linear bequest tax rate τ_b.

The government revenue from this cohort (including bequest taxes) is given by

$$R = \tau_l \left(y_1 + \frac{p y_{2b} + (1-p) y_{2n}}{1+r} \right) + \frac{p \tau_b b}{1+r} - T_1 - \frac{T_2}{1+r}.$$

We now ask the following question: What is the impact of an increase in τ_b on R? To this end, we make the simplifying assumption that the size of bequest does not respond to the tax rate, i.e. $\frac{\partial b}{\partial \tau_b} = 0$ – we generalize our results in Appendix A.1.

2.1 The Revenue Effect of Unexpected Bequests

To obtain the change in revenue, it is useful to define a couple of behavioural effects. First, we start with a classical income effect parameter

$$\eta_1 = -\frac{\partial y_1}{\partial T_1}\bigg|_{da=0} \quad \text{and} \quad \eta_{2i} = -\frac{\partial y_{2i}}{\partial T_2}\bigg|_{da=0} \quad \forall\, i = b, n. \tag{1}$$

These income effect parameters capture the decrease in earned income due to a marginal increase in unearned income. Certainly, if leisure is a normal good – for which assumption there is unambiguous empirical evidence and which we will assume throughout what follows – individuals do decrease their earnings if they are more wealthy. These wealth effect parameters are defined in a somewhat 'static way', meaning under the

assumption that the household does not adjust savings in response to the additional income she received. Thus η_{2b} captures the wealth effect on earnings of a bequest that arrives unexpectedly (equivalent to a lottery win) – a case that we now consider first.

Assume that individuals do not anticipate their bequest. Hence, when they surprisingly receive a bequest in period 2, their savings decision is irreversible and earnings adjustments are described by (1). In that case, the increase in total tax revenue R due to a small change in bequest taxes $d\tau_b$ is given by

$$dR = \frac{p}{1+r} \times bd\tau_b + \frac{p}{1+r} \times \tau_l \times \eta_{2b} \times bd\tau_b. \tag{2}$$

Dividing this effect by the direct mechanical increase in bequest tax revenue $\frac{p}{1+r} \times bd\tau_b$ gives an easy-to-interpret normalization

$$\frac{dR}{\frac{p}{1+r} \times bd\tau_b} = 1 + \tau_l \times \eta_{2b} > 1. \tag{3}$$

How can we interpret this? For each mechanical Euro of bequest taxes (absent any behavioral effects on the side of bequeathers), the government obtains an additional $\tau_l \times \eta_{2b} \times 100$ cents through additional labor tax revenue from the heirs. If, for example, the marginal labor income tax rate is 50% and $\eta_{2b} = 0.11$,[2] we would obtain an additional 5.5 Cents through labor supply responses of heirs. This kind of back of the envelope calculation can obviously be done without any quantitative exercise or model building. However, there is one issue here: inheritances are typically (at least partly) anticipated. The question then is whether and how (3) changes, if individuals in this model rationally anticipated that they inherit b with probability p?

2.2 The Revenue Effect of Expected Bequests

When individuals rationally anticipate the chance of receiving an inheritance, they adapt their behavior already in period 1. In particular, they shift resources between periods 1 and 2 in order to smooth out utility from consumption and disutility from labor supply. To capture this savings response, we define

$$\alpha = -\frac{\partial\big[(1+r)a\big]}{\partial\big[b(1-\tau_b)\big]} = -\frac{\partial\big[(1+r)a\big]}{\partial T_2} > 0,$$

which informs us about how second period income from savings reacts to changes in second period resources from bequests $b(1-\tau_b)$. If period 1 consumption is a normal good, we have $\alpha > 0$: a greater amount of resources from bequests leads the household to transfer resources into period 1, meanings that she will lower her savings. The

[2] Which is a good benchmark from the literature on labor supply effects of lottery winners, see Imbens et al. (2001) and Cesarini et al. (2015).

change in savings $(1+r)a$ owing to the marginal increase of the inheritance tax is then given by

$$\alpha \times bd\tau_b > 0,$$

and the change in first-period labor supply can consequently be described by

$$\eta_1 \times \frac{\alpha}{1+r} \times bd\tau_b$$

with η_1 being defined in (1). The implied change in savings then of course also influences labor supply in period 2 as

$$-\eta_{2i} \times \alpha \times bd\tau_b \quad \forall\, i = n, b.$$

Thus, even those individuals that ex post do not inherit anything exhibit a labor supply reaction in period 2. For individuals who do inherit, the overall second period labor supply change is given by

$$\eta_{2b} \times \left[1-\alpha\right] \times bd\tau_b.$$

Anticipation hence has important effects on individual behavior in all periods and states of the world. Consequently, we can write the change of government revenue due to the marginal increase of τ_b as

$$dR = \frac{1}{1+r} d\tau_b b \left[p\Big(1+\tau_l \eta_{2b}\Big) + \alpha\tau_l \left(\eta_1 - \Big[p\eta_{2b} + (1-p)\eta_{2l} \Big] \right) \right] \tag{4}$$

where the first term in the square bracket is the same as (2), i.e. when bequests are unexpected. The second term incorporates the effects from anticipation. Thus, when bequests are anticipated, a simple back of the envelope calculation that straightforwardly applied the wealth effects from the lottery literature actually makes two mistakes: (i) It ignores anticipation effects of those who actually inherit, and (ii) it disregards that even individuals that do not inherit ex post may still adjust their labor supply in both periods because there was some likelihood that they receive a bequest in period 2. When we again normalize (4) in the same way as above and rearrange terms to better illustrate (i) and (ii), we obtain

$$\frac{dR}{\frac{p}{1+r} \times d\tau_b b} = 1 + \tau_l \Bigg(\underbrace{\eta_{2b}}_{\text{Unexp.}} + \underbrace{\alpha\Big(\eta_1 - \eta_{2b}\Big)}_{\text{Anticipating Heirs}} + \underbrace{\frac{1-p}{p}\alpha\Big(\eta_1 - \eta_{2n}\Big)}_{\text{Anticipating Non-Heirs}} \Bigg) \tag{5}$$

Summing up, under the assumption that bequests are inelastic, for every additional Euro in bequest tax revenues the government raises through an increase of the bequest tax rate by $d\tau_b$, it obtains an additional $\eta_{2b} + \alpha\Big(\eta_1 - \eta_{2b}\Big) + \frac{1-p}{p}\alpha\Big(\eta_1 - \eta_{2n}\Big) \times 100$ Cents through higher labor tax revenues from heirs. To assess how the two anticipation terms matter quantitatively, one has to move beyond a two-period model. We therefore now move to a life-cycle model, which we then calibrate to German data.

3 Quantitative Life-Cycle Model

We now describe our full life-cycle model. Time $t \in \{1, ..., T\}$ is discrete and period length is one year. The economy is populated by agents of N different types, who are heterogeneous with respect to their earnings ability and the amount of bequests they receive. Agents enter the economy at age 20 (model age 1), after which they work until they reach retirement age t_r. They die at age T.

The terminal value of agent $i \in \{1, ..., N\}$ is given by

$$V_T^i(a_T, h_T = 1) = \frac{c_T^{1-\gamma}}{1-\gamma}, \tag{6}$$

where consumption c_T is financed with last period's assets (including their after-tax interest payments), pension income and potential receipt of bequests b_T^i.[3]

$$c_T = (1 + (1-\tau_k)r)a_T + \mathcal{P}_T^i + (1-\tau_b)b_T^i. \tag{7}$$

We assume iso-elastic utility in consumption with the coefficient of relative risk aversion $\gamma > 0$. Further, we assume that the interest rate r, the capital income tax τ_k and the pension income $\mathcal{P}_T^i$ are all exogenous.

Aside from age t, which we include as a subscript, there are two state variables, assets a and the binary variable h. The latter takes the value zero if there is still the possibility of receiving an inheritance in the future and the value one otherwise. Formally, the stochastic process $\{h_t\}_{t=1}^T$ is given by

$$P[h_t = 1|h_{t-1} = 0] = p_t, \;\; P[h_t = 0|h_{t-1} = 0] = 1 - p_t, \;\; P[h_t = 1|h_{t-1} = 1] = 1, \tag{8}$$

where p_t denotes the probability of an agent's only parent dying in period t, conditional on being alive in period $t-1$.[4] We assume that each agent in our economy inherits at most once during her lifetime. In particular, we assume that with probability p^h the agent receives an inheritance at some point in her life. With the complementary probability $1 - p^h$ she does not receive an inheritance at all. Let the indicator variable $I_t \in \{0, 1\}$ take the value one if the agent inherits at age t and zero otherwise, then

$$P[I_t = 1|h_{t-1} = 0] = p^h p_t, \;\; P[I_t = 0|h_t = 0] = 1 - p_t + (1-p^h)p_t, \;\; P[I_t = 0|h_t = 1] = 1. \tag{9}$$

At any age $t < T$ the agents' value function is given by

$$V_t^i(a_t, h_t) = \max_{c_t, l_t, a_{t+1}} \left\{ \frac{c_t^{1-\gamma}}{1-\gamma} - \lambda \frac{l_t^{1+\chi}}{1+\chi} + \beta \mathbb{E}_t V_{t+1}(a_{t+1}, h_{t+1}) \right\}. \tag{10}$$

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[3] We implicitly assume $a_{T+1} = 0$, which would be the outcome of the agent's optimization problem if we restrict after death assets to be non-negative.

[4] This is the most intuitive way to think about the stochastic process. More abstractly, conditional on not knowing if she receives an inheritance or not at age $t-1$, with probability p_t the agents learns this at age t.

We assume separability between utility of consumption c_t and disutility of labor l_t. The parameter λ denotes the relative weight of leisure in the agent's utility, χ is the inverse of the Frisch elasticity of labor supply and β is the time discount factor.

The budget constraint is given by

$$c_t + a_{t+1} = \mathcal{T}(w_t^i l_t) + (1 + (1 - \tau_k)r)a_t + (1 - \tau_b)b_t^i + \mathcal{P}_t^i. \tag{11}$$

Consumption and next period's assets are financed with net labor income $\mathcal{T}(w_t^i l_t)$, current assets including net interest payments $(1 + (1 - \tau_k)r)a_t$, net bequests $(1 - \tau_b)b_t^i$, and pension income $\mathcal{P}_t^i$. Remember that b_t^i is strictly positive for at most one period in the life-cycle. Further, the pension income $\mathcal{P}_t^i$ is positive only during retirement. In particular we assume

$$\mathcal{P}_t^i = \begin{cases} 0 & \text{if } t \leq t_r \\ \mathcal{P}^i > 0 & \text{if } t > t_r, \end{cases} \tag{12}$$

i.e. the pension income in retirement is constant and equal to $\mathcal{P}^i$.

The function $\mathcal{T}(.)$ maps gross into net labor income and will be specified in the calibration section of this paper.

The agent needs to satisfy the borrowing constraint

$$a_{t+1} \geq a_{min}, \tag{13}$$

with the minimal asset level (i.e. the maximal debt level) given by $a_{min} \in (-\infty, 0]$. The retirement age t_r is an exogenous parameter. Hence labor supply is restricted to be zero at ages higher than t_r,

$$l_t = 0 \quad \forall t > t_r. \tag{14}$$

Thus, given some initial wealth a_0, at any age $t < T$ the agent maximizes (10) subject to the stochastic processes (8) and (9), the budget constraint (11) including the process for pensions (12), the borrowing constraint (13) and the exogenous retirment constraint (14).

4 Calibration

In our analysis we consider a cohort of agents, who undergoes a whole life-cycle. These agents differ in their earnings ability. They further receive inheritances of varying amounts.

The parameters are summarized in table 1. We assume that agents retire at age 65 (model age $t_r = 46$) and die at age 80 (model age $T = 61$). We assume that the agent

starts his economic life with zero initial wealth ($a_{min} = 0$) and consider two cases for the borrowing limit. The first one is a strict no-borrowing constraint ($a_{min} = 0$), the second one allows for unlimited borrowing ($a_{min} = -\infty$), as long as debt is ultimately repaid ($a_{T+1} \geq 0$). Further, we assume an interest rate of 2% and a discount factor β such that $\beta(1+r) = 1$. The choice of the remaining parameters is explained in detail in the following subsections.

Table 1: Parameters.

Parameter	Value	Note
T	61	Age of death: 80
t_r	46	Retirement age: 65
r	2%	Interest rate
β	$1/(1+r)$	Time discount factor
γ	1	Coefficient of risk aversion
χ	5.4 ; 5.05	See section 4.6, 2 cases
λ	1	Coefficient for disutility of work
a_0	0	Zero initial wealth
a_{min}	$0; -\infty$	Borrowing limit, 2 cases
$\{p_t\}_{t=1}^T$	see section 4.1	Conditional learning probabilities
p^h	0.75	Aggregate probability of inheriting
$\{\{b_t^i\}_{t=1}^T\}_{i=1}^N$	see section 4.2	Bequest profiles
$\{\{w_t^i\}_{t=1}^T\}_{i=1}^N$	see section 4.4	Wage profiles
$\mathcal{P}$	0.4	Pension income 40% of average wage
τ_0	0.679	Coefficient in HSV tax function
τ_1	0.128	One minus exponent in HSV tax function
τ_k	0.25	Linear capital income tax
τ_b	0.00	Linear inheritance tax

4.1 Conditional Learning Probabilities

We use data from the German *Socio Economic Panel (SOEP)* to calibrate the conditional probabilities of learning about one's inheritance in the next period, $\{p_t\}_{t=1}^T$. Every blue dot in figure 1 depicts for a given age between 20 and 80 the fraction of people receiving an inheritance at this age. For our calculation we use the trend component of the HP-filtered series (red line), which we normalize such that the rates sum up to one. Denoting these rates by $\{\tilde{p}_t\}_{t=1}^T$ the probability of learning about one's inheritance in period t conditional on not having learned until $t-1$ is given by

$$p_t = \frac{\tilde{p}_t}{1 - \sum_{s=1}^{t-1} \tilde{p}_s}.$$

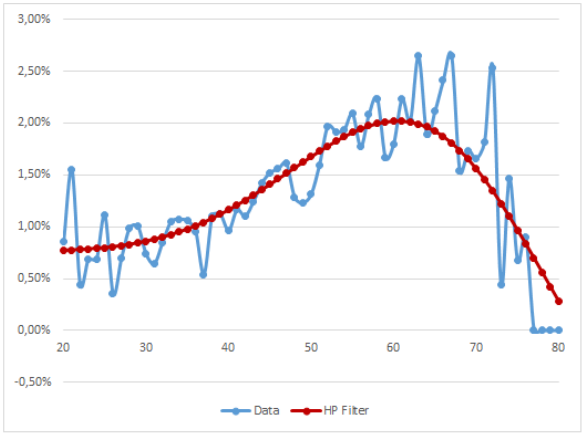


Figure 1: Bequest rate by age

Assuming that agents inherit at most once in their life time, the (accumulative) fraction of agents receiving a bequest is about 42% in the data.[5] Unfortunately, even when applying a law of large numbers argument, this fraction does not directly translate to the probability p^h, with which agents receive bequests at some point in their life. When setting $p^h = 0.42$ one assumes that all agents expect to receive a bequest with the same probability 0.42 and not to receive a bequest with the same probability $1 - p^h = 0.68$. However, the fraction of 42% can equally plausible emerge under the assumption that 42% of agents in the data know with certainty that they will inherit ($p^h = 1$), while the other 68% know with certainty that they will not inherit ($p^h = 0$). While there is no way to directly identify agents' anticipation of bequests from the data, we assume the "true" process to lie somewhere in the middle of the mentioned extreme cases. Therefore, in our benchmark calibration we use $p^h = 0.75$. We perform robustness checks by varying p^h between 0.001 and one. It turns out that the answer to the question we are after is not sensitive to this choice: The revenues raised from increased labor supply of heirs per euro raised directly through bequest taxes on parents varies very little. What changes, though, is the decomposition of revenues raised from heirs and non-heirs, the latter varying between 0 and 28% of the overall labor tax revenues raised.

4.2 Inheritance Profiles

The size of bequests varies across agents. But it also varies across age. This can be seen in figure 2, which depicts the size of the mean inheritance for each age. In order to account for the shape of the life-cycle profiles of bequests we perform the regression

$$\log \bar{b}_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \epsilon_t,$$

[5] Figure from the German Bundesbank's Panel of Household Finances.

where $\overline{\log} b_t$ denotes the mean of log bequests over all heirs of age t. The regression line is depicted in red. The coefficients β_1 and β_2 determine our age profile of bequests.

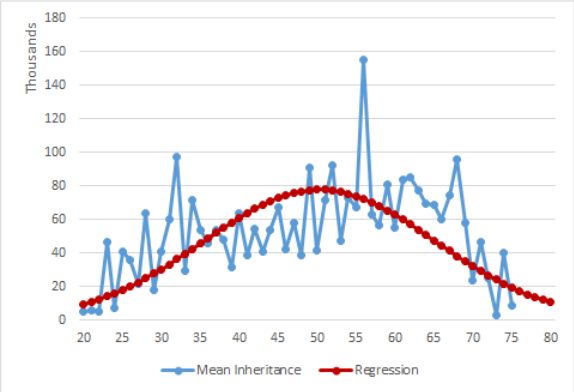


Figure 2: Bequest Size by Age

But, more importantly, we also want to account for the fact that inheritances are distributed unevenly across households. In the data we observe a large concentration of bequests at the top. For example only 22 households (or about 1% of heirs) in the SOEP receive 20% of the total inheritance sum. Hence splitting the sample equally according to the size of inheritance will unavoidably lead to small sample problems. On the other hand ranking inheritances and splitting the sample into categories such that each class has the same number of heirs will not represent the universe of bequests well as many profiles will represent only a low share of the total sum of bequests and few profiles will represent a large share of the total sum of bequests.

We hence follow an intermediate procedure. In particular, we categorize households into five inheritance groups. Table 2 summarizes these classes, where $\bar{b}_t$ and S_t denote the sample mean, respectively sample standard deviation, of inheritances at age t.

Table 2: Inheritance Classes.

Inheritance Class	Description	Number	% of Heirs	% of Total Amount
I1	$b_t^i < \bar{b}_t - 0.25S_t$	1331	61.2	10.6
I2	$\bar{b}_t - 0.25S_t \leq b_t^i < \bar{b}_t$	340	15.6	11.0
I3	$\bar{b} \leq b_t^i < \bar{b}_t + 0.5S_t$	225	10.3	15.9
I4	$\bar{b}_t + 0.5S_t \leq b_t^i < \bar{b}_t + 2S_t$	174	8.0	23.5
I5	$b_t^i \geq \bar{b}_t + 2S_t$	105	4.8	38.9
Total		**2175**		**129,332,360 EUR**

We picked the thresholds in a way such that the number of heirs is decreasing as the inheritance class in increasing but such that it is never less than 100. On the other hand the total amount of inheritances represented by a class is increasing as a consequence of the high concentration.

The inheritance profiles are then obtained by using the coefficients β_1 and β_2 from above and adjusting the constant such that the average of the profile equals the data counterpart in the respective class. The resulting profile are shown in figure 3.

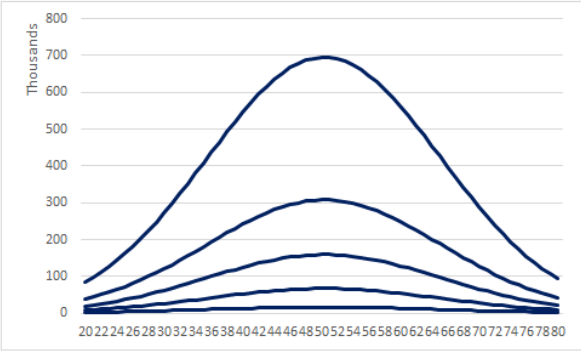


Figure 3: Inheritance Profiles

4.3 Labor Income Tax Code and Pensions

For labor income taxes, we use the mapping of gross into net income derived by Lorenz and Sachs (2016).[6] We fit an 'HSV' (Heathcote, Storesletten and Violante 2016) tax function that maps gross into net labor income,

$$T(y) = \tau_0 y^{1-\tau_1}.$$

The parameters we obtain are $\tau_0 = 0.679$ and $\tau_1 = 0.128$. In Figure 4 we observe that for an agent with the average wage profile, which varies between 0.56 and 1.16, the estimated marginal tax rate lies below the actual one.

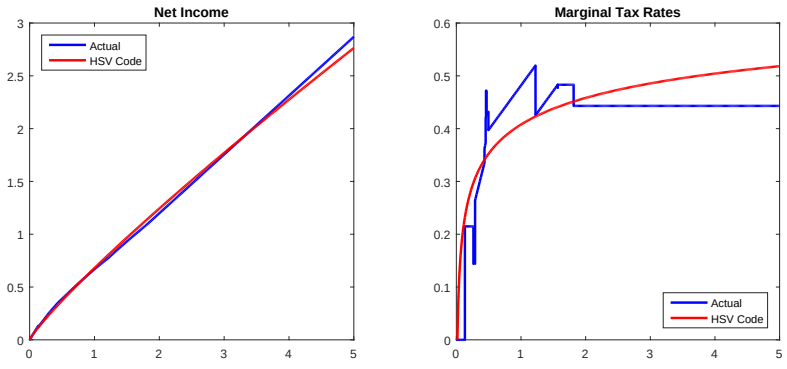


Figure 4: Labor income tax function

[6] We assume that individuals are not eligible for long-term unemployment benefit ('Hartz IV'). This weakens our main result as it implies lower marginal tax rates.

For the pension income we choose a value of $\mathcal{P} = 0.4$, implying that an agent's pension is about 40% of her average labor income.

4.4 Labor Earnings and Wages

We also want to account for variations in earnings ability. For this means we estimate the fixed effects model

$$\log y_t^i = \alpha_i + \beta_1 t + \beta_2 t^2 + \epsilon_{i,t}$$

twice: Once for all households, in which the main earner is college educated and once for all other households. This way we obtain age profiles (β_1, β_2) both for college and non-college educated households. It further allows us to rank households according to the fixed effect α_i and to calculate percentiles of this fixed effect. In particular for both college and non-college educated households we calculate quartiles of α_i. The mean α_i in a certain quartile then completes one earnings profile. In total we end up with 8 earnings profiles, four for college educated agents and four for non-college educated. They are depicted in figure 5. The blue profiles represent households with college education, the red profiles households without college education.

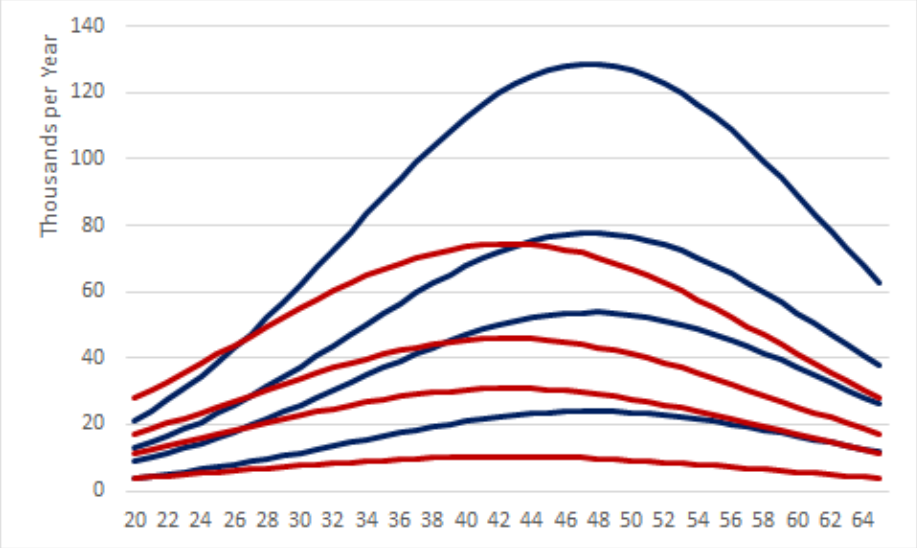


Figure 5: Earnings Profiles

From Earnings to Earnings Ability. The earnings we observe in the data are endogenous objects. In particular, they depend on the labor supply decision of agents. Fortunately, following Saez (2001), there is a way to back out the corresponding wage profiles. For each earnings profile $\{y_t^i\}_{t=1}^{t_r}$, and our assumptions about taxes and pensions, we can (for values of γ) directly calculate the consumption profile $\{c_t\}_{t=1}^{T}$ – at

this point we do not need to know anything about the labor supply or the wages because of the separability of utility between labor and consumption. We can then make assumptions about λ and χ and infer the productivity profile $\{w_t^i\}_{t=1}^{t_r}$ that rationales the earnings choices as optimal as in Saez (2001). We obtain this from t_r first-order conditions of the form:

$$w_t^i c_t^{-\gamma} \tau_0 (y_t^i)^{-\tau_1} = \lambda \left(\frac{y_t^i}{w_t^i} \right)^{\chi}.$$

Like that w_t^i (l_t) need not have a strict wage per hours (hours) interpretation. Instead we can interpret w_t^i (l_t) as a more abstract ability (effort) level.

4.5 Probability Distribution over Profiles

In the preceding sections we described how we constructed five inheritance and eight earnings profiles. This leaves us with a total of 40 different combinations of profiles. The distribution of agents over this profiles is simply taken from the data and can be seen in figure 6.

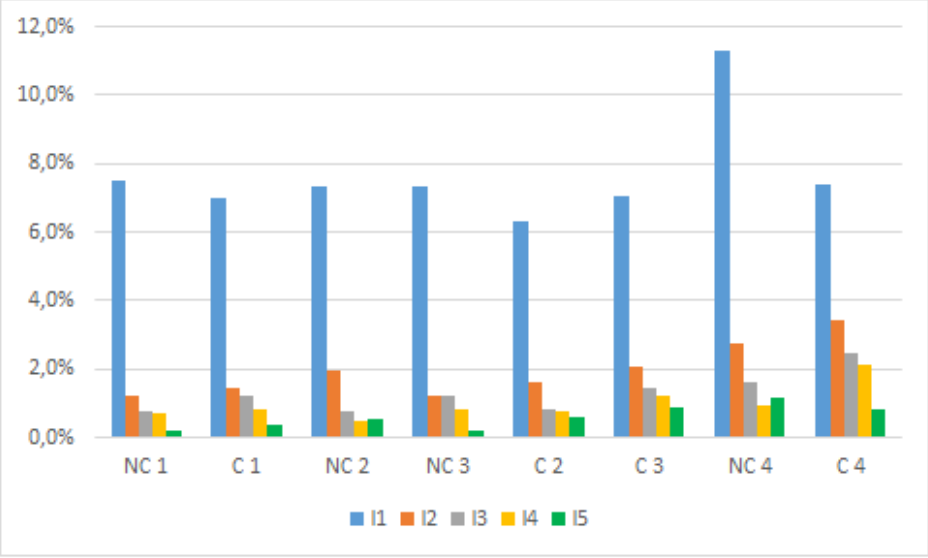


Figure 6: Distribution over Income and Inheritance Profiles

We ranked the earnings profiles according to the net present value of lifetime earnings. C denotes college, NC non-college educated households. One observes that there is a tendency for high earning households to also receive higher inheritances but this correlation is low. In particular, the Spearman correlation of earnings and inheritance classes is only about 0.13.

4.6 Targeting the Effect of an Unexpected Lottery Win

The parameters γ and χ are used to target empirical evidence on the effect of unearned income on labor earnings.[7] While there is some direct empirical evidence on negative effects of inheritances on labor supply of heirs,[8] these studies typically suffer from endogeneity biases. In particular, in the data – as in our model – inheritances are not a random treatment on agents. Rather, agents – in anticipation of (potential) bequests – adjust their economic decisions (such as saving, consumption and labor supply) prior to their arrival. However, we think it is valid to assume that lottery wins are randomized treatments. A recent study on the effect of lottery wins on labor earnings that uses a rich data set of over 250,000 lottery winners in Sweden is performed in Cesarini et al. (2015). The authors find an average marginal propensity to earn out of unearned income of -0.11.[9] When including social security of employers (which in our model corresponds to part of the labor tax) this number decreases to -0.14. This is the target we want to match, i.e. for every euro an agent receives as a lottery win, her lifetime gross labor should decrease – on average – by 14 cents.

For this purpose we include lottery wins, which are assumed to be completely unexpected by the agents, in our model. The size of the lottery is 1,000 EUR, which is about the average in the data of Cesarini et al. (2015). We distribute the arrival of lotteries across ages such that it matches the distribution of lotteries over age in the data of Cesarini et al. (2015). Since we find that the effect of a lottery win on labor earnings only depends on the ratio γ/χ, we fix $\gamma = 1$ and calibrate χ such that on average agents reduce their lifetime gross labor earnings for every euro of lottery received by 14 cents. This gives us a value of $\chi = 5.10$ when borrowing is prohibited and a value $\chi = 4.55$ when borrowing is allowed. The implied Frisch elasticities of respectively 0.20 and 0.22 are in the lower range of empirical estimates.

Figure 7 plots the average effect of a lottery win on labor earnings 5 years prior and 10 years after the win. The left panel is the case of a strict no-borrowing constraint, in the right panel borrowing is allowed up to the natural borrowing constraint. The red stars correspond to the data in Cesarini et al. (2015), the blue line to our model. We observe that in the case of a strict no-borrowing limit the response is too strong in the first years following the lottery win, and too weak in later years. Instead, when

[7] The parameter λ only affects the level of labor but not the responses of lotteries. Since with our calibration strategy we do not rely on a strict hours interpretation for labor we just normalized this parameter to one.

[8] See section 1.

[9] The reduction in earnings is measured before labor tax but after social security contributions of employers.

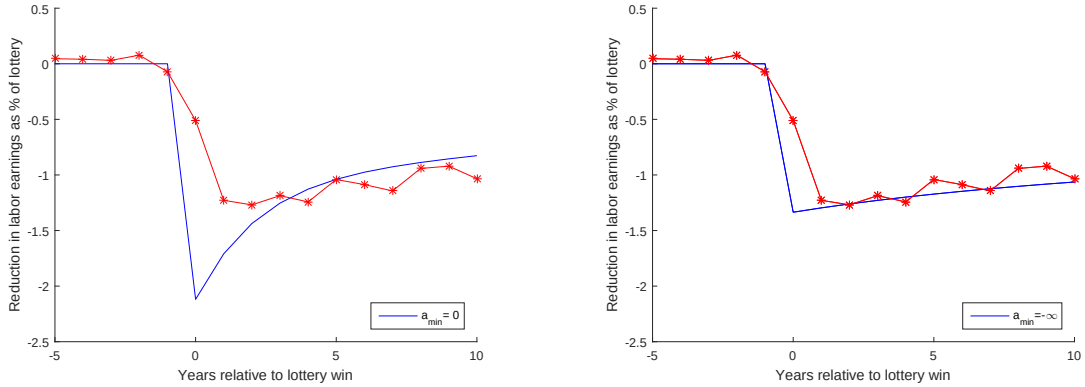


Figure 7: Effects of a lottery win without and with borrowing.

borrowing is allowed the match is almost perfect for the whole time period.[10]

The reason for the difference is that in the no-borrowing case agents at the beginning of their economic life are (without a lottery win or inheritance) not able to borrow against their future income in order to smooth consumption. Instead they finance their whole consumption via labor earnings. Hence, labor earnings are higher than in the case without a constraint on borrowing. If an agents now receives an early lottery, it is not only an income effect that makes her work less but also the relaxation of the borrowing constraint. Further, in the no-borrowing case the limited ability to postpone labor to later periods (when wages are higher), not only makes them work more in early periods but also less in later periods compared to the case of unlimited borrowing. As a consequence with a strict no-borrowing limit a lottery win makes – on average – labor earnings drop a bit less in the years 5-10 after the lottery win than in the case of unlimited borrowing. Overall, this analysis suggests that borrowing constraints do not play a big role or, at least, that a strict no-borrowing limit is a too extreme assumption.

5 Results

In this section we will first analyze individual and aggregate life-cycle profiles for the two cases, (1) a strict no-borrowing limit and (2) unlimited borrowing as long as debt is ultimately repaid. This – together with the two-period model presented in section 2 – should provide enough intuition to understand the results of our policy experiment in section 5.2. In this experiment we marginally increase the inheritance tax rate and analyze the resulting changes in labor- and capital- tax revenues. Further we decom-

[10] As time is discrete in the model, the response in the year of the lottery win (year 0) is greater in the model than in the data. The data on earnings in Cesarini et al. (2015) are for a given calendar year. Hence, especially when receiving a lottery late during the year, the response of agents is weaker. Additionally labor market frictions that are not modeled here (e.g. notice periods) might play a role.

pose these effects for heirs and non-heirs and disentangle the role of anticipation. We provide robustness checks regarding the probability of inheriting (which we could not identify from the data), as well as regarding non-linearities in earnings and bequest sizes.

5.1 Life Cycle Profiles

We first look at the case of a strict no-borrowing limit. Figure 8 depicts the asset-, consumption-, and earnings profiles of an agent who inherits at age 60 (left panel) and an agent, who expects to inherit with the same probability but learns at age 60 – e.g. due to the death of his parent – that he does not inherit (middle panel). The right panel aggregates over all agents with this particular combination of inheritance and labor productivity profiles, where we assume that all agents expect to inherit with $p^h = 0.75$ and the deaths of parents occur with the probabilities $\{\tilde{p}_t\}_{t=1}^{T}$.[11]

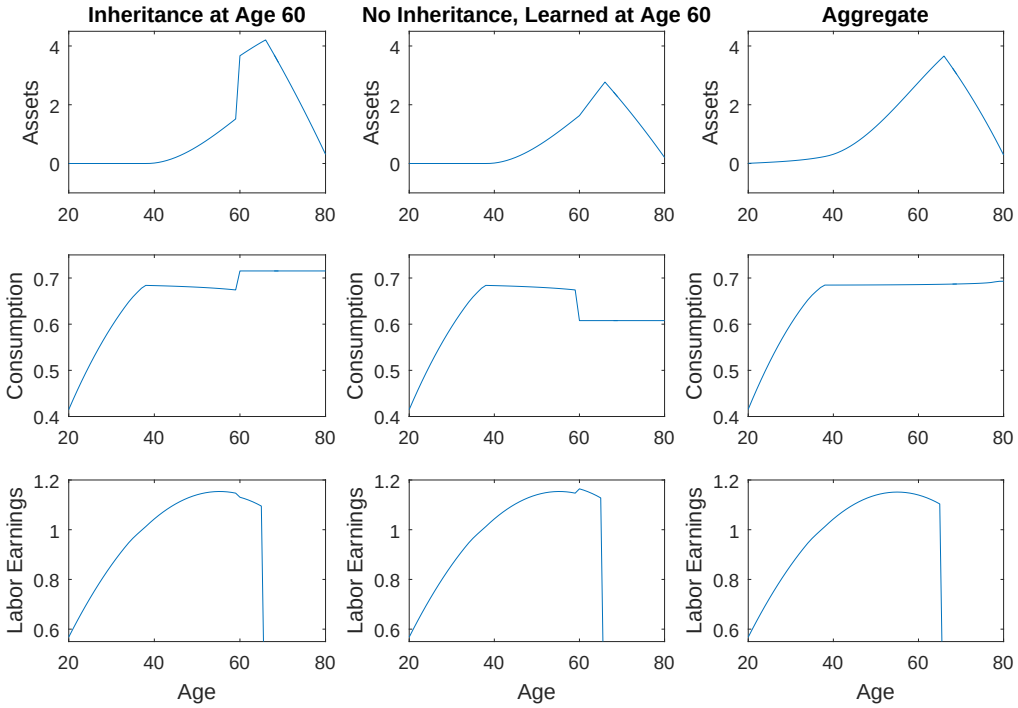


Figure 8: Life cycle profiles: $a_{min} = 0$, learning at age 60

The inheritance increases the heir's assets, which in turn – through the wealth effect – makes her consume more and work less. As a consequence her labor earnings drop, reducing the tax revenues for the government. The opposite is true for the non-heir. After learning that he will not inherit, his expected net present value of wealth drops, resulting in a drop of consumption and an increase in labor effort and hence labor

[11] See section 4.1.

earnings. In the aggregate – when weighting all these agents according to their fraction in the population – these jumps smooth out.

In the case of a strict no-borrowing constraint it is also interesting to look at agents, who learn about their inheritance early in their life, i.e. when they are still borrowing constrained. Figure 9 plots the life-cycle profiles for these agents (left and middle panel) in addition to the aggregate profiles (right panel) that we already had. After receiving the inheritance, not only does the heir's expected net present value of wealth increase, also her borrowing constraint is relaxed. She is now able to smooth consumption by dissaving in early, low wage, years of work and start saving again for retirement in later, high wage, years. Instead, the non-heir is held at the borrowing constraint. His consumption is gradually increasing until labor earnings are high enough to leave the borrowing constraint and start saving for retirement.

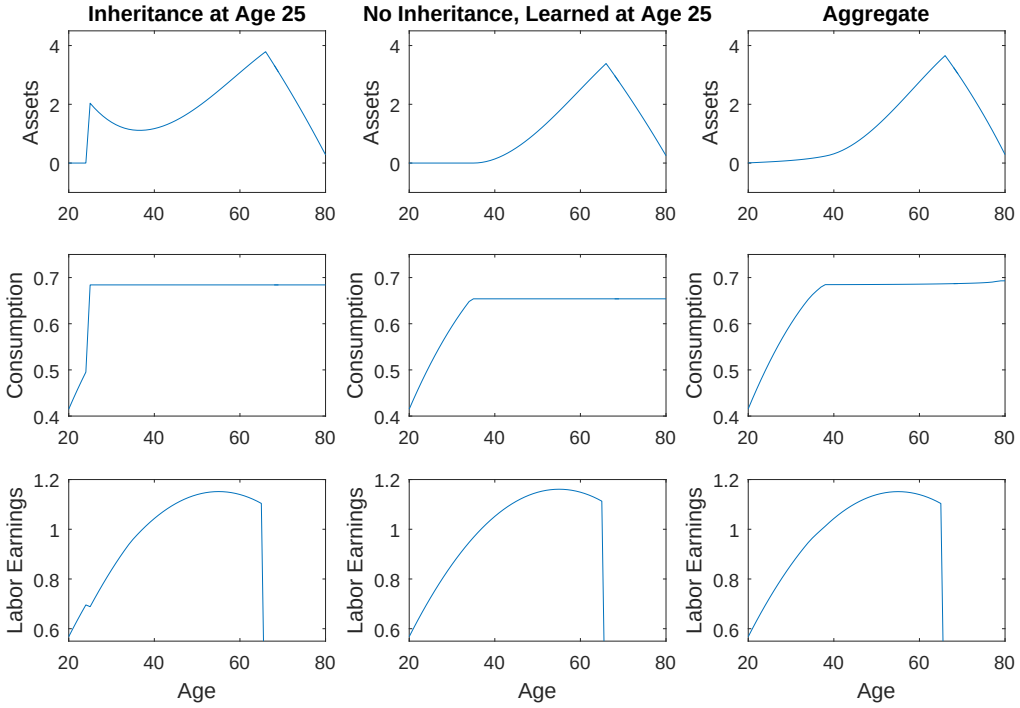


Figure 9: Life cycle profiles: $a_{min} = 0$, learning at age 25

We now consider the case where borrowing is allowed and the limit is low enough such that the borrowing constraint does not bind for any of the agents we consider. In Figure 10 we again see those agents who learn about their inheritance at age 60. Agents are able to smooth consumption from the beginning of their economic life as they are able to borrow against (higher) future labor earnings. For both the heir and the non-heir we observe a slight decrease in consumption over time prior to the time of learning. After they learned about their inheritance, the consumption profiles of both are flat. The reason for this phenomenon is that prior to the death of the parent agents do not only want to smooth consumption over time, but also across states. With

exogenous retirement the time in working life left decreases as time passes. This limits the agents' room for adjustment of labor effort. In order to have enough resources left for retirement, also in the eventuality of not inheriting, agents adjust their behavior already prior to the time they learn. After uncertainty is resolved a flat consumption profile is optimal for both agents.

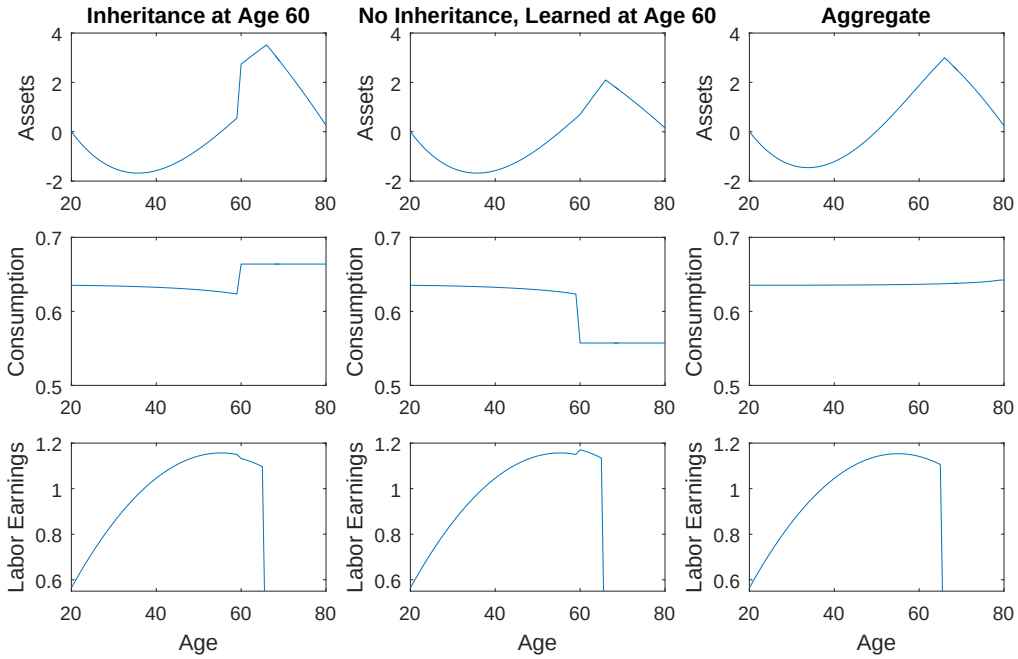


Figure 10: Life cycle profiles: $a_{min} = -\infty$, learning at age 60

In figure 11 we present the case in which agents learn at age 25. We observe the same patterns as above. The jumps in consumption, though, are much smaller. The reason is related to the observed phenomenon we just discussed. There are now 50 years of working life left, in which agents can adjust their labor effort. This is the reason why we do not observe the same jump in labor earnings as when only 5 years of working time is left (figure 10). However, we observe that (almost) the whole labor earnings profile in the middle panel is slightly higher than the one in the left panel. The non-heir thus finances the lower drop in consumption by higher life-time labor earnings.

5.2 Policy Experiment

Our policy experiment is as follows. We increase the linear tax of bequests τ_b from 0% to 1%. This will change not only the revenues directly raised through bequest taxes but also the revenues raised through labor income- and capital taxes as it will change the agents' behavior. Table 3 summarizes the results. The second column is the case with no borrowing, the third column the case with borrowing. The third column is the case

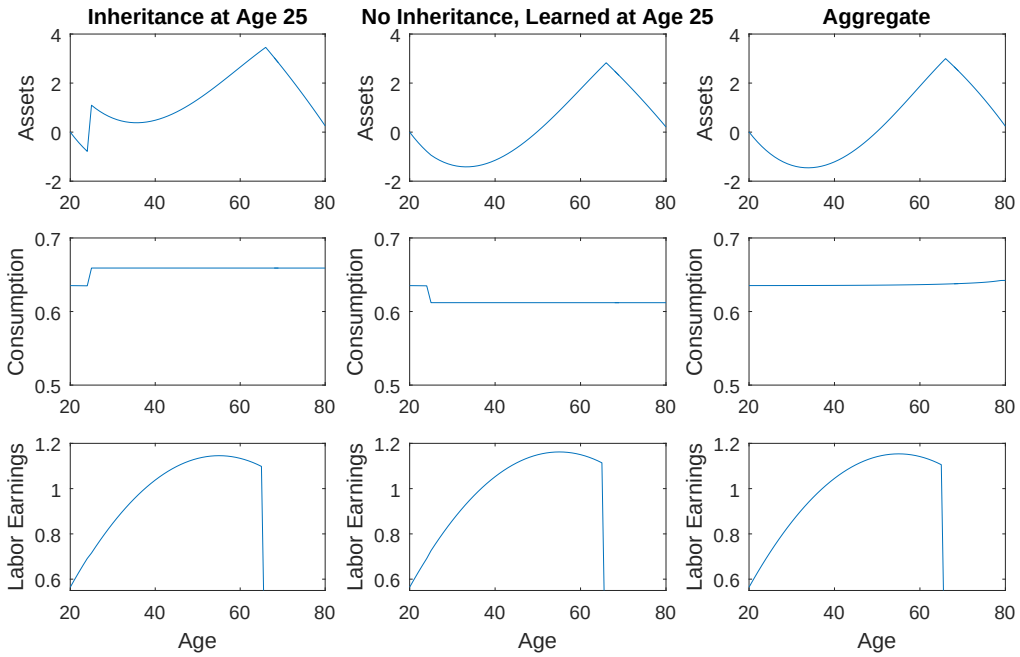


Figure 11: Life cycle profiles: $a_{min} = -\infty$, learning at age 25

when borrowing is allowed and χ is not re-calibrated.[12] The numbers in the table are normalized by the additional bequest tax revenues raised.

For each Euro additionally raised directly through higher bequest taxes, aggregate (gross) labor earnings increase by 19.3 cent in the case when borrowing is prohibited and by 22.2 cent in the case when borrowing is allowed. The reason for this difference is twofold. First, and more obviously, a lower value of the parameter χ implies a higher elasticity of labor supply and thus a stronger response to the policy change. However, this explains only 2.05 cent of the difference (compare with column 3). Second, the dynamics for agents who inherit early in life are different. Remember that when borrowing is prohibited an agent who inherits early reduces her labor supply (1) because of the usual wealth effect and (2) because the borrowing constraint is not binding anymore. Since this second effect is less sensitive to the tax rate than the first agents' response is weaker when there is a strict no-borrowing limit. The absence of this second effect in the case when borrowing is allowed thus explains the remaining 0.89 cent of the difference.

The increase in labor earnings resulting from the policy change then triggers an increase in labor tax revenues. In particular, on average for each euro raised directly via an increase in bequest taxes, the government obtains an additional 8.04 (without borrowing) to 9.07 (with borrowing) cent.

[12] Remember that we calibrate χ in order to match an average marginal elasticity to earn out of unearned income of -0.14.

However, there is also an effect on capital tax revenues. The sign and magnitude of this effect differs substantially for the two parameterisations. When borrowing is prohibited each euro in additional bequest tax revenues causes a reduction in aggregate savings (i.e. when summing savings over the whole life-cycle) by 3.95 euro. The reason is mainly mechanical. Agents inherit less, thus they have less assets to save. Contrary, when borrowing is allowed, agents live the earlier part of their life – but at least until they inherit – in debt, a period, in which they do not pay capital income taxes. As discussed above an increase in the bequest tax rate makes agents – via a wealth effect and because leisure is a normal good – consume less and work more. Consequently agents also save more, resulting in an earlier repayment of debt and an earlier accumulation of assets. The latter is the reason why capital income tax revenues increase when borrowing is allowed.[13]

Table 3: Results

Change in ... per euro of additional bequest tax revenue:*			
	$a_{min} = 0, \chi = 5.10$	$a_{min} = -\infty, \chi = 4.55$	$a_{min} = -\infty, \chi = 5.10$
Labor earnings	19.27	22.21	20.16
Savings	-394.88	281.96	276.83
Labor income taxes	8.04	9.07	8.23
Capital income taxes	-1.97	1.41	1.38
Total income taxes	6.06	10.48	9.62
Decomposition of labor income taxes:			
Heirs	7.33	8.28	7.52
Non-heirs	0.70	0.78	0.71
Share non-heirs	8.77%	8.65%	8.68%

*Numbers in cent.

We decompose the effect on labor income tax revenues for heirs and non-heirs. In the current calibration between 8.65% and 8.77% of additional labor tax revenues are raised from agents who do in fact not inherit. It is not a priori clear that non-heirs increase their labor effort after the policy reform. On the one hand, before they learn about their inheritance the reduction in expected lifetime (unearned) income causes them – due to a wealth effect and normality of leisure – to work more and thus triggers higher labor tax revenues. On the other hand also savings are higher after the policy reform. Since the wealth effect not only increases labor but also reduces consumption, at the point the non-heir learns that he will not inherit, he has more assets after than before the policy reform. Consequently, the policy reform induces the non-heir to work

[13] In the current calibration we assume that agents can net positive and negative capital gains over the whole life-cycle. In reality this is possible only to a very limited extent. It is work in progress to capture the German tax code in this respect more accurately. For the moment the reader should notice the mechanism without relying too much on the number of 1.41 cent.

more before but less after the time he learns.[14] However, the fact that more agents learn about their inheritance late in their life – some even after they already retired – makes the first effect dominate the second one.

Robustness to Probability of Inheriting: As discussed in section 4.1 there is no way to identify the probability with which agents expect to receive a bequest from the data. We therefore perform a robustness check by varying p^h. Table 4 reports the results for the calibration where borrowing is allowed.[15] In the data about 43% of agents received an inheritance. A value $p^h = 0.43$ would be our choice if we believe that all agents in the data set expect to receive an inheritance with the same probability. Thus, while also reporting $p^h = 0.001$, the lower bound of reasonable estimates – assuming rational agents – is $p^h = 0.43$. The third column repeats the benchmark case $p^h = 0.75$, the fourth column $p^h = 1$ would be our choice if we believe that agents face uncertainty only regarding the timing of bequests but not regarding whether or not they receive them. This is therefore the upper bound of reasonable estimates.

Table 4: Robustness to the probability of inheriting

Change in ... per euro of additional bequest tax revenue:*				
	$p^h = 0.01$	$p^h = 0.43$	$p^h = 0.75$	$p^h = 1$
Labor earnings	21.35	21.79	22.21	22.80
Savings	156.64	220.12	281.96	372.72
Labor income taxes	8.72	8.90	9.07	9.30
Capital income taxes	0.78	1.10	1.41	1.86
Total income taxes	9.50	10.00	10.48	11.17
Decomposition of labor income taxes:				
Heirs	5.70	7.13	8.28	11.17
Non-heirs	3.02	1.77	0.78	0.00
Share non-heirs	34.61%	19.86%	8.65%	0.00%

*Numbers in cent. $a_{min} = -\infty, \chi = 4.55$

We observe that while there are substantial changes in savings, labor income and hence labor income taxes vary very little. In the reasonable range for $p^h \in (0.43, 1)$, for every euro the government directly raises through bequest taxes, it obtains an additional 8.9 to 9.3 cent in increased labor tax revenues from heirs. What differs though is the decomposition between heirs and non-heirs, the latter accounting for 20% of additional labor tax revenue with $p^h = 0.43$.

Decomposition of Anticipation Effects: As already noted inheritances differ substantially from lottery wins as the former are – at least to some extent – anticipated, while

[14] Remember the 2-period model in section 2, where this mechanism is explained very intuitively.

[15] The other case leads to similar results.

the latter are generally not. In order to disentangle the response of an unexpected bequest from an anticipated one, we solve our model under the assumption that agents expect bequests with probability zero. Column three of table 5 reports the results for this case, column two presents again the benchmark (with borrowing). We observe that when agents only react in response but not in anticipation of bequests, the change in labor earnings after the policy reform reduces from 22.21 to 13.66. Hence with a back-of-the-envelope calculation that assumes agents' response to unearned income is the same, irrespective of whether this income is obtained from bequests or lotteries, we would underestimate the response in labor earnings by about one third. Similarly we would underestimate the obtained labor tax revenues by about one third (5.64 instead of 9.07 cent).

Why is the effect on savings so different? In the case where bequests arrive as a complete surprise the strong negative response of savings (about -13 Euro) after the policy reform is purely mechanical. Agents inherit less giving them less assets to save. Contrary, when bequests are anticipated a higher bequest tax induces agents to save more in early periods of life counteracting the mechanical effect just described. This mechanism increases capital income tax revenues from -6.64 cent to 1.41 cent per euro of bequest tax revenue.

Table 5: Decomposition of Anticipation Effects

Change in ... per euro of additional bequest tax revenue:*		
	Rational Anticipation	Bequests as Surprise
Labor earnings	22.21	13.66
Savings	281.96	-1327.78
Labor income taxes	9.07	5.64
Capital income taxes	1.41	-6.64
Total income taxes	10.48	-1.00
Decomposition of labor income taxes:		
Heirs	8.28	5.64
Non-heirs	0.78	0.00
Share non-heirs	8.65%	0.00%

*Numbers in cent. $a_{min} = -\infty$, $\chi = 4.55$

Heterogeneity. The effect of an increase in inheritance taxes on labor tax revenues is highly heterogeneous. Table 6 summarizes the effect for all 40 combinations of inheritance and labor earnings profiles for the benchmark calibration, in which borrowing is allowed. We observes that the effect increases towards the southwest of the table. It is highest for the highest earners with the lowest inheritances (13.5 Cent). In contrast it is lowest for the lowest earners with the highest inheritances (0.7 Cent). In appendix **??** we demonstrate the mechanics behind these differences analytically by means of a static model.

Table 6: Heterogeneity

Change in ... per euro of additional bequest tax revenue:*					
Income Profile	I1	I2	I3	I4	I5
NC1	4.09	3.38	2.36	1.47	0.72
C1	6.58	5.92	4.81	3.48	1.93
NC2	8.02	7.35	6.22	4.71	2.65
NC3	9.63	9.05	8.03	6.54	4.02
C2	9.77	9.22	8.27	6.88	4.43
C3	11.28	10.82	10.00	8.74	6.13
NC4	11.65	11.18	10.34	9.04	6.30
C4	13.46	13.10	12.45	11.43	9.02

*Numbers in cent. $a_{min} = -\infty$, $\chi = 4.55$

6 Conclusion

To be written.

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A Appendix

A.1 Elastic Bequests

$$\begin{aligned}\frac{dR}{\frac{p}{1+r}\times d\tau_b b} =& 1+\tau_l\Bigg(\underbrace{\eta_{2b}}_{\text{Unexp.}}+\underbrace{|\alpha|\Big(\eta_1-\eta_{2b}\Big)}_{\text{Anticipating Heirs}}+\underbrace{\frac{1-p}{p}\alpha\Big(\eta_1-\eta_{2n}\Big)}_{\text{Anticipating Non-Heirs}}\Bigg)\\ =:& 1+\kappa \end{aligned} \tag{15}$$

So far we made the assumption that bequests are inelastic, i.e. that parents do not react to an increase in the change of the tax rate τ_b. We now relax this assumption and assume that bequests are elastic. In particular, we define the elasticity of (gross) bequests with respect to the net-of-bequest-tax-rate as

$$\varepsilon_{b,1-\tau_b}(\tau_b)=\frac{\partial b(\tau_b)}{\partial(1-\tau_b)}\frac{1-\tau_b}{b(\tau_b)}.$$

Using this elasticity one can express the response of net bequests to a change in the bequest tax rate τ_b as

$$\frac{\partial\big[(1-\tau_b)b(\tau_b)\big]}{\partial\tau_b}d\tau_b=-\Big[1+\varepsilon_{b,1-\tau_b}(\tau_b)\Big]bd\tau_b$$

and the (direct) effect on government revenues as

$$\frac{\partial\big[\tau_b b(\tau_b)\big]}{\partial\tau_b}d\tau_b=\left[1-\frac{\tau_b}{1-\tau_b}\varepsilon_{b,1-\tau_b}(\tau_b)\right]b(\tau_b)d\tau_b.$$

The total effect on government revenues needs to take into account labor supply responses of heirs. It can be compactly written as

$$\frac{dR}{p\frac{1}{1+r}\Big[1-\frac{\tau_b}{1-\tau_b}\varepsilon_{b,1-\tau_b}\Big]bd\tau_b}=1+\frac{1+\varepsilon_{b,1-\tau_b}(\tau_b)}{1-\frac{\tau_b}{1-\tau_b}\varepsilon_{b,1-\tau_b}(\tau_b)}\kappa. \tag{16}$$

Note that compared to the case with inelastic bequests we multiply the denominator by $\frac{\partial[\tau_b b(\tau_b)]}{\partial\tau_b}$, which leaves the interpretation unchanged. For any additional Euro the government directly raises when increasing the bequest tax by $d\tau_b$, it obtains an additional $\frac{1+\varepsilon_{b,1-\tau_b}(\tau_b)}{1-\frac{\tau_b}{1-\tau_b}\varepsilon_{b,1-\tau_b}(\tau_b)}\kappa\times 100$ Cents through higher labor tax revenues of heirs.[16]

[16] To be precise this is the interpretation only at the increasing part of the Laffer curve, i.e. when $\frac{\tau_b}{1-\tau_b}\varepsilon_{b,1-\tau_b}(\tau_b)<1$. At the decreasing part the interpretation would be: For any euro of bequest tax revenues **lost** when increasing the inheritance tax by $d\tau_b$, how many cents does the government get back from increased labor tax revenues of heirs.

Hence, while an increase in the bequest tax rate may reduce the overall sizes of taxable bequests, the reduction in net bequests amplifies the response of heirs' labor supply and hence increases labor tax revenues even further. For example, with $\tau_b = 0.15$ and $\varepsilon_{b,1-\tau_b}(\tau_b) = 0.2$, our effect increases by 24%. What is the intuition for that? If bequests are elastic, then a higher bequest tax does not only reduce net bequests received of heirs through the mechanical reduction but additionally through the channel that gross bequests shrink if the bequest elasticity is positive.