Consumption Smoothing during Unemployment*

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June 3, 2011

Abstract

A vast literature has investigated how unemployment insurance (UI) affects labor supply. However, the distorting effect of UI on labor supply is to a large extent determined by how well UI benefits smooth private consumption, which in turn depends on the resources available to the unemployed. To determine UI's consumption-smoothing effect, I exploit a kink in the deterministic relationship between previous earnings and unemployment benefits. The randomized assignment of benefits created by the kink allows me to identify how UI affect the use of private wealth to finance consumption during unemployment spells. Using Swedish data for 2000 − 2002 I find that a large share of the unemployed actually can consume at the same level as they did prior to the layoff. I also find that loans are of great importance to consumption smoothing as more than half the sample lacks buffer savings. This is further emphasized for different subpopulations. Women, couples, and older individuals holds significantly larger liquid wealth than men and young singles.

JEL codes: D91, J64, J65

Keywords: Saving, wealth, unemployment benefit, unemployment, consumption smoothing.

*I would like to thank Adrian Adermon, Pia Fromlet, and Vesna Corbo for useful discussions during the course of this work. Additional thanks to seminar and conference participants in Uppsala and Lund for comments on previous drafts of this text.

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1 Introduction

Despite the raison d'être of the unemployment insurance (UI) system being to smooth consumption during unemployment spells, little is known about its benefits to consumption-smoothing. However, the small previous literature that has investigated this issue is unanimous in its conclusion: The average unemployed seems unable to fully smooth consumption between employment despite access to UI, thereby suggesting that private savings are not on par with UI generosity (Gruber, 1997 and 2001, Arslanogullari, 2000, and Browning and Crossley, 2001).

Following Gruber (2001), this paper aims at empirically assessing the adequacy of the Swedish UI, i.e., the extent to which UI benefits are reflected in consumption behavior. UI is referred to as adequate if an unemployment spell has negligible impact on consumption. For this purpose, I begin by surveying the assets of the unemployed to provide descriptive evidence of UI's importance for consumption smoothing. In addition, such a survey highlights which demographic groups that might be more UI-dependent than others. Second, I measure UI adequacy directly by correlating asset use with UI generosity to see if more generous UI benefits make the unemployed rely less on self-insurance and more on the UI system during their unemployment spells.

The paper contributes to the earlier literature in three ways. First, Sweden is interesting to study as its UI is one of the most generous in the industrialized world, both regarding net replacement rate and benefit duration. Consequently, unemployed Swedes can serve as a description of how a generous UI affects adequacy and consumption. In addition, the high quality of Swedish register data offers an opportunity to observe the total financial wealth accounted for, along with debts, without the potential measurement errors that come with survey data.

The second contribution is methodological. I use a Regression Kink Design (RKD) that identifies the effect of UI on asset use by exploiting a kink in the benefit schedule where the maximum benefit amount is reached and the wage-benefit relation is shut off (Card et al., 2009). The kink induces randomized allotment of UI given that the previous earnings which determine UI benefits cannot be precisely manipulated by the individual worker (Lee and Lemieux, 2009). For Sweden, this identifying assumption arguably holds as Swedish wage formation is based on collective wage bargaining, leaving little room for individuals to effectively determine wages themselves. The RKD, combined with a sample period of substantial increments in UI benefits, enables me to separate the policy induced variation in UI benefits from the variation that is due to previous earnings.

Third, instead of solely focusing on how UI affects gross financial wealth like Gruber (2001) and Arslanogullari (2000), the paper also recognizes how the use of debt is affected by more generous UI benefits. If the unemployed possess low levels of financial wealth, debt use during the unemployment spell is likely. Thus, individuals who can borrow for consumption-smoothing purposes enjoy a UI adequacy which differs from what one might conclude by exclusively looking at the use of gross financial wealth. Therefore, I construct a measure of net financial wealth that captures the entire use of holdings; own as well as borrowed holdings. Estimates of how UI affects this flow can also be used to calibrate the effect of UI on consumption.

My results show that the Swedish UI is on average inadequate as it affects consumption in a non-neglectable way. Asset use is reduced by 0.75 percent from a 1 percent increase in UI benefits, thus implying a consumption increase of 0.25 percent. Moreover, I show that asset use would be superfluous for the average unemployed if the mean net replacement rate were to rise from 0.7 to 0.75; a replacement rate enjoyed by half the sample. Job search incentives due to consumption-related purposes alone should thus be small for these individuals as no pecuniary cost is associated with unemployment in the short run.

Further, I find that singles, men and younger unemployed possess little liquid wealth. These groups borrow money to further smooth consumption beyond what is provided by the UI payments. However, borrowing is elastic to increased UI generosity, i.e., a rise in UI causes a more than perfect crowd out of the borrowed means and effectively lowers these individuals' consumption. There are also discrepancies in UI's consumption-smoothing benefits depending on wealth in a broader sense. Couples, individuals with an above median net worth and house owners adjust their consumption less compared to less wealthy individuals when there is an increase in UI generosity. Finally, I find that individuals with fewer hopes of finding work change their asset use less compared to individuals who expect to remain unemployed only for a shorter period of time.

The paper is organized as follows. It begins by developing a simple theoretical model that describes the magnitude of an elasticity of asset use with respect to UI benefits. The model also suggests heterogeneity in the response of benefits to asset use stemming from differences in initial wealth endowment and employment prospects. The paper continues by describing a sample of unemployed individuals from the Swedish register-based panel data set LINDA and the characteristics of the Swedish UI scheme followed by a survey of the wealth holdings of the unemployed.

After that, I present the research design used to estimate the effect of benefits on asset use along with the estimation results. The last two sections test the results robustness of the results against different specifications and conclude the paper.

2 Theory

This section examines the optimal use of assets during unemployment in a two-period model when individuals have access to unemployment benefits. The aim of the model is to guide the empirical analysis below in three ways. First, how do UI benefits affect asset use for consumption-smoothing purposes during the unemployment spell? Second, does the effect of UI on asset use change significantly depending on the level of UI? Third, to what extent do heterogenous characteristics such as the probability of being employed and the level of wealth of the unemployed affect the sensitivity of asset use to UI? To answer these questions, I derive an expression that states what is the effect of UI on asset use. Then, I simulate how the sensitivity of asset use to UI changes for various levels of UI generosity as well as differences in employment prospects and initial asset endowment.

2.1 The Unemployed's Optimal Use of Assets

Consider a two-period model where an individual spends the first period unemployed. In period 2, the unemployed can either become employed with an exogenous probability λ or remain unemployed with probability $1 - \lambda$. Either state lasts the entire second period. To help smooth consumption between the two states, the government provides a UI benefit B which is smaller than the wage W earned if the individual becomes employed in period 2.

According to the Permanent Income/Life Cycle Hypothesis, individuals will try to smooth the difference between B and W using the resources available to them when period 1 starts, A_1. The stock of assets in period 2, A_2, is thus expected to be smaller than A_1, which implies negative saving or asset use. The existence of B, however, lets the unemployed use less savings. As a consequence, it is policy-relevant to determine how large this crowd out is; to what extent does UI affect consumption-smoothing behavior?

The optimal asset use with respect to UI is equivalent to the effect of UI on the optimal asset stock in period 2, A_2, as initial assets are assumed to be exogenously given to the individual:

$$\frac{\partial \Delta A}{\partial B} = \frac{\partial (A_2 - A_1)}{\partial B} = \frac{\partial A_2}{\partial B}$$

To determine the UI benefits effect on asset use, the optimal level of consumption of the unemployed must be specified. Ignoring discounting and the real interest rate, the unemployed individual maximizes expected utility over the two periods:

$$V = u(C_{1U}) + \lambda u(C_{2E}) + (1-\lambda) u(C_{2U}) \tag{1}$$

where the utility function $u(\cdot)$ is assumed to be strictly concave. C_{tE} and C_{tU} are the levels of consumption as employed, denoted by E, and unemployed, denoted by U, for $t = 1, 2$. The budget constraints are $C_{1U} = B + A_1 - A_2$ and $C_{2U} = B + A_2$ as unemployed and $C_{2E} = W + A_2$ if employed. The optimality condition for consumption is given by:

$$-u'(C_{1U}) + \lambda u'(C_{2E}) + (1-\lambda) u'(C_{2U}) = 0 \tag{2}$$

Using implicit differentiation, the effect of UI on the stock of assets and asset use in period 2 is written as:

$$\frac{\partial A_2}{\partial B} = \frac{u''(C_{1U}) - (1-\lambda) u''(C_{2U})}{u''(C_{1U}) + \lambda u''(C_{2E}) + (1-\lambda) u''(C_{2U})} \tag{3}$$

Permanent Income/Life Cycle Hypothesis intuition tells that $\partial A_2 / \partial B$ should be positive; a higher UI reduces asset use as it allows the individual to spend less assets balancing the difference between W and B. Nevertheless, the sign of the effect is indefinite. However, it is obvious that $\partial A_2 / \partial B$ is smaller than $|1|$ and that the denominator in (3) is negative since the utility function is assumed to be concave. But whether the numerator is negative cannot be seen here.[1]

2.2 Simulations

To determine the sign of (3), I assume CRRA utility and simulate the expression for different benefit rates. First, the calibration provides a sign to the effect in (3) above. Second, it will show if the size of the effect of raised benefits on asset use differs for different benefit levels. Finally, studying (3) for a variety of benefit levels

[1] In a setting with more periods ahead, the unemployed has a better scope of accomodating the negative impact on consumption caused by the unemployment spell. In that case, the numerator is almost certainly negative as the effect on utility of increased benefits can be seen in all future periods. These factors would all enter expression (3) negatively.

can also be seen as a sensitivity test of whether the sign of $\partial A_2 / \partial B$ changes for different levels of B. Assuming CRRA utility, equation (3) is written as:

$$\frac{\partial A_2}{\partial B} = \frac{C_{1U}^{-(1+\theta)} - (1-\lambda)\, C_{2U}^{-(1+\theta)}}{C_{1U}^{-(1+\theta)} + \lambda C_{2E}^{-(1+\theta)} + (1-\lambda)\, C_{2U}^{-(1+\theta)}} \tag{4}$$

where θ is the coefficient of relative risk aversion.

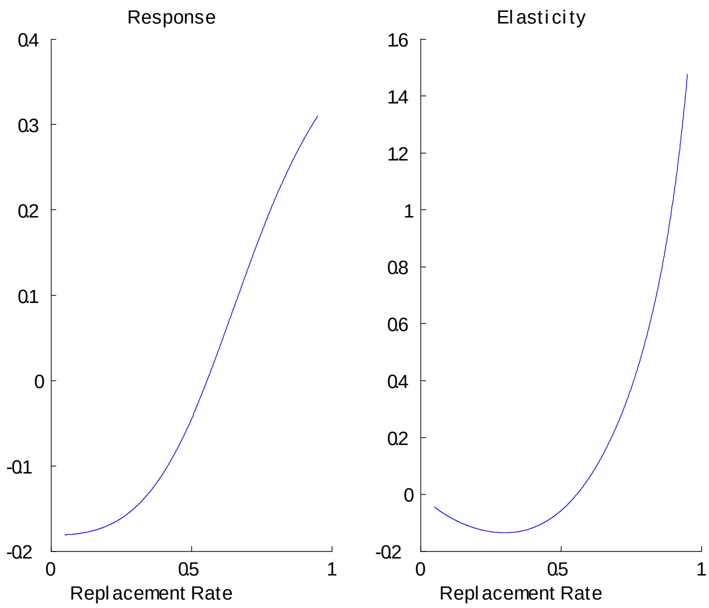


Figure 1. The effect of UI on asset use. The left-hand panel describes the absolute change in asset use caused by different levels of UI generosity. The right-hand panel shows the relative change in terms of the elasticity of asset use with respect to UI benefits.

The left-hand panel of figure (1) shows the effect of UI benefits on asset use for a median individual with $\theta = 3$.[2] As predicted, the response $\partial A_2 / \partial B$ remains below $|1|$ for all benefit levels. Somewhat less intuitive is the fact that asset use actually increases for low levels of UI. However, the negative effect on the stock of assets in period 2 could be understood as coming from a credit restriction where UI benefits effectively work as a cap on asset use. Since Ponzi-games are not allowed, the individual must at least break even in period 2, irrespective of his or her employment status. Consequently, A_2 cannot exceed the minimum income received in period 2 which is B. So, when there is an increase in UI generosity, the highest feasible level of asset use will also increase.

[2] Differences in risk aversion within a reasonable interval, $\theta \in [1, 5]$, do not change the simulations in any significant way.

In figure (1), it is seen that for replacement rates above 1/2, the sign of the effect of increased benefits on asset use becomes more intuitive as asset use decreases. The utility gain of a higher UI rises up around the point where there is a shift in the sign; beyond that point the marginal utility of UI decreases as the slope of the curve in figure 1 is flattened out. I also calibrate the elasticity of asset use on benefits; $(-B/\Delta A) * (\partial A_2/\partial B)$, plotted in the right-hand panel of figure 1. Just like the response, the elasticity is negative for lower replacement rates which indicates that asset use increases also in relative terms when benefits rise.[3]

The differences in the effect of UI on asset use have great implications for the consumption-smoothing benefits and adequacy of UI. For instance, consider the change in period 1's consumption from a 1 SEK UI increase:

$$\frac{\partial C_{1U}}{\partial B} = 1 - \frac{\partial A_2}{\partial B}$$

For low replacement rates, this effect is larger than 1 SEK as $\partial A_2/\partial B < 0$. Consumption as unemployed can thus be greatly improved if UI is low as compared to the attainable wage. Generous UI benefits, on the other hand, will have a lesser effect on consumption but it will always be positive with this model as $\partial A_2/\partial B < 1$. This means that UI benefits cannot be adequate in an absolute sense as the reduction in asset use never exactly offsets the UI increase; UI benefits are always reflected in consumption behavior.

In relative terms, however, UI becomes adequate for replacement rates around 0.9. At this point, a 1 percent increase in UI benefits causes asset use to decrease a corresponding 1 percent and the total insurance coverage remains unchanged just like consumption. For replacement rates below 0.9, UI benefits are inadequate as the elasticity is smaller than 1; consumption increases when UI increases and UI is reflected in consumption behavior.

2.3 Heterogenous Effects on Asset Use

The following section considers if differences in employment probability and initial asset endowments affect the elasticity of UI benefits on asset use in any significant way, both of which are empirically testable. The first dimension to be explored is differences in employment prospects. An individual's likelihood of being employed

[3] The minus sign in the above elasticity facilitates the interpretation of the measure. Since the stock of assets in period 2 will always be smaller than the stock in period 1, the change in period 2's assets is booked as a decrease in debt rather than an increase in assets.

in the next period should amplify the effect of benefit increases on asset use as the individual becomes more willing to act on the raised benefit through saving when new work is a more likely outcome. In figure 2, I plot the elasticity of asset use with respect to UI benefits for three different unemployment risk profiles; the baseline case from figure 1 with $\lambda = 2/3$, a case where the chance of being hired is larger than the baseline case; $\lambda = 0.9$, and a case with lower chances of getting a job as compared to the baseline case; $\lambda = 1/3$.

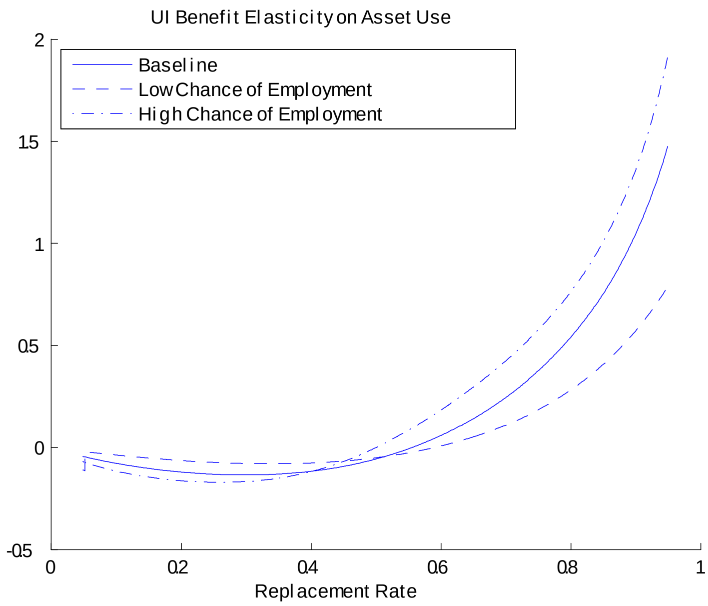


Figure 2. UI elasticity on asset use for three different employment probabilities.

Figure 2 shows that an individual with few hopes of becoming employed in period 2 does not change his or her asset use as much as an individual who is quite certain of being employed in the next period. In addition, the elasticity for the individual with low employment prospects remains below 1 for all replacement rates. This means that UI benefits are never perceived as adequate by this individual; a 1 percent increase in UI makes asset use decrease by less than 1 percent, always resulting in increased consumption. When employment prospects improve, UI benefits do become adequate for replacement rates above 0.9.

The second source of variation in UI adequacy is the amount of assets available to the unemployed. Along with the baseline case with $A_1 = 20,000$ SEK, I have plotted the elasticity for an individual with negative initial assets; $A_1 = -1000$ and a wealthy individual with an asset stock of $200,000$; a number that suffices to fully self-insure most unemployed for a median unemployment spell. The a priori notion is that if the unemployed is wealthy, he or she can self-insure against a job loss which means that UI benefits are of less importance for consumption (Gruber, 2001). As a consequence, even low UI generosity could be adequate with this group.

However, as depicted below in figure 3, the wealthy unemployed's lesser UI dependence does not make UI more adequate. Asset use changes considerably less with the wealthy individual as compared to the median unemployed and the unemployed with low initial assets. A wealthy unemployed can afford to spend more on consumption without really decreasing his or her asset use, which means that UI benefits never become adequate. For the unemployed with negative assets, a replacement rate of 0.8 is adequate; the individual starts saving when there is a further increase in UI generosity.

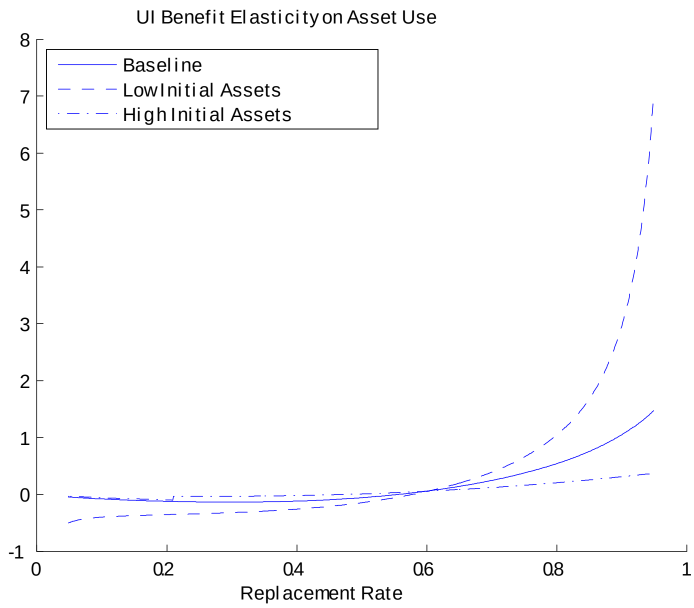


Figure 3. UI elasticity on asset use for three different stocks of initial assets.

The above simulations suggest that there can be substantial differences in UI adequacy and the effects of UI benefits on asset use and thus consumption depending on the characteristics of the beneficiary. The initial asset endowment of the unemployed offers the largest discrepancy in UI adequacy while employment probability matters the most when it is low. The two predictions that UI adequacy fall with wealth and rise with employment prospects suggest an empirically testable variation in UI adequacy between demographic groups with differences in wealth as well as the prospects of employment.

3 Data and Institutions

The empirical part of the paper is based on register data from the years 2000−2002; a period with policy-induced changes in UI generosity. The Swedish UI benefit scheme was at the time, and still is, a progressive one with low-income earners enjoying a higher replacement rate compared to workers with above-average earnings. The progressiveness of the system is accomplished by a cap on benefits which, when it is reached, makes replacement rates fall with previous earnings. Before July 1, 2001, unemployed who were eligible for UI benefits had a replacement rate of 80 percent if they earned no more than 725 SEK a day. If the unemployed worker had a daily wage exceeding the cap of 725 SEK, 580 SEK a day were paid out.

In 2001 and 2002, Sweden raised the maximum daily UI benefit amount twice and a two-tiered benefit structure was introduced. The reforms were meant to counter the previous years' drop in effective replacement rates due to strong nominal wage growth and constant UI benefits, combined with stronger incentives for job search. The first reform was implemented on July 1, 2001 and raised the maximum daily UI amount to 680 SEK which, with the new two-tired system, dropped to 580 SEK a day from the twenty-first week of unemployment and onwards. On July 2, 2002; maximum daily benefits were raised to 730 SEK but were then instead reduced by only 50 SEK in the twenty-first week of unemployment (see Bennmarker et al. (2007) for details on these reforms).

To evaluate the effect of UI generosity on asset use during unemployment, I combine three sources of data. First, the register-based longitudinal data set LINDA, an annually updated panel covering approximately $300,000$ individuals, which provides background variables such as age, sex, education and place of residence. Second, register data on wealth from Statistics Sweden which contains information on money in checking accounts, bonds, stocks, mutual funds and other financial instruments as well as debt and real estate; apartments, houses, holdings, second homes, and commercial realty. Third, unemployment history data from the Swedish Public Employment Service (Arbetsförmedlingen) with information on unemployment duration, date of registering as unemployed, eligibility to receive UI benefits, and earnings used to base UI payments on.

I restrict the attention to individuals who became unemployed sometime during 2001 or 2002 after having been employed throughout the previous year. An individual is considered to be unemployed if registered as such with the Public Employment Service in 2001 or 2002. Unless being registered as unemployed in the year prior to the layoff, the unemployed qualify as previously employed if having earned at least 150, 000 SEK; the approximate full-time yearly minimum wage. In addition, I exclude a 9 percent share of unemployed who are not eligible for full UI benefits and, like Zeldes (1989) and Gruber (1997), another 13 percent whose net asset holdings changed more than threefold during the year they were unemployed. All in all, this leaves me with a sample of 4, 733 individuals.

Table 1. Mean and Median Values for Covariates

	Mean	Median
Male	0.608	
Age	40.43	39
	(10.98)	
Married or Cohabitant w/Children	0.509	
Household Size	2.339	2
	(1.412)	
House Owner	0.381	
High School	0.583	
College < 2 years	0.066	
College > 2 years	0.175	
Daily Wage	838.1	765.3
	(424.9)	
Above the Cap	0.546	
Replacement Rate	0.700	0.758
	(0.134)	
No. Obs.	4,733	

Notes: All variables but age, household size and daily wage are dummies. The dummy "Married or Cohabitant with Children" does not detect unmarried cohabitants with no children.

Table 1 presents means and medians of covariates from the merged data sets. The average unemployed is a high school educated male in his early forties who is married or has a cohabitant and children. He earns slightly above the cap and does not own a house. By looking at the median values of wage and replacement rate, it is seen that the wage distribution is somewhat skewed. The median unemployed thus earns a lower wage but consequently has a higher replacement rate which means that he or she can depend less on own assets to smooth the consumption between employment and unemployment.

Table 2. Mean and Median Values of Assets and Asset Use

	Mean	Median
Gross Financial Assets	53707	815
	(193188)	
Debt	229320	151908
	(273951)	
Net Financial Assets	-175634	-126160
	(331932)	
Change in Gross Financial Assets	-8518	0
	(79635)	
Change in Debt	862	-2966
	(96798)	
Change in Net Financial Assets	-9380	1291
	(131055)	
No. Obs.	4,733	

Note: Based on the author's tabulations from wealth data from Statistics Sweden. Standard errors in parenthesis. All variables are in noted in year 2000 SEK.

Table 2 shows means and medians of various asset holdings the year before the layoff and the change in asset holdings during the year the individual is unemployed. Gross financial assets refer to money in checking accounts, bonds, stocks, mutual funds and other financial products; debt is the sum of loans lent at banks and other financial institutions; net financial assets are the difference between gross financial assets and debt.

Some facts worth noting from table 2: First, a comparison between means and medians highlights the skewness of the wealth distribution; the mean gross financial holdings in the sample are 66 times larger than the median gross financial wealth stock. Second, the unemployed in general have very low levels of liquid financial wealth in terms of gross financial assets. Consumption smoothing exclusively using gross financial assets seems infeasible for most people; the typical unemployed will have to resort to UI benefits and loans to finance the unemployment spell. Third, the median unemployed actually improve their finances at the end of the second year. This effect is mostly driven by loans which are repaid when new work is found.

4 Wealth Holdings among the Unemployed

Below, the distribution of mainly gross financial assets is surveyed in more detail. Gross financial assets are easy to liquidate and should be the first private source of wealth that the unemployed turn to when they lose their job. If these holdings are unevenly distributed among the unemployed, the adequacy of UI benefits should differ between groups; depending on the initial stock of assets at one's disposal but also between different demographic groups. A third issue is whether individuals who spend a long time as unemployed have larger asset holdings compared to those with shorter spells. If so, these larger asset holdings enable wealthier individuals to maintain living standards for a longer time and make it possible for them to be more selective when searching for new work.

4.1 The Distribution of Assets and Liabilities

Table 3 displays the distribution of gross financial assets, debt and net financial assets ex-ante unemployment. A large share of the sample has no gross financial assets at all and is thus fully reliant on UI to fund its consumption unless it resorts to credits. Among those with no gross financial assets, 45 percent have real assets which can be used as collateral. The rest does not and will therefore need to use unsecured debt if they wish to further smooth their consumption beyond what is provided by UI benefits.

Table 3. Ex-ante Financial Assets and Liabilities

Percentile	*Gross Financial*	*Debt*	*Net Financial*
10th	0	0	-501,320
25th	0	40,547	-298,389
50th	815	151,908	-126,160
75th	27,800	322,199	-20,069
90th	134,752	530,457	46,818

Note: The three columns present year 2000 SEK wealth holdings, the first shows gross financial wealth, the second shows debt and the third column shows the distribution of net financial wealth.

83 percent of the unemployed have some form of liabilities. Among those, 60 percent own real estate which can be used as collateral for loans to finance consumption. But 40 percent of the sample are indebted without owning any real estate. Consequently,

net financial assets are negative in most cases. About 15 percent of the sample have positive net financial wealth whereas about 3 percent have zero net wealth ex-ante unemployment. However, these negative numbers stem from owning real estate. If the distribution of net financial wealth is studied separately for those without real estate, the negative numbers are approximately halved.

4.2 Wealth Differences by Demographics

Tables 4 and 5 show the distribution of gross financial assets broken down by demographics. Table 4 shows quite large differences between the three groups. Women save more than men and can therefore better smooth consumption without borrowing. Older individuals have distinct larger savings compared to individuals aged below 45. This difference seem to stem from a surge in wealth around the age of 55. The median person aged above 55 has about $20,000$ SEK in gross financial assets compared to the median individual above 45 who possesses a fourth of that amount. The median person below 45, however, has no gross financial wealth at all that is accounted for.

Table 4. Ex-ante Gross Financial Holdings by Group

Group/Percentile	10th	25th	50th	75th	90th
Men	0	0	0	15,008	91,877
Women	0	0	536	23,308	121,676
Age>45	0	0	1,721	50,781	219,516
Age<45	0	0	0	11,200	54,227
Married	0	0	686	22,853	131,043
Single	0	0	0	14,519	83,506

Note: The table presents year 2000 SEK gross financial asset holdings for different subgroups ex-ante unemployment.

There are also differences between married or cohabitants and singles but the differences are not as sharp as between men and women and between different age groups. In general, married or cohabitants have a better scope for smoothing their consumption compared to singles but they can also rely on their partner in various ways. In 50 percent of all cases, the partner has an own gross financial wealth that can be used to smooth the household's consumption. Through the Added Worker Effect, the partner can increase his or her labor supply which reduces the need for asset use. In addition, an employed partner can better access credit markets if unemployment is credit constraining.

Table 5. Ex-Ante GFA Relative to Income Loss by Group

Group/Percentile	10th	25th	50th	75th	90th
All	0	0	1	81	416
Men	0	0	0	65	363
Women	0	0	2	106	500
Age>45	0	0	7	201	824
Age<45	0	0	0	47	254
Married	0	0	3	91	483
Single	0	0	0	70	363

Note: The table presents year 2000 SEK gross financial asset holdings divided by the loss of disposable income for all individuals as well as for different subgroups.

In Table 5, I follow Gruber (2001) and relate the figures in table 4 to daily income loss; that is the disposable income as employed minus the disposable income as unemployed. The numbers show how many daily income losses that can be covered using the gross financial assets that the individual possesses. The median individual can only cover 1 daily loss without reducing consumption or using loans. By the 75:th percentile, the scope of consumption smoothing with gross financial assets is clearly improved as individuals possess about 80 daily income losses which corresponds to five months of ex-ante consumption. When the 90:th percentile is reached, individuals can sustain around 18 months of unaltered consumption. As individuals on average save some fraction of their income as employed and assuming that being unemployed costs less than working, this time is prolonged even further. In addition, the differences seen in table 4 between men and women, young and old, and married or cohabitants and singles are confirmed in table 5.

To summarize, half of the sample must rely on loans or welfare transfers if they wish to smooth consumption further beyond what is provided by the UI. It is also evident that individuals between percentiles 50 and 75 in the gross financial asset distribution have low ability to smooth consumption exclusively with gross financial assets. It is not until the 75:th percentile has been reached that full consumption smoothing with gross financial assets becomes feasible. By looking at demographic differences, it is seen that the most UI-dependent type is a young single male whereas the less UI-dependent type is an older married woman. To exemplify this, the median married woman aged above 45 has 260 times the gross financial asset holdings of the median young single male.

4.3 Wealth Differences by Spell Length

Theoretical as well as empirical research has noted the importance of wealth when designing optimal UI (Shavell and Weiss, 1979; Baily, 1978; Hopenhayn and Nicolini, 1997; Lentz and Tranæs, 2005; and Lentz, 2009). The intuition in this literature is that wealthy individuals can afford to remain unemployed for a longer period of time since, by self insuring, they can maintain their ex-ante level of consumption. This is further emphasized when UI benefits are constant over time as in the Swedish UI scheme of 2000 − 2002.

Table 6. Ex-Ante GFA Relative to Loss by Duration

Group/Percentile	10th	25th	50th	75th	90th
<1 Month	0	0	3	73	390
2-3 Months	0	0	1	71	353
4-6 Months	0	0	2	76	395
7-12 Months	0	0	1	100	473
>12 Months	0	0	0	82	453

Note: The table presents year 2000 SEK gross financial asset holdings divided by the loss of disposable income for different lengths of the unemployment spell.

From this literature, it could be expected that the longer time period an individual spends unemployed, the wealthier he or she is. On the other hand, wealth is positively correlated with earnings and earnings are positively correlated with education. Since we expect educated people to spend less time unemployed compared to individuals with a low level of education, wealth could also be negatively correlated with unemployment spell duration. This is what Gruber (2001) finds in his data.

Table 6 shows a somewhat mixed result. Comparing individuals that spend seven months or more as unemployed with the three other groups, it is seen that the median level of wealth falls while wealth in the 75:th and 90:th percentiles rises. The long-term unemployed consist of both wealthy individuals and, to the most part, poor individuals while the middle is hollowed out. An important factor that might explain the increased wealth among those that remain unemployed for a long time is age. The fraction of individuals older than 45 increases with spell length and, as has previously been noticed, age is a key explanatory factor for ex-ante wealth. Those that have the best scope for smoothing their consumption are those that are unemployed for the shortest period of time; that is less than a month. This group has the highest median wealth in relation to their lost income and the wealth above the median is fully sufficient to maintain consumption at its ex-ante level.

5 Asset Use and UI Generosity

UI has two main sources of variation; the individual's wage prior to the layoff and the institutional settings of the benefit scheme. Both determinants affect asset use during an unemployment spell. Thus, a key question when estimating UI's influence on asset use is how to distinguish the effect of differences in previous wage from the effect of changes in UI generosity. To separate these two sources of variation in UI benefits, I use a Regression Kink Design that exploits the randomization of UI generosity created by the cap on benefit payments. Estimates on net financial assets are then used to both assess the adequacy of UI and calibrate UI's effect on consumption.

5.1 Empirical Strategy

In a setting where the treatment that is given to individuals, UI, is mechanically determined by an endogenous assignment variable, wage, it is almost impossible to find instruments that affect the treatment intensity without being correlated with unobservable characteristics of the individual (Card et al., 2009). The set up of the UI scheme, however, exogenously assigns UI benefits via the kink where the wage-benefit relation is shut off. As long as individuals are unable to precisely manipulate their wages, it follows that the variation in treatment around the kink will be as random as the treatment assignment in a randomized trial (Lee and Lemieux, 2009).

Assume that individual i's asset use between period 1 and period 2, measured as the change in logged assets $\Delta \ln A_i = \ln(A_{2i}/A_{1i})$, depends on UI benefits; mechanically determined by previous earnings by a linear function $B(\cdot)$ that has a kink at k, some unknown function $g(\cdot)$ of the previous wage and an idiosyncratic shock, ε:

$$\Delta \ln A_i = \tau B(W_i) + g(W_i) + \varepsilon_i \tag{5}$$

The treatment on the treated effect of benefits on asset use, τ, is identified if the kink in the benefit scheme also induces a kink in the relationship between asset use and previous wage that coincides with k (Nielsen et al., 2009). The solution for τ is written as

$$\tau = \frac{\lim\limits_{W \to k^+} \left(\partial E\left[\Delta \ln A | W\right] / \partial W\right) - \lim\limits_{W \to k^-} \left(\partial E\left[\Delta \ln A | W\right] / \partial W\right)}{\lim\limits_{W \to k^+} \left(\partial B(W) / \partial W\right) - \lim\limits_{W \to k^-} \left(\partial B(W) / \partial W\right)} \tag{6}$$

As in Regression Discontinuity Design, estimates are made within a window or bandwidth h on the wage scale around the cutoff point. This means that I estimate the treatment on the treated effect τ for all individuals with $W \in [k-h, k+h]$ for some appropriate choice of h. The largest bandwidth I will use is $h_1 = 285$, suggested by a Rule Of Thumb (ROT) test described in Lee and Lemieux (2009). For $h_1 = 285$, 80 percent of the sample are included in the analysis which renders the results a large degree of generality and is mainly due to the compressed nature of the Swedish wage structure.[4] To test the sensitivity of the optimal bandwidth results, I use three other bandwidths as well. The first is $h_2 = 200$ and includes roughly 70 percent of the sample. The two additional bandwidths I will use are $h_3 = 150$ and $h_4 = 100$ and they comprise about 60 percent and 40 percent of the sample, respectively.

More specifically, I address the issue of UI's influence on asset use by estimating parametric polynomials on the form

$$\Delta \ln A_i = \sum_{p=1}^{3} \left(\beta_p (W_i - k)^p + \gamma_p (W_i - k)^p \times D_i \right) + Z_i \eta + \varepsilon_i \tag{7}$$

where D_i is a dummy indicating that $W_i > k$ and Z are the covariates. The parametric model obtains the effect of UI on asset use, τ, by dividing $-\widehat{\gamma}_1$ with 0.8 which is the slope of the wage-benefit relation up to the kink.[5] This means that the estimated model (7) corresponds to the numerator in (6) above whereas the denominator in (6) is the share of previous income replaced up to the kink; 0.8. If UI has a consumption-smoothing effect, this would correspond to $\tau = -\widehat{\gamma}_1/0.8 > 0$; that is, asset use is reduced when UI is increased.[6]

Two identifying assumptions are associated with the RKD. First, individuals cannot exercise precise control of the wage which corresponds to $\partial E[\varepsilon]/\partial W$ being equal on both sides of k. For Sweden, the assumption should hold as wages are mostly set in collective bargaining agreements between an employers' confederation

[4] However, Lee and Lemieux (2009) show that the treatment effect is a weighted average across all individuals. τ is weighted by the probability of being close to the cut-off point. Therefore, the design renders generalizable results.

[5] An additional advantage of measuring the treatment effect using wage instead of replacement rate is that wages vary across all individuals, not only among those that earn a wage above the kink.

[6] τ thus measures the effect of expected UI on asset use. According to Blank and Card (1991) UI take-up should be assumed to be endogenous which means that using actual UI payments to predict asset use renders biased estimates. If there is some kind of social stigma associated with UI take-up or that specific but unobserved individual characteristics affect UI payments, it is better to use an expected measure of UI. The expected measure is simply the benefit an individual receives if he or she is eligible to full UI benefits.

and a trade union resulting in wage contracts that run for two or three years. To manage individuals who can adjust their labor supply or directly influence their own wage by bargaining with the employer, I add randomization by using a sample period where reforms in the UI are being conducted that change the location of the kink.

The second identifying assumption regards sorting on observables; sample characteristics must be similar on both sides of the cutoff point to ensure that $\partial E[Z\eta]/\partial W$ is equal on both sides of k. The risk of sorting on observables is reduced if all covariates are determined prior to the job loss. This will reduce possible sources of correlation between the kink and the right-hand side variables in the estimated models as unemployed individuals can make significantly different choices regarding asset use depending on their wage.

5.2 Data Issues

To analyze how UI affects asset use, I calculate three financial wealth measures: gross financial assets (GFA), that is the sum of money in checking accounts, bonds, stocks, funds, and other financial instruments; debt which include all debt, secured and unsecured accounted for by any financial company or institution, and finally, net financial assets (NFA), the difference between gross financial assets and debt. NFA is the measure that will be most stressed as individuals can use both own assets *and* borrowed means for consumption-smoothing purposes. Thus, NFA can measure the whole flow of financial means to consumption and in what way this flow is affected by more generous UI.

I use the log of these three measures as the distributions are highly skewed. The missing value issue that comes with using logs is solved by adding 1 SEK to each sample member's positive as well as negative holdings. When $\ln(A_{2i}/A_{1i})$ is computed, individuals with no assets in either period will have a change of zero in wealth instead of a missing value. 45 percent of the sample have zero gross financial holdings in both periods. For debt and net financial assets, these shares are reduced to 13 percent and 3 percent, respectively.

The measure $\ln(\text{NFA}_{2i}/\text{NFA}_{1i})$ requires a few adjustments, though. For those with a negative NFA value in both periods, $\ln(\text{NFA}_{2i}/\text{NFA}_{1i}) > 0$ is booked as saving although it actually indicates a debt increase. Therefore, these observations are multiplied by -1. Another issue is that $\ln(\text{NFA}_{2i}/\text{NFA}_{1i})$ is undefined when one of the NFA figures is negative and the other is positive. For individuals who have been using assets so that $\text{NFA}_{1i} > 0$ and $\text{NFA}_{2i} < 0$, I retain the observation by evaluating the change as a case of saving. The negative number NFA_{2i} is moved a distance $\text{NFA}_{1i} - \text{NFA}_{2i}$ to the right of the positive number NFA_{1i}. The change in logs is then written as:

$$\frac{\text{NFA}_{2i} - \text{NFA}_{1i}}{\text{NFA}_{1i}} = \frac{\text{NFA}_{1i} - \text{NFA}^*_{2i}}{\text{NFA}_{1i}} \simeq -\ln\left(\frac{\text{NFA}^*_{2i} - \text{NFA}_{1i}}{\text{NFA}_{1i}} + 1\right) = -\ln\left(\frac{\text{NFA}^*_{2i}}{\text{NFA}_{1i}}\right)$$

where $\text{NFA}^*_{2i} = \text{NFA}_{1i} + (\text{NFA}_{1i} - \text{NFA}_{2i}) > 0$. In the opposite case, I evaluate the relative change in net financial assets as a case of borrowing by moving the positive number NFA_{2i} a distance $\text{NFA}_{1i} - \text{NFA}_{2i}$ to the left of the negative number NFA_{1i}. Call this number NFA^{**}_{2i} where $\text{NFA}^{**}_{2i} = \text{NFA}_{1i} + (\text{NFA}_{1i} - \text{NFA}_{2i}) < 0$. The log approximation is then written as above with NFA^{**}_{2i} instead of NFA^*_{2i} and without multiplying by (-1) to indicate that saving has occurred.[7]

The second data issue concerns sample members who face different kinks as they become unemployed during three different benefit regimes: before June 2001, between July 2001 and June 2002, and between July 2002 and December 2002. If τ is roughly the same in the three benefit-regime groups, estimates from a pooled analysis will be more effective than group-wise estimates (Card et al., 2009). As τ depends on the level of the benefit or replacement rate, the mean replacement rate in the three benefit-regime groups needs be roughly the same, which they are: Before June 2001, the mean replacement rate was 0.73, between July 2001 and June 2002 it decreased to 0.72, and between July 2002 and December 2002 it rose to 0.74. To carry out the pooled analysis in practice, the daily wage is reduced by the daily benefit raise (Card et al., 2009). Those who become unemployed between July 2001 and June 2002 get their daily wages reduced by 100 SEK and those who become unemployed between July 2002 and December 2002 gets a wage reduction of 150 SEK. Now, all sample members face the same kink: $k = 725$ SEK.

5.3 Asset Use Estimations

The effect from benefits on net financial asset use is estimated with model (7) for the four different bandwidths. Bandwidth h_1, derived by the ROT method, will serve as the baseline model while the three other bandwidths are used to check the sensitivity of the baseline results. The outcomes of the estimations are presented

[7] Excluding these 4 percent of the sample does not change the estimates in section 5 in any significant way.

in detail in tables $A1 - A2$. Along with the estimates of γ_1, I also present their robust standard errors and p-values from a goodness-of-fit test that looks for any systematic occurrence of kinks in the data.[8] In addition, each polynomial is tested with the Akaike Information Criterion, AIC, to see which specification is the most suitable.

Table 7. Preferred RK-estimates on ΔlnNFA by the AIC

(Standard Errors in Parenthesis)

Specification/Bandwidth	*h = 285*	*h = 200*	*h = 150*	*h = 100*
Without Covariates	-0.00113**	-0.00150**	-0.00070**	-0.00118**
	(0.00042)	(0.00057)	(0.00026)	(0.00041)
With Covariates	-0.00107*	-0.00151**	-0.00067*	-0.00118**
	(0.00042)	(0.00058)	(0.00026)	(0.00041)
No. Obs.	3873	3364	2849	2041

Notes: The first row reports the RK-estimate from the polynomial specification preferred by the AIC whereas the second row shows the robust standard error. For the two wider bandwidths, a second-order polynomial is preferred while a linear specification describes data the best for the two narrower bandwidths. * denotes that the estimate is significant at the 5 percent level, ** denotes significance at the 1 percent level.

For the two larger bandwidths, $h_1 = 285$ and $h_2 = 200$, the second-order polynomial is preferred by the AIC, while a first-order polynomial has the best fit for the two smaller bandwidths. The four preferred RK estimands on Δ lnNFA, one for each h_j, range between -0.00161 and -0.00076. For h_1 I get -0.00105, h_2 renders the largest estimate of -0.00161 and h_3 the smallest, -0.00076. The narrowest bandwidth of 100 SEK, h_4, gives me a point estimate of -0.0127. Table 7 summarizes the results.

To express these estimates in terms of the UI-elasticity on asset use, I divide them by -0.8 to get the semi-elasticity of UI benefits on asset use; τ. I then multiply each τ_j with the expected average daily benefit in each bandwidth to obtain the elasticity of asset use on benefits resulting in elasticities between 0.49 and 1.1. The baseline specification estimated in h_1 lies in the middle of this range.

[8] The idea of the goodness-of-fit test, described in Lee and Lemieux (2009), is that including a dummy for each bin except those just to the left and to the right of k in each regression and then testing the joint significance of these dummies shows whether or not the regression line jumps at randomly chosen points in the wage distribution, that is at the bin thresholds. As long as this p-value remains above 0.05, the fit of the model cannot be brought to question. But if the dummies are jointly significant, the particular polynomial specification should be discarded since the kink cannot be attributed to the benefit rule with any certainty.

The regression models are once more estimated including a vector of covariates: age, sex, education dummies, a dummy for being a house owner, a dummy for being married or being a cohabitant, the number of individuals in the household, and a set of residential dummies.[9] The estimates are not changed in any significant way after the inclusion of the covariates; only somewhat reduced, which shows that there is no sorting on observables. For h_1 the elasticity is 0.73 and for the other three bandwidths I compute the elasticities 1.03, 0.38 and 0.67, respectively.

Since asset use has thus far been defined as the change in log net financial assets, the estimates capture the change in the net flow of assets to consumption. But the results cannot distinguish from what source the assets emanate: gross financial assets or debt. In tables $A1 - A2$, it is seen that it is mainly debt that responds to raised UI benefits. In addition, the elasticities of UI benefits on debt change are of a significantly larger magnitude as compared to those on net financial assets: -1.33, -1.60, -1.11, and -1.67. For gross financial assets, h_2 estimates an elasticity of 0.68.

What do these elasticities imply for adequacy and consumption? Assume a 1 percent increase in benefits that makes asset use drop by 0.75 percent. The change in consumption is written as $\Delta C = \Delta B - \Delta^2 A$, that is $1 - 0.75 = 0.25$. Thus, consumption rises by 0.25 percent according to this calibration, assuming that no other unobserved cash flows are affected. The fact that there is an increase in consumption indicates that, on average, individuals are not consuming at the ex-ante level which also means they cannot fully insure against job loss. Therefore, UI is inadequate on average; the reduction in asset use does not correspond to the increase in UI benefits which raises consumption as some asset use remains.

The estimated elasticity of asset use on benefits from the baseline model, 0.75, can also be used to calculate a UI benefit level that would make asset use unnecessary. With an average replacement rate of 0.7, the asset use or reduction in net financial assets is 5.3 percent. A linear relation between asset use and UI can then be expressed as $\Delta \ln A = -0.053 + 0.75 \Delta \ln B$ which is zero when $\Delta \ln B = 0.07$. The calculation shows that a 7 percent increase of the average daily benefit would make asset use superfluous which corresponds to an average replacement rate of 0.75; a number slightly below the median replacement rate.

Benchmarking my estimate against those previously made shows that they are quite similar. Gruber (2001) estimates an elasticity of 0.78 using the replacement

[9] I previously included initial wealth proxied by net worth. However, the variable does not change the RKD-estimates in any significant way.

rate to measure UI generosity, although exclusively on gross financial assets. Adjusting my estimates for the replacement rate, I get an average elasticity for the four bandwidths of 0.6. For consumption, Gruber (1997) finds that food expenses increase by 0.3 percent when the replacement rate is increased by 1 percent whereas Browning and Crossley (2001) estimate an elasticity of 0.05 for overall consumption. My calibration shows that consumption would increase by approximately 0.2 percent from a 1 percent increase in the replacement rate which is quite close to the estimate in Gruber (1997).

5.4 Heterogeneity in Adequacy

The theoretical model of section 2 suggested that UI adequacy should fall with wealth and rise with employment prospects. To test for heterogeneity in employment prospects, I predict the risk of being unemployed for more than a year for each individual. That is, I estimate $pr\,(1-\lambda)$ using the same background variables used earlier along with previous earnings and county of residence at the time when the job separation took place. County of residence, which is more detailed than the regional dummies used earlier, serves as an instrument for unemployment risk. Since the economic conditions vary significantly between counties, such dummies have a good explanatory power for employment probability. In addition, the county dummy should be uncorrelated to the unobserved determinants of asset use as most individuals do not ex-ante unemployment choose place of residence mainly on the basis of unemployment risk (Carroll et al., 2003).

After predicting the unemployment risk for each individual, I re-estimate the AIC-prefered models separately for those below the median risk of being unemployed for more than a year of 0.56 and for those who run a risk above the median for a more than one-year long unemployment spell. Estimates for those below the median risk should be higher as compared to those above it. This is is also the case: asset use is unaffected by more generous UI benefits for those having an above the median risk of spending more than a year as unemployed. For those with better employment prospects, the elasticity of UI benefits on asset use is on average 37 percent higher as compared to estimates from the baseline model.

To proxy wealth, I use three different measures; net worth prior to the job loss, owning a house, and living with a partner. The rationale behind net worth is straight forward; wealthier unemployed depend less on UI to finance their consumption and should thus change their asset use less as compared to a less wealthy individual. A house can be used as a source of consumption smoothing since it requires investments. If the unemployed house owner just lets depreciation run its course, he or she can effectively save money in the short run. The last proxy, being married, is used due to the Added Worker Effect described earlier.

Table 8. Preferred RK-estimates on ΔlnNFA by the AIC for Subgroups (Standard Errors in Parenthesis) [No. Obs. in Square Brackets]

Specification/Bandwidth	*h = 285*	*h = 200*	*h = 150*	*h = 100*
Above $p50$ Net Worth	-0.00112	-0.00025	-0.00023	-0.00051
	(0.00059)	(0.00080)	(0.00037)	(0.00058)
	[1936]	[1682]	[1424]	[1020]
Below $p50$ Net Worth	-0.00100	-0.00281**	-0.00111**	-0.00171**
	(0.00060)	(0.00082)	(0.00037)	(0.00058)
	[1936]	[1682]	[1424]	[1020]
House owners	-0.00040	-0.00023	-0.00003	-0.00009
	(0.00060)	(0.00079)	(0.00034)	(0.00059)
	[1386]	[1197]	[1012]	[716]
Non-House owners	-0.00145*	-0.00224**	-0.00100**	-0.00179**
	(0.00057)	(0.00078)	(0.00036)	(0.00054)
	[2487]	[2167]	[1837]	[1325]
Married and Cohabitants	-0.00073	-0.00152*	-0.00041	-0.00087
	(0.00056)	(0.00075)	(0.00034)	(0.00052)
	[1916]	[1664]	[1404]	[1009]
Singles	-0.00131*	-0.00142	-0.00088*	-0.00153*
	(0.00062)	(0.00087)	(0.00039)	(0.00063)
	[1957]	[1700]	[1445]	[1032]
Above $p50$ Emp. Chance	-0.00141*	-0.00227**	-0.00069	-0.00154*
	(0.00062)	(0.00084)	(0.00037)	(0.00061)
	[1936]	[1682]	[1424]	[1020]
Below $p50$ Emp. Chance	-0.00095	-0.00097	-0.00063	-0.00084
	(0.00060)	(0.00080)	(0.00037)	(0.00056)
	[1936]	[1682]	[1424]	[1020]

Notes: All regressions are run with covariates. * denotes that the estimate is significant at the 5 percent level, ** denotes significance at the 1 percent level.

I start by dividing the sample into two groups; above and below median net worth. Then, I re-run the AIC-preferred model for each bandwidth and for the two groups.

The results show that wealthier individuals do not alter their asset use at all; the RKD-coefficient $\widehat{\gamma}_1$ cannot be separated from zero in any of the four regressions. With the part of the sample that has below median net worth, the estimates are considerably larger as compared to those made on all individuals in each bandwidth. Apart from a non-significant estimate for h_1, the elasticities of benefits on asset use increase by approximately 70 percent, mainly due to a more frequent use of credits with this group.

The next asset proxy is house ownership. If the AIC-preferred models are run for house owners and non-house owners, respectively, results similar to those for net worth are seen. House owners do not alter their asset use when benefits are increased; for all bandwidths the RKD-estimand is non-significant. Non-house owners, i.e. tenants and those living in condominiums, have an elasticity of UI benefits on asset use that is, on average, about 20 percent higher as compared to the whole sample. The differences are not as sharp as in the previous case but the pattern is the same; assets decrease the will to alter one's asset use when UI benefits rise.

The final asset proxy is having a partner. Just as above, my results show that unemployed who are married or cohabitants do not alter their asset use when UI benefits rise as none of the RKD-estimands are significant.[10] Single unemployed, on the other hand, alter their asset use 28 percent more than the average unemployed. This result is in line with Arslanogullari's (2000) finding that unemployed with a partner do not alter their asset use when UI benefits are raised.

To sum up, these results show large differences in adequacy between subgroups. For UI to be considered as adequate, the UI benefit elasticity on asset use needs to rise above 1 from its average of 0.75 which corresponds to an increase of 1/3. Two subgroups have elasticities that increase by more than 1/3: those having a net worth below the median and those having employment prospects above the median. For these two groups, UI benefits were adequate at the time as they did not make consumption rise. Non-house owners and singles have a close to adequate UI, but it is not fully adequate as their elasticities remain below 1.

6 Robustness Tests

This section assess the robustness of the results presented above along three dimensions. The first robustness check is related to the choice of empirical strategy.

[10] Married and cohabitants use assets though. In fact, they use more than singles during an unemployment spell.

Since I argue that previous estimates of the UI-elasticity on asset use are biased, my RKD-estimates should differ from those obtained when estimating the kind of model used in earlier research by Gruber (1997 and 2001), Browning and Crossley (2001) and Arslanogullari (2000) on these data. If they do, the RKD-approach is fruitful. But if they do not, then RKD-estimation is clearly less motivated. Second, for the RKD to be a reliable design, there cannot be any bunching of individuals around the kink point due to unobservable and observable factors which I test for empirically. Finally, I re-estimate the models with different asset use measures to see how much the estimates above depend on choosing the change in logged net financial assets to measure asset use.

6.1 Sensitivity to choice of UI Measure

To motivate the use of RKD, there should be differences between the estimates presented above and estimates from the kind of models that has been used in previous research. The main issue here is whether fixed effects should be controled for, the same fixed effects that make UI vary exogenously across individuals. Gruber (1997 and 2001), who uses U.S. data where the exogenous variation is achieved through differences in UI generosity over state and time, control for these two fixed effects. Browning and Crossley's (2001) study on Canadian conditions does not control for time effects as their exogenous variation stems from differences in UI generosity over time. With Gruber's (1997 and 2001) approach, one is still left with the variation within particular federal states, if such variation exists. However, this variation is subject to the same influence of time dependent federal state-specific shocks and the general fiscal conditions in the studied states as Browning and Crossley's (2001) approach where time is not controlled for.

The first model I estimate is similar to that of Browning and Crossley (2001)

$$\Delta \ln A_i = \beta_1 UIRR_i + X\beta_2 + \varepsilon_i \tag{8}$$

where $UIRR$ denotes the UI replacement rate and X is a set of background characteristics. The effect of UI generosity on asset use is identified by including the log of previous earnings in the control set X; then, only the policy determined part of the replacement rate is allowed to vary. The second model corresponds to the one used by Gruber (2001) and is identical to model (8) above with two exceptions. First, Gruber control for time, which with my data means that UI only differs exogenously between individuals within the years 2001 and 2002. Second, he includes a spline function of the wage instead of the wage itself to identify the effect of policy determined UI generosity on asset use. The results from the two models are presented in the table below.

Table 9. Alternative Estimates on ΔlnNFA

(Standard Errors in Parenthesis)

Specification/Bandwidth	*h = 285*	*h = 200*	*h = 150*	*h = 100*
Browning and Crossley (2001)	0.127	0.362	0.665*	1.145*
	(0.145)	(0.193)	(0.256)	(0.398)
Gruber (2001)	1.836*	1.987*	1.719	1.537
	(0.685)	(0.824)	(1.006)	(1.226)
RKD-estimates in terms of *UIRR*	0.56	0.84	0.38	0.65
No. Obs.	3873	3364	2849	2041

Notes: The first row reports OLS estimates of the effect of the replacement rate on asset use and the second row shows the standard error. * denotes that the estimate is significant at the 5 percent level.

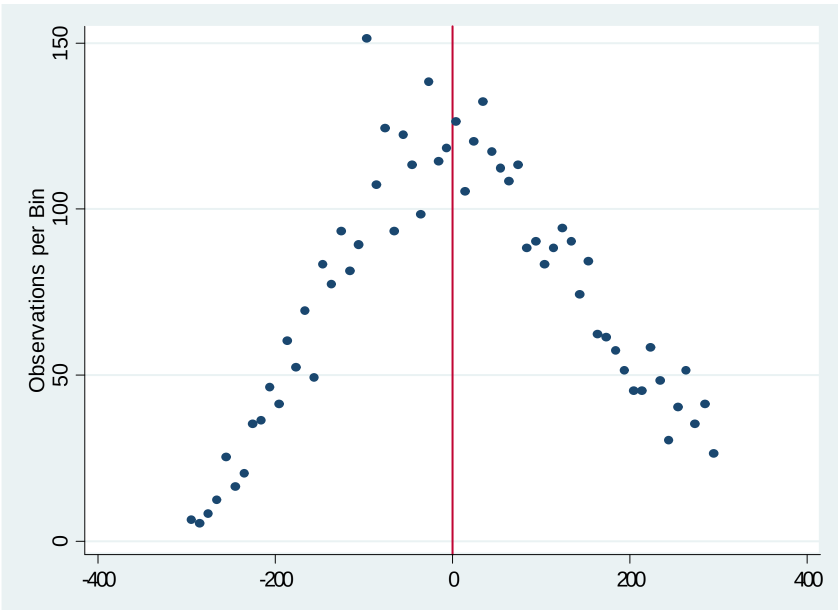
The results from the two specifications differ, both between each another and between those obtained by the RKD. The Browning and Crossley model underestimates the effect for the two wider bandwidths and overestimates it for the two narrower while the Gruber model overestimates the effect for all bandwidths when benchmarking against the RKD-estimates. Thus, there seem to be a cause for RKD-estimation as all estimates in these two models are significantly different from those obtained earlier. Nevertheless, this is not proof of the RKD being right and the previous approaches being wrong but it does not undermine the choice of RKD as the empirical strategy.

6.2 Sensitivity to Sorting

As mentioned above, to identify the effect of UI on asset use, two conditions must be met. The first is that individuals cannot exercise any precise control of the assignment variable, daily wage. That is, individuals cannot by themselves determine on which side of the kink they will end up on if they become unemployed. If this were the case, it would correspond to sorting on unobservables and be seen by a "bunching" of individuals on one side of the kink when the density of the assignment variable is plotted. The second condition is that there can be no bunching or sorting on observables; sample characteristics should thus be similar on both sides of the cutoff point.

To test if the two conditions hold, I begin by plotting the density of the assignment variable after having collapsed data into equal-sized bins with a width of 10 SEK. Figure 2 shows no sign of sorting, rather a smooth transition across k. The graphical evidence of figure 2 is also supported by McCrary's (2008) test where the number of observations per bin, N_{bin}, is regressed on $(W-k)$ and $(W-k) \times D$. If sorting is present, the coefficient on $(W-k) \times D$ should be different from zero. With a third degree polynomial which fits data the best, the coefficient on the interaction term $(W-k) \times D$ is non-significant with a t-statistic at 0.75. Given the nature of Swedish wage setting and the fact that I study a period with substantial changes in k, the result that no sorting on unobservables seems to be present is far from surprising.

Figure 2. Density of the Assignment Variable, Daily Wage



Note: Each point in figure 2 represents the number of individuals per bin. The number of observations per bin is plotted against the assignment variable, i.e. normalized daily wage. The number of bins is 60 and their size is 10 SEK. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

To test for sorting on observables, I plot the densities of some key characteristics such as education, fraction of males and age against daily wage, displayed in figures

$A1-A7$. None of the plots show any sign of kinks at k which suggests that no sorting on observables is present. I also more rigorously test for the presence of kinks in the covariates by estimating the polynomial RKD model (7) with the covariates in Z as dependent variables. If $\widehat{\gamma}_1$ is significant, there is a kink in the covariate at k and possible sorting on that variable. My results, presented in tables $A3-A6$, show no presence of a kink in the covariates apart from four exceptions: the fraction of high school educated for bandwidth h_1, household size for bandwidth h_2, and the regional dummies "living in Norrland" and "living in the Gothenburg metropolitan area" where $\widehat{\gamma}_1$ is significant seven and four times, respectively.

Naturally, this violates the identifying assumption of my model and it can potentially bias the RKD-estimate. But the kinks in the share of high school educated and household size are not robust and there is no sign of sorting when the variables are plotted against the assignment variable daily wage. In addition, only once do the AIC preferred model for "living in Norrland" and NFA coincide which happens for h_2. The preferred specification for "living in the Gothenburg metropolitan area" never coincides with the preferred polynomials for $\Delta \ln\text{NFA}$. Most importantly, the estimated effects of UI on asset use with and without covariates do not differ significantly from each other which leads to the conclusion that the bias, if it exists, is small and statistically insignificant.

6.3 Sensitivity to choice of Dependent Variable

When choosing how to measure asset use, three issues need to be considered. First, what should be included in the measure - all wealth, net wealth, or just liquid wealth? Second, who should be included - all individuals or just those who have assets before and after the unemployment spell? And finally, how should asset use be measured - as a relative or an absolute change in wealth? The preferred measure so far has been net financial assets. But housing wealth can also be included in asset use as individuals might be forced to sell off real assets to compensate for the loss of income generated by the unemployment spell.

To see if housing wealth should be included, I re-estimate the AIC-preferred models with the change in logged net worth. My results, summarized in table 10, show that the inclusion of housing wealth makes asset use unaffected by UI benefits; no estimate is significant at any conventional level. This is not very surprising as the Swedish UI system at the time had a limited emphasis on the geographic mobility of UI beneficiaries.

Next, I test whether it matters who is included in the estimations. As the logarithm function is not defined for zero, I added 1 SEK to all individuals' wealth in both periods so that those with no wealth in either period have a zero change in asset use. Not doing this forces me to exclude those 4 percent of the sample. But for this operation to influence the estimations, there is required to be a correlation between being a zero-saver and UI generosity. Engen and Gruber (2001) point out that there should not be any such correlation as the UI system only replaces a fraction of the previous income; even with UI benefits, consumption needs to be smoothed during an unemployment spell. My results are in line with those in Engen and Gruber (2001); the estimates are more or less unaffected by excluding individuals with no assets in either period.

Table 10. Alternative Asset Use Measures with Covariates

(Standard Errors in Parenthesis)

Specification/Bandwidth	*h = 285*	*h = 200*	*h = 150*	*h = 100*
Net Worth	-0.00175	-0.00266	-0.00093	-0.00111
	(0.00114)	(0.00157)	(0.00070)	(0.00114)
Non-Zero Assets Only	-0.00112*	-0.00162**	-0.00070*	-0.00125**
	(0.00045)	(0.00061)	(0.00028)	(0.00043)
Percentage Change in NFA	-0.00104	-0.00180*	-0.00085*	-0.00051
	(0.00060)	(0.00083)	(0.00038)	(0.00060)
Absolute Change in NFA	-249.43*	-433.79**	-159.24*	-288.76*
	(109.19)	(159.82)	(71.18)	(135.38)
No. Obs.	3873	3364	2849	2041

Notes: The first row reports RKD-estimates of the effect of the replacement rate on asset use and the second row shows the robust standard error. * denotes that the estimate is significant at the 5 percent level, ** denotes significance at the 1 percent level.

Finally, there is the matter of how asset use should be measured. The main reason for using the difference in logged assets is the penalization of extreme values. The logarithm function compresses the wealth distribution and makes it more bell shaped as displayed in figures $A8$ - $A10$. Both the distribution of the percentage change in net financial assets and the distribution of the absolute change in net financial assets have high spikes around zero and long, flat tails. If these measures are compared to the distribution of the difference in logged net financial assets, it is seen that the spike is not as high and the tails are not as flat as in the two other measures.

To test if the results in the previous section in any way hinge on the choice of dependent variable, I re-estimate the AIC-preferred models with first the percentage change in NFA and then the absolute change in NFA as the dependent variable. With the percentage change in NFA, I largely get the same estimates. In the widest bandwidth, 285 SEK, the estimate is only significant at the 10 percent level while the narrowest bandwidth renders a non-significant estimate. Apart from that, the estimates from the two middle bandwidths are within the confidence intervals of the log-estimates.

The absolute difference, $\text{NFA}_2 - \text{NFA}_1$, fits the model better compared to the percentage change as all estimates are significant at the 5 percent level. The mean estimate for all four bandwidths says that a raise in the daily UI benefit of 1 SEK reduces the use of assets by 360 SEK over an average unemployment spell of 465 days. As UI benefits are only paid out for weekdays, this corresponds to an average UI benefit raise of 330 SEK over the entire spell. Thus, a raise in UI benefits by 1 SEK makes asset use drop by an average 1.09 SEK for the four bandwidths. Even though suggesting adequate UI benefits as saving actually occurs, the estimates once more show a crowd-out of private asset use when UI benefits are increased.

7 Conclusions

The aim of this paper has been to assess the Swedish UI both in terms of consumption smoothing and adequacy. During the sample period $2000-2002$, my estimates show that UI was inadequate since asset use, in terms of net financial assets, on average drops by 0.75 percent due to a 1 percent UI increase. The effect of UI on asset use is mainly seen on the use of credits. Thus, incorporating debt is pivotal to accurately evaluate the function of any social insurance program as debt is frequently used to smooth consumption. In addition, as debt is more elastic to increased UI generosity, a frequent use of debt among the unemployed results in smaller effects on consumption as more or less all debt use is crowded out by the rise in UI benefits.

A calibration on the estimate of UI benefits on asset use also shows that only a minor raise in the average net replacement rate, from 0.7 to 0.75, would make asset use superfluous and thus effectively remove the consumption gap between the two states employment and unemployment. Since a large part of the sample has a net replacement rate of 0.75, it also enjoys full consumption smoothing. Given these numbers, the policy recommendation would be to raise the gap between wages and benefits for low-income groups. This was also done in Sweden during $2007-2009$

with an earned income tax credit that reduced the income tax on wages but not on UI benefits.

There are considerable discrepancies in perceived UI adequacy between subgroups. Individuals with access to resources, purely financial but also such as a working partner or real estate, do not alter their consumption behavior in any significant way when the UI is raised. Their larger asset stock makes them less dependent on UI and the income raise provided by increased UI generosity can be entirely spent on consumption. Moreover, I find significant differences between individuals with good versus bad employment prospects, where the latter group adjusts their asset use far less compared to the first.

Finally, the larger asset holdings among women, couples, and older individuals enable them to better smooth consumption as compared to men, singles, and younger individuals. The most UI-dependent individual seems to be a young single male. These facts suggest that other means-tested programs can be accompanied with the UI to reduce consumption shortfalls among certain groups. Another conclusion is that UI benefits have a larger effect on consumption the more individuals save. Thus, the low asset holdings among the unemployed effectively remove one of the basic functions of what the UI system should do: smooth both individual as well as aggregate consumption during unemployment.

However, there are some issues to which the above cannot provide answers. The first shortcoming is a methodological one and is related to a lack of flexibility in the econometric model. Since it can only estimate a linear effect of UI on asset use, there is no possibility to mimic the result provided in the theoretical part of the paper. Intuitively as well as theoretically, the level of UI should be of importance for its marginal consumption-smoothing benefit. The second shortcoming, pointed out by Gruber (1997), is that the type of estimations made here cannot provide an answer to *why* this consumption-smoothing effect even occurs. A future research agenda should thus include an attempt to answer the question of why UI even affects consumption behavior.

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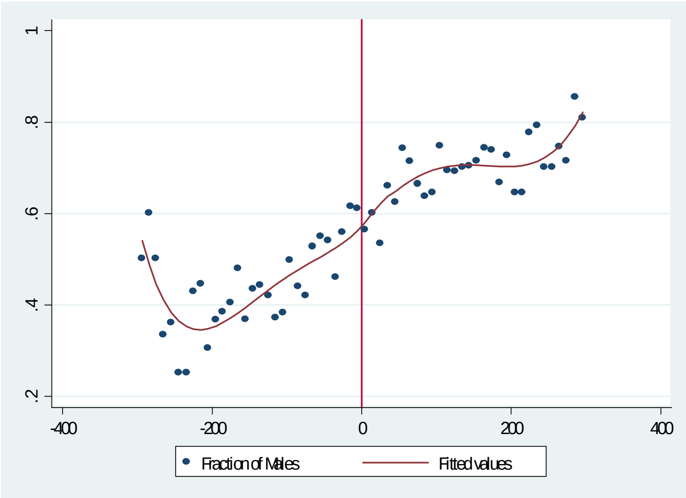
Data Appendix

Figure A 1. Sensitivity Check, Kink in Baseline Covariate

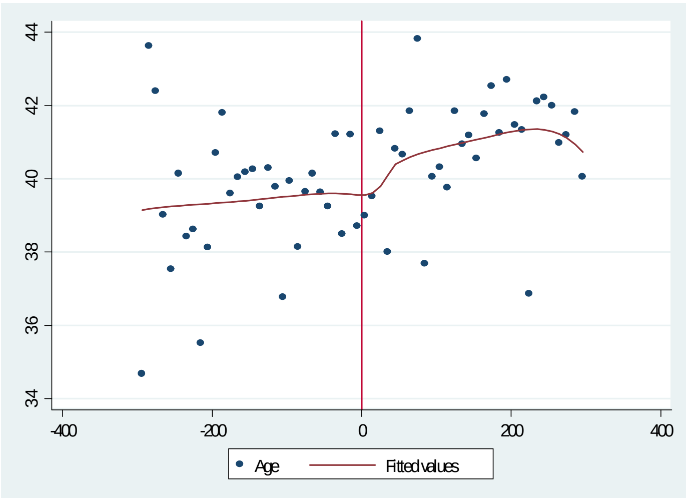
(60 bins)



Note: Each point in figure A 1 represents the local average of the fraction of males. The dependent variable is plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

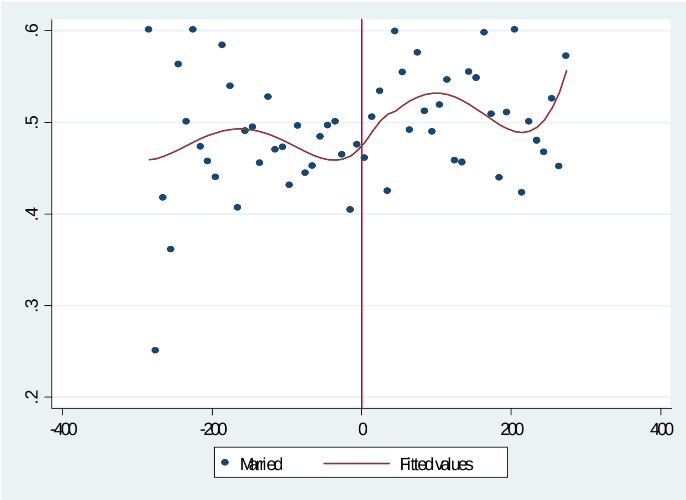
Figure A 2. Sensitivity Check, Kink in Baseline Covariate

(60 bins)



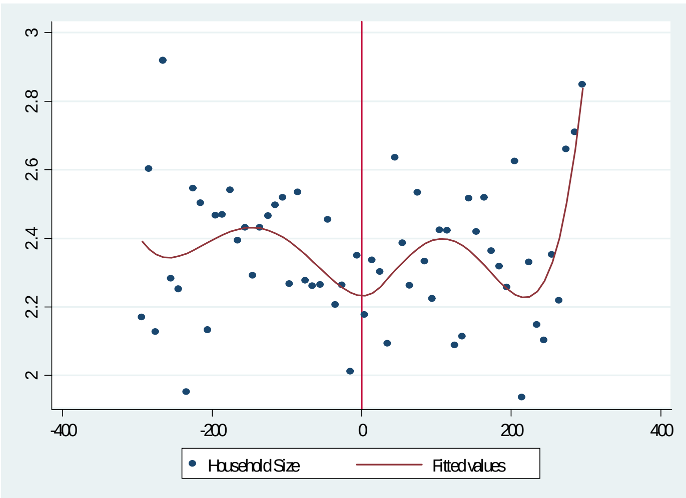
Note: Each point in figure A 2 represents the local average of age. The dependent variable is plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 3. Sensitivity Check, Kink in Baseline Covariate
(60 bins)



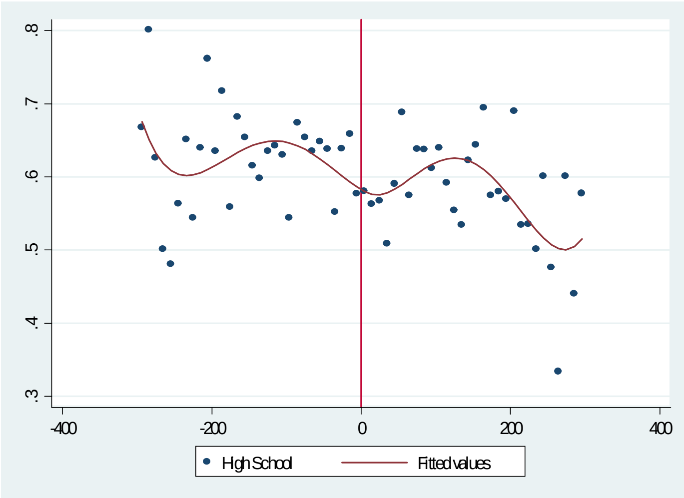
Note: Each point in figure A 3 represents the local average of the fraction of married individuals. The dependent variable is plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 4. Sensitivity Check, Kink in Baseline Covariate
(60 bins)



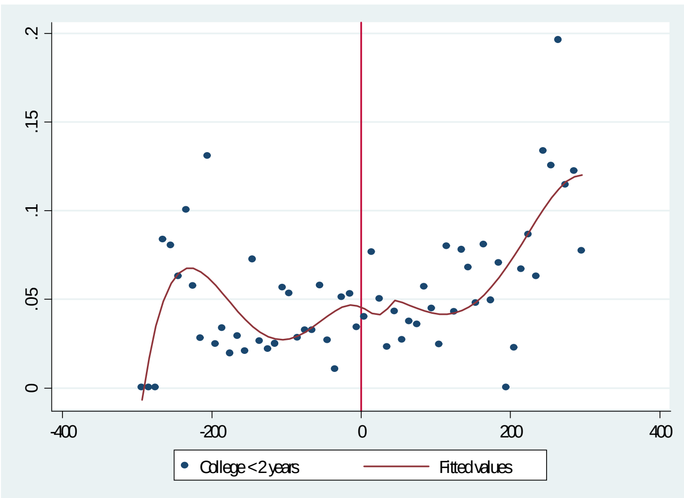
Note: Each point in figure A 4 represents the local average of the number of individuals per household or household size. The dependent variable is plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 5. Sensitivity Check, Kink in Baseline Covariate
(60 bins)



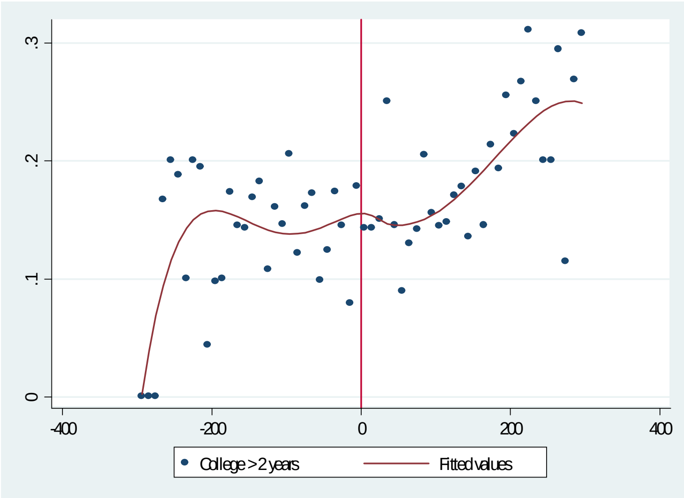
Note: Each point in figure A 5 represents the local average of the fraction of individuals with high school as their highest level of education. The dependent variable is plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 6. Sensitivity Check, Kink in Baseline Covariate
(60 bins)



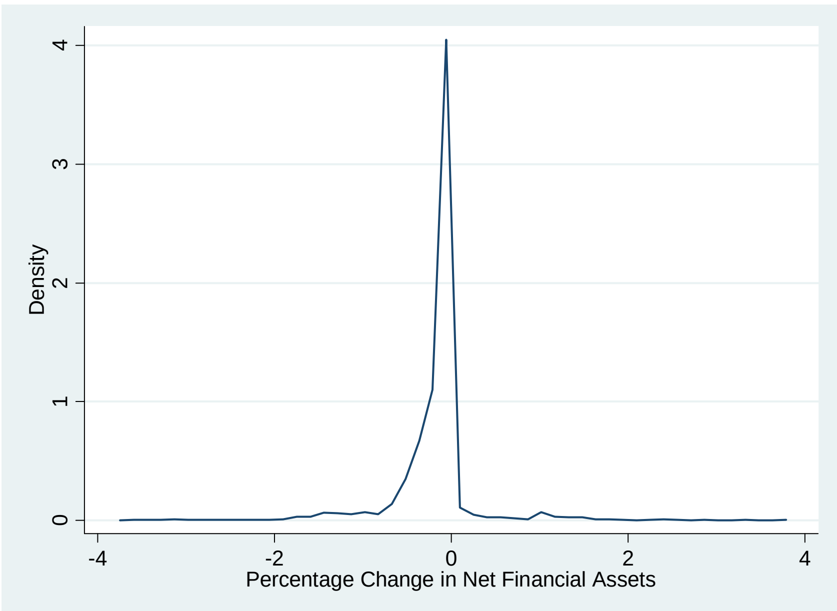
Note: Each point in figure A 6 represents the local average of the fraction of individuals with at most two years in college as their highest level of education plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 7. Sensitivity Check, Kink in Baseline Covariate (60 bins)



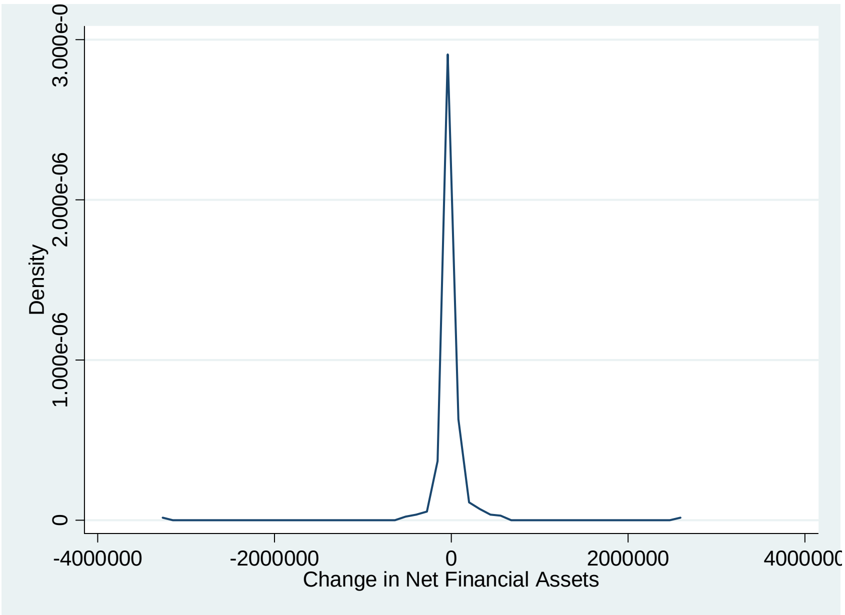
Note: Each point in figure A 7 represents the local average of the fraction of individuals with at least two years in college plotted against the assignment variable, normalized daily wage. The vertical line corresponds to the kink of 725 SEK in daily wages where the wage-benefit relation is shut off.

Figure A 8. Sensitivity Check, Asset Use Distribution



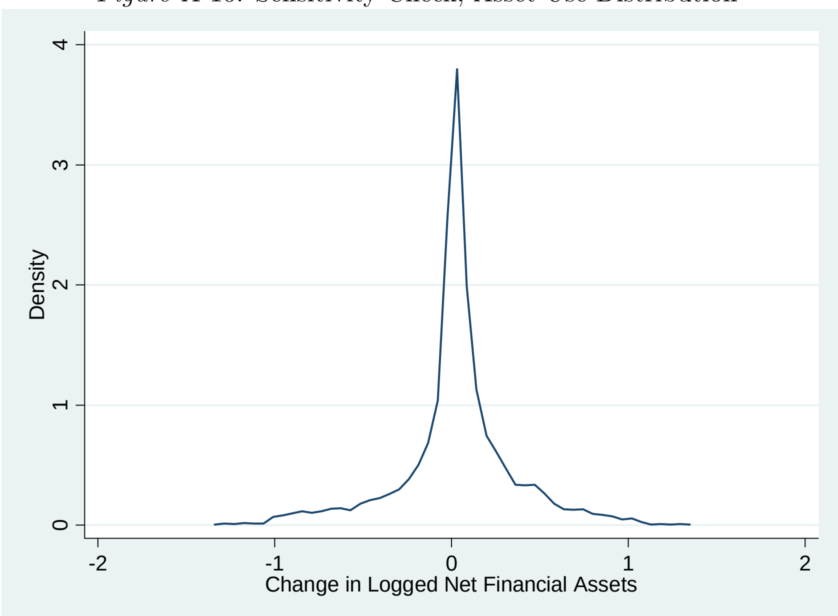
Note: Figure A 8 shows the distribution of the change in net financial assets measured in precentage points.

Figure A 9. Sensitivity Check, Asset Use Distribution



Note: Figure A 9 shows the distribution of the change in net financial assets.

Figure A 10. Sensitivity Check, Asset Use Distribution



Note: Figure A 10 shows the distribution of the change in logged net financial assets.

Table A1. RK Estimates for Financial Assets and Liabilities

Bandwidth	Poly Order	GFA	Debt	NFA	Bandwidth	Poly Order	GFA	Debt	NFA
$h = 285$	1	-0.00039	0.00018	-0.00018	$h = 150$	1	-0.00009	0.00036	-0.00070
$n = 4300$		(0.00095)	(0.00011)	(0.00013)	$n = 3147$		(0.00016)	(0.00018)	(0.00026)
		[0.7164]	[0.0128]	[0.0931]			[0.0683]	[0.0261]	[0.0652]
	2	-0.00108	0.00080	-0.00113		2	-0.00099	0.00161	-0.00175
		(0.00289)	(0.00035)	(0.00042)			(0.00046)	(0.00055)	(0.00071)
		[0.6984]	[0.0155]	[0.1357]			[0.0598]	[0.0659]	[0.1412]
	3	-0.00161	0.00226	-0.00214		3	-0.00076	0.00256	-0.00248
		(0.00541)	(0.00065)	(0.00075)			(0.00083)	(0.00098)	(0.00126)
		[0.7560]	[0.1186]	[0.2353]			[0.1253]	[0.0851]	[0.1333]
Optimal Poly		1	3	2	Optimal Poly		2	2	1
$h = 200$	1	-0.00009	0.00012	-0.00041	$h = 100$	1	-0.00040	0.00091	-0.00118
$n = 3727$		(0.00011)	(0.00013)	(0.00018)	$n = 2256$		(0.00024)	(0.00030)	(0.00041)
		[0.5416]	[0.0293]	[0.1234]			[0.7402]	[0.1039]	[0.1279]
	2	-0.00043	0.00120	-0.00150		2	-0.00086	0.00238	-0.00256
		(0.00035)	(0.00042)	(0.00057)			(0.00066)	(0.00080)	(0.00103)
		[0.2754]	[0.0455]	[0.2427]			[0.7330]	[0.2860]	[0.1703]
	3	-0.00104	0.00235	-0.00240		3	-0.00056	0.00343	-0.00038
		(0.00062)	(0.00075)	(0.00096)			(0.00137)	(0.00162)	(0.00230)
		[0.2992]	[0.0704]	[0.2746]			[0.7660]	[0.2744]	[0.1778]
Optimal Poly		1	3	2			1	2	1

Note: For each polynomial bandwidth specification in table 11, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.

Table A2. RK Estimates for Financial Assets and Liabilities with Covariates

Bandwidth	Poly Order	GFA	Debt	NFA	Bandwidth	Poly Order	GFA	Debt	NFA
$h = 285$	1	-0.00031	0.00016	-0.00013	$h = 150$	1	-0.00006	0.00033	-0.00067
$n = 4300$		(0.00094)	(0.00012)	(0.00013)	$n = 3147$		(0.00011)	(0.00018)	(0.00026)
		[0.7316]	[0.0097]	[0.0759]			[0.3462]	[0.0117]	[0.0394]
	2	-0.00109	0.00073	-0.00107		2	-0.00099	0.00164	-0.00173
		(0.00293)	(0.00035)	(0.00042)			(0.00046)	(0.00055)	(0.00071)
		[0.7317]	[0.0101]	[0.1018]			[0.3200]	[0.0398]	[0.0978]
	3	-0.00153	0.00218	-0.00193		3	-0.00076	0.00250	-0.00242
		(0.00550)	(0.00066)	(0.00075)			(0.00083)	(0.00097)	(0.00127)
		[0.7820]	[0.0852]	[0.1713]			[0.3346]	[0.0501]	[0.0920]
Optimal Poly		1	3	2	Optimal Poly		2	2	1
$h = 200$	1	-0.00006	0.00010	-0.00040	$h = 100$	1	-0.00043	0.00091	-0.00118
$n = 3727$		(0.00011)	(0.00013)	(0.00017)	$n = 2256$		(0.00024)	(0.00029)	(0.00041)
		[0.5250]	[0.0164]	[0.0941]			[0.8111]	[0.0908]	[0.1113]
	2	-0.00043	0.00119	-0.00151		2	-0.00089	0.00240	-0.00256
		(0.00035)	(0.00042)	(0.00058)			(0.00066)	(0.00080)	(0.00104)
		[0.2763]	[0.0252]	[0.1843]			[0.8114]	[0.2521]	[0.1375]
	3	-0.00104	0.00235	-0.00238		3	-0.00050	0.00335	-0.00043
		(0.00062)	(0.00075)	(0.00097)			(0.00137)	(0.00161)	(0.00230)
		[0.3156]	[0.0373]	[0.2118]			[0.8399]	[0.2354]	[0.1440]
Optimal Poly		1	3	2			1	2	1

Note: For each polynomial bandwidth specification in table 12, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.

Table A3. RK Estimates for Covariates

Bandwidth	Poly Order	Male	Age	Married	Bandwidth	Poly Order	Male	Age	Married
$h = 285$	1	-0.00090	0.00374	0.00021	$h = 150$	1	-0.00076	0.00663	0.00072
$n = 4300$		(0.00054)	(0.00457)	(0.00052)	$n = 3147$		(0.00100)	(0.00848)	(0.00097)
		[0.5779]	[0.0648]	[0.8422]			[0.5376]	[0.0018]	[0.7292]
	2	-0.00122	0.01628	0.00139		2	-0.00007	0.01515	0.00218
		(0.00163)	(0.01412)	(0.00159)			(0.00293)	(0.02539)	(0.00286)
		[0.8432]	[0.0858]	[0.8857]			[0.2952]	[0.0030]	[0.8667]
	3	0.00182	0.01276	0.00249		3	-0.00211	0.01750	0.00736
		(0.00302)	(0.02657)	(0.00295)			(0.00535)	(0.04683)	(0.00525)
		[0.6263]	[0.0720]	[0.9372]			[0.0024]	[0.0034]	[0.8842]
Optimal Poly		2	1	1	Optimal Poly		1	1	1
$h = 200$	1	-0.00071	0.01415	0.00062	$h = 100$	1	-0.00117	0.01235	0.00153
$n = 3727$		(0.00074)	(0.00632)	(0.00072)	$n = 2256$		(0.00161)	(0.01391)	(0.00158)
		[0.6778]	[0.0863]	[0.7098]			[0.4210]	[0.0040]	[0.6559]
	2	-0.00028	-0.00397	0.00159		2	0.00188	0.03823	0.00466
		(0.00225)	(0.01952)	(0.00220)			(0.00429)	(0.03793)	(0.00422)
		[0.7014]	[0.1004]	[0.8405]			[0.0037]	[0.0055]	[0.6725]
	3	0.00010	0.03229	0.00386		3	-0.01955	-0.12605	-0.00047
		(0.00402)	(0.03536)	(0.00393)			(0.00957)	(0.08492)	(0.00942)
		[0.2531]	[0.1103]	[0.8411]			[0.0058]	[0.0227]	[0.7048]
Optimal Poly		2	1	1			1	1	1

Note: For each polynomial bandwidth specification in table 13, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.

Table A4. RK Estimates for Covariates

Bandwidth	Poly Order	H-size	Not full UI	House	Bandwidth	Poly Order	H-size	Not full UI	House
$h = 285$	1	0.00089	0.00149	-0.00004	$h = 150$	1	0.00196	0.00056	0.00078
$n = 4300$		(0.00059)	(0.00071)	(0.00053)	$n = 3147$		(0.00110)	(0.00135)	(0.00100)
		[0.4760]	[0.8490]	[0.5816]			[0.0235]	[0.8774]	[0.3135]
	2	0.00320	0.00110	0.00151		2	0.00502	0.00221	0.00063
		(0.00183)	(0.00216)	(0.00163)			(0.00324)	(0.00408)	(0.00293)
		[0.5433]	[0.8010]	[0.4923]			[0.0307]	[0.8422]	[0.3568]
	3	0.00604	0.00001	-0.00015		3	0.01024	0.00944	0.00599
		(0.00336)	(0.00407)	(0.00302)			(0.00594)	(0.00734)	(0.00535)
		[0.6580]	[0.7792]	[0.5251]			[0.0737]	[0.9252]	[0.2520]
Optimal Poly		3	1	1	Optimal Poly		1	1	1
$h = 200$	1	0.00173	0.00119	0.00043	$h = 100$	1	0.00335	0.00146	0.00021
$n = 3727$		(0.00081)	(0.00100)	(0.00073)	$n = 2256$		(0.00178)	(0.00218)	(0.00162)
		[0.5929]	[0.9693]	[0.2761]			[0.2236]	[0.7291]	[0.3232]
	2	0.00382	-0.00041	0.00037		2	0.00672	0.00571	0.00495
		(0.00250)	(0.00303)	(0.00225)			(0.00472)	(0.00623)	(0.00433)
		[0.6155]	[0.9604]	[0.2395]			[0.3203]	[0.6623]	[0.2937]
	3	0.00633	0.00726	0.00396		3	-0.00022	0.01688	-0.00353
		(0.00444)	(0.00582)	(0.00403)			(0.01050)	(0.01367)	(0.00966)
		[0.6754]	[0.9861]	[0.2215]			[0.3270]	[0.7538]	[0.4092]
Optimal Poly		1	1	1			1	1	1

Note: For each polynomial bandwidth specification in table 14, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.

Table A5. RK Estimates for Covariates cont.

Bandwidth	Poly Order	High S.	Col.<2 yrs	Col.>2 yrs	Bandwidth	Poly Order	High S.	Col.<2 yrs	Col.>2 yrs
$h = 285$	1	-0.00033	0.00274	0.00134	$h = 150$	1	0.00072	0.00107	0.00088
$n = 4300$		(0.00053)	(0.00092)	(0.00062)	$n = 3147$		(0.00099)	(0.00180)	(0.00118)
		[0.3284]	[0.8572]	[0.4654]			[0.5127]	[0.8337]	[0.2141]
	2	0.00404	-0.00399	0.00112		2	0.00419	-0.00703	0.00057
		(0.00160)	(0.00268)	(0.00193)			(0.00288)	(0.00488)	(0.00346)
		[0.5795]	[0.9504]	[0.2698]			[0.5935]	[0.8274]	[0.1398]
	3	0.00201	-0.00263	-0.00200		3	0.00182	-0.01137	0.00376
		(0.00297)	(0.00492)	(0.00354)			(0.00529)	(0.00902)	(0.00638)
		[0.5584]	[0.9237]	[0.2832]			[0.5940]	[0.8433]	[0.1431]
Optimal Poly		2	2	1	Optimal Poly		1	1	1
$h = 200$	1	0.00094	0.00002	0.00095	$h = 100$	1	0.00293	-0.00296	0.00125
$n = 3727$		(0.00073)	(0.00128)	(0.00087)	$n = 2256$		(0.00160)	(0.00292)	(0.00195)
		[0.6718]	[0.9612]	[0.3957]			[0.5789]	[0.8899]	[0.0182]
	2	0.00234	-0.00035	0.00055		2	0.00173	-0.00967	0.00031
		(0.00222)	(0.00394)	(0.00268)			(0.00426)	(0.00735)	(0.00509)
		[0.5694]	[0.9246]	[0.2474]			[0.6740]	[0.9115]	[0.0186]
	3	0.00348	-0.01384	0.00182		3	-0.00886	-0.01040	-0.01936
		(0.00396)	(0.00664)	(0.00468)			(0.00950)	(0.01703)	(0.01130)
		[0.6091]	[0.9310]	[0.2895]			[0.7712]	[0.8878]	[0.0619]
Optimal Poly		1	1	1			1	1	1

Note: For each polynomial bandwidth specification in table 15, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.

Table A6. RK Estimates for Covariates cont.

Bandwidth	Poly Order	Scania	Norrland	G-burg	Bandwidth	Poly Order	Scania	Norrland	G-burg
$h = 285$	1	0.00025	0.00071	-0.00105	$h = 150$	1	0.00193	-0.00051	-0.00013
$n = 4300$		(0.00069)	(0.00053)	(0.00066)	$n = 3147$		(0.00130)	(0.00101)	(0.00122)
		[0.3759]	[0.4517]	[0.6133]			[0.0927]	[0.0545]	[0.6865]
	2	0.00122	-0.00219	0.00194		2	0.00342	0.00599	0.00576
		(0.00214)	(0.00164)	(0.00202)			(0.00387)	(0.00295)	(0.00366)
		[0.4201]	[0.0705]	[0.3518]			[0.0940]	[0.0118]	[0.4672]
	3	0.00683	-0.00710	0.00509		3	0.01135	-0.01625	0.02031
		(0.00408)	(0.00304)	(0.00384)			(0.00696)	(0.00542)	(0.00698)
		[0.5588]	[0.0748]	[0.4905]			[0.1869]	[0.0187]	[0.7743]
Optimal Poly		1	1	1	Optimal Poly		1	3	3
$h = 200$	1	-0.00013	0.00040	-0.00077	$h = 100$	1	0.00117	-0.00299	0.00109
$n = 3727$		(0.00094)	(0.00074)	(0.00090)	$n = 2256$		(0.00213)	(0.00164)	(0.00193)
		[0.1232]	[0.0655]	[0.6995]			[0.0239]	[0.0268]	[0.4621]
	2	0.00584	-0.00491	0.00361		2	0.01014	-0.01055	0.01585
		(0.00309)	(0.00227)	(0.00279)			(0.00572)	(0.00435)	(0.00573)
		[0.1854]	[0.0459]	[0.6175]			[0.1106]	[0.0381]	[0.8342]
	3	0.00458	-0.00792	0.01157		3	0.02156	-0.04527	0.03316
		(0.00529)	(0.00404)	(0.00518)			(0.01276)	(0.00991)	(0.01200)
		[0.1587]	[0.0249]	[0.6193]			[0.1337]	[0.6486]	[0.9226]
Optimal Poly		2	2	1			2	3	2

Note: For each polynomial bandwidth specification in table 16, the first row reports the RKD estimate, the second row the robust standard error and the third row the p-value from the Goodness of Fit test. The optimal polynomial specification recommended by the AIC is also reported.