“The Effect of Wealth on Individual and Household Labor Supply: Evidence from Swedish Lotteries”

Online Appendix

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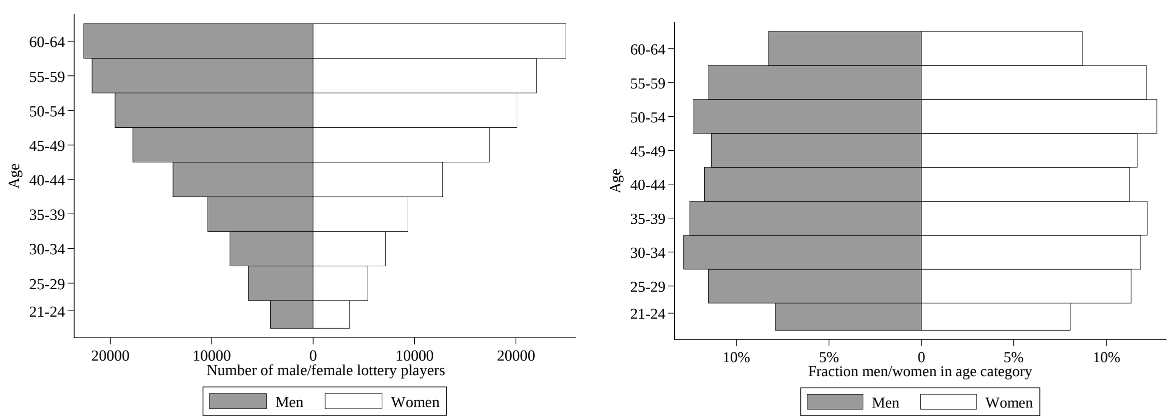
1. Introduction

This document contains tables and figures referenced in the main text and additional information about various aspects of our analyses, including model simulation methodology, relevant institutional details, construction of outcome variables and additional robustness analyses. For a detailed description of how the lottery data were processed and quality controlled, see sections III–VI of Cesarini et al. (2016).

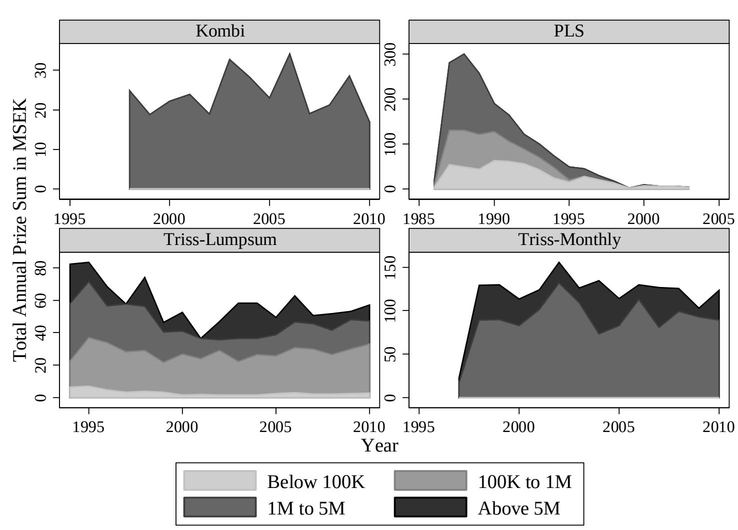
2. Additional Figures and Tables

Figure A1. Age Distribution in Lottery and Representative Sample



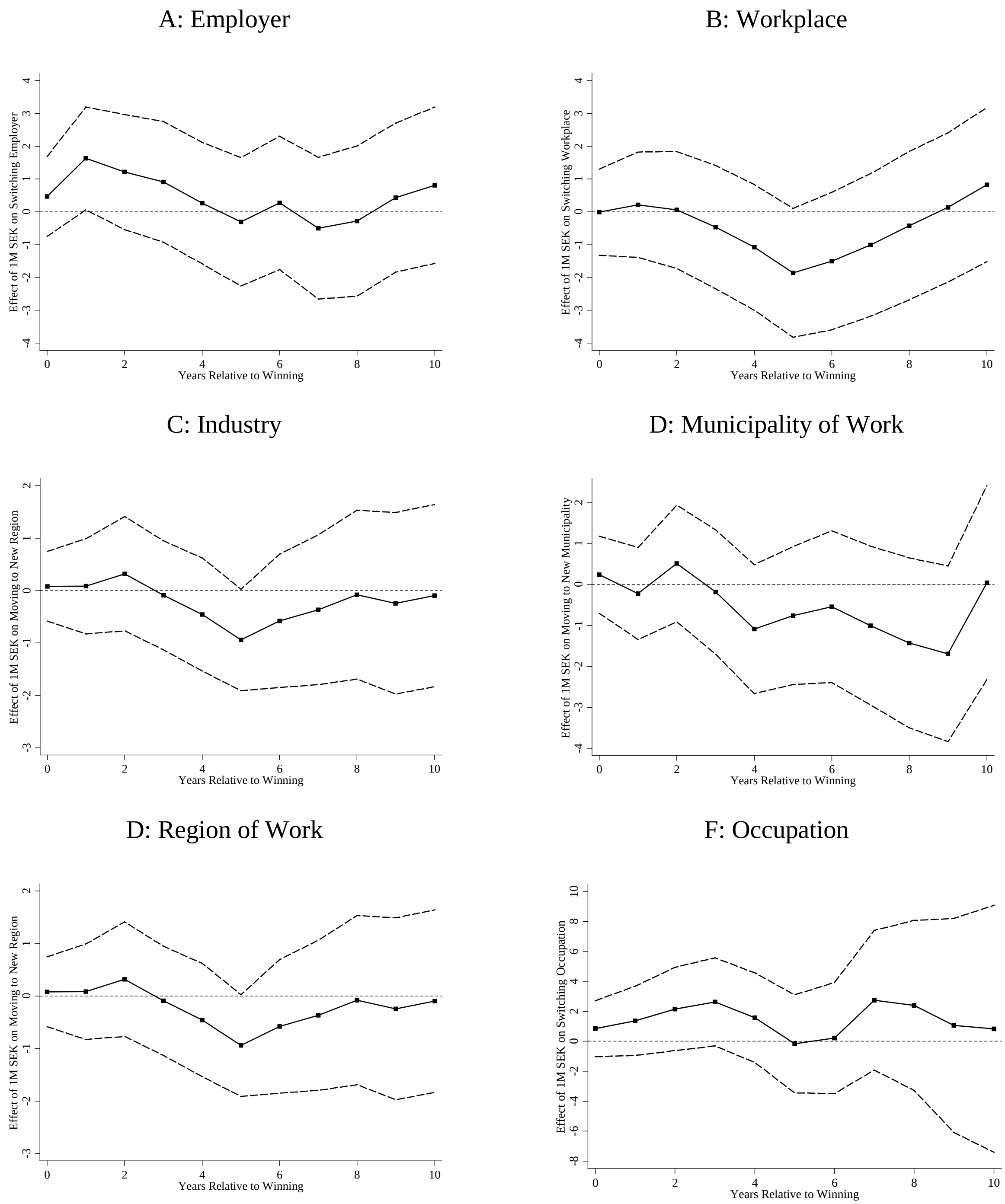
Notes: This figure reports the age distribution at the time of the win for the pooled lottery sample (left panel) and a representative sample between age 21 and 64 in year 2000 (right panel).

Figure A2. Lottery Prize Distribution



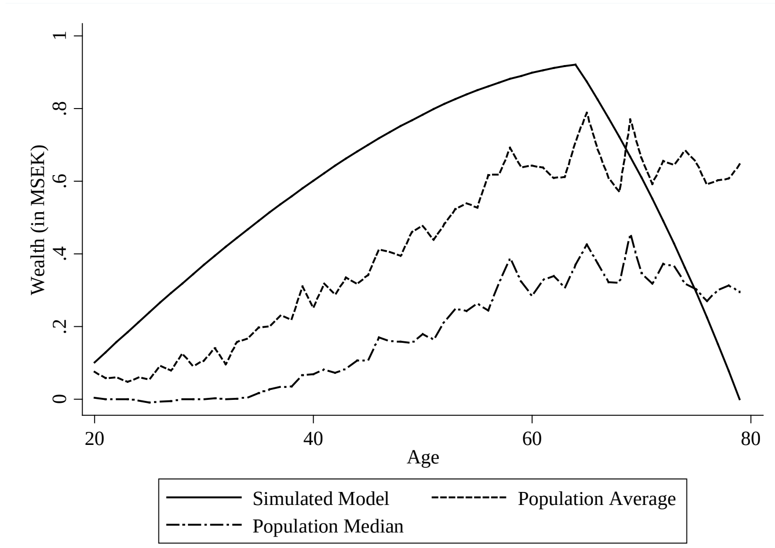
Notes: This figure presents the total value of lottery prizes by lottery and year for different prize categories.

Figure A3. Effect of Lottery Wealth on Probability of Switching Employer, Workplace, Industry, Municipality, Region of Work, or Occupation



Notes: This figure reports estimates of equation (2) obtained from our pooled lottery sample, but excludes the lag of the dependent variable. The dependent variable is an indicator equal to 1 if the player's employer (Panel A), workplace (Panel B), and so on, in year *t* differed from the year before the lottery. Each year corresponds to a separate regression and the dashed lines show 95% confidence intervals.

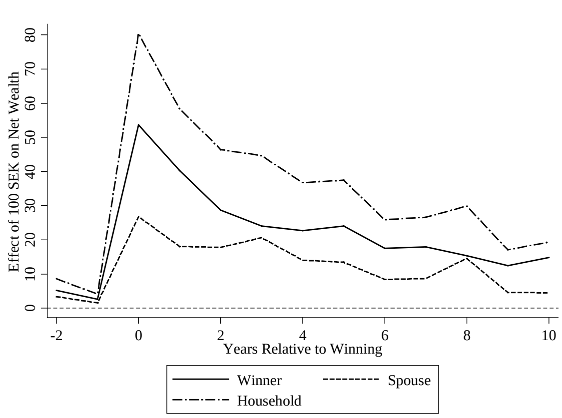
Figure A4. Asset Accumulation in Representative Sample and Simulated Model



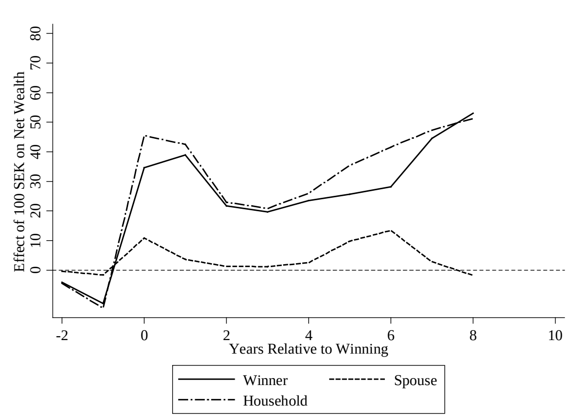
Notes: The figure shows the average and median registered net wealth in year 2000 by age for a representative sample of the Swedish population together with the simulated path for a 20-year-old non-winner using the parameter estimates reported in Table 5.

Figure A5. Effect of Lottery Wealth on Household Wealth

A: Triss-Lumpsum Lottery



B: Kombi Lottery



Notes: This figure reports estimates of equation (2) for married winners and their spouses with registered net wealth as the dependent variable.

Table A1. Tests of Conditional Randomization Assignment

	Pooled Sample		Individual Lottery Samples			
			PLS	Kombi	Triss-Lumpsum	Triss-Monthly
	(1)	(2)	(3)	(4)	(5)	(6)
Omnibus *p*	<0.001	0.596	0.900	0.942	0.299	0.885
Baseline Controls						
Female	11.19	4.036	0.662		4.766	1,063
	(8.754)	(6.189)	(3.290)		(277.9)	(1344)
	[0.201]	[0.514]	[0.841]		[0.986]	[0.429]
Age	29.18	14.99	5.861		507.6	685.2
	(17.65)	(12.14)	(5.882)		(515.7)	(2211)
	[0.098]	[0.217]	[0.319]		[0.325]	[0.757]
Age^2	-0.803	-0.341	-0.145		-12.46	-10.10
	(0.410)	(0.285)	(0.139)		(12.55)	(52.69)
	[0.050]	[0.232]	[0.297]		[0.321]	[0.848]
Age^3	0.006	0.003	0.001		0.101	0.039
	(0.003)	(0.002)	(0.001)		(0.098)	(0.402)
	[0.034]	[0.237]	[0.292]		[0.300]	[0.923]
Nordic Born	-98.74	10.060	3.292	-24.22	157.1	894.3
	(28.39)	(18.47)	(7.439)	(76.08)	(548.3)	(2122)
	[0.001]	[0.586]	[0.658]	[0.750]	[0.774]	[0.674]
College-Graduate	-38.40	4.784	-2.234	-7.947	553.0	114.6
	(10.12)	(6.975)	(3.823)	(19.02)	(361.2)	(1586)
	[<0.001]	[0.493]	[0.559]	[0.676]	[0.126]	[0.942]
Labor Earnings in Previous Year (in 1000 SEK)	0.142	-0.015	-0.004	-0.014	-1.138	1.425
	(0.040)	(0.025)	(0.012)	(0.057)	(1.026)	(5.440)
	[<0.001]	[0.551]	[0.756]	[0.811]	[0.267]	[0.793]
R^2	0.000	0.531	0.082	0.003	0.008	0.120
Cell FEs	No	Yes	Yes	Yes	Yes	Yes
N	247,275	247,275	219,274	24,172	3,260	569

Notes: This table reports results from tests for random assignment of lottery prizes by estimating equation (1). The omnibus *p* value is from the test of the joint significance of all variables. Column (1) shows the specification that excludes controls for the cell fixed effects, and the remaining columns show the *p*-value when cell fixed effects are included. Standard errors are clustered at the level of the player.

Table A2. Similarity of Lottery Winners to the General Population

	Pooled Lottery Sample	Individual Lottery Samples			
		PLS	Kombi	Triss-Lumpsum	Triss-Monthly
Birthyear	1945.64	1945.00	1949.78	1956.30	1958.39
Female	0.496	0.507	0.391	0.496	0.478
Nordic Born	0.966	0.965	0.981	0.929	0.930
College	0.245	0.250	0.207	0.206	0.228
Married	0.594	0.599	0.559	0.497	0.478
Labor Earnings	212,435	208,543	246,766	214,363	242,530
After-tax Income	146,810	141,310	193,624	164,097	178,643
After-tax income (Incl. SSC)	180,969	174,626	235,205	199,412	215,759
SD of Labor Earnings	137,568	134,739	155,701	143,696	152,824
Labor Earnings > 25K	0.889	0.893	0.858	0.867	0.891
Spousal Labor Earnings	203,581	201,870	217,400	221,329	242,350
N	247,275	219,274	24,172	3,260	569

	Unweighted Random Population Samples		Random Population Samples: Sex and Age Reweighted to Distribution of Above Lottery			
	1990	2000	1990	2000	2000	2000
Birthyear	1949.08	1957.82	1945.00	1949.78	1956.30	1958.39
Female	0.493	0.499	0.507	0.391	0.496	0.478
Nordic Born	0.933	0.900	0.937	0.914	0.904	0.902
College	0.166	0.283	0.210	0.286	0.298	0.319
Married	0.533	0.455	0.595	0.586	0.495	0.480
Labor Earnings	189,773	198,546	184,780	237,201	214,075	231,065
After-tax Income	112,894	141,253	130,702	185,250	162,432	173,954
After-tax income (Incl. SSC)	141,761	178,090	161,437	223,455	196,529	209,359
SD of Labor Earnings	116,829	114,787	132,664	183,805	164,354	172,279
Labor Earnings > 25K	0.897	0.824	0.838	0.806	0.829	0.835
Spousal Labor Earnings	203,243	225,452	192,350	228,058	227,541	246,212

Notes: This table compares characteristics of lottery players to those of the general population. The first column in the upper panel reports summary statistics for the pooled lottery sample, and the four other columns display descriptive statistics by lottery. Each lottery sample is compared to representative samples of Swedes drawn randomly from the year-end Swedish population in 1990 or 2000. For PLS, we reweight the 1990 representative sample so that its age and sex distribution exactly matches that of the PLS sample. For the remaining three lotteries, we proceed analogously except that we use the 2000 representative sample. We measure the covariates of the successfully matched members of the representative sample the year before the winner to whom they were matched won the prize. The earnings measures include income variables measured prior to 1991 (which are not used as outcome variables in our analysis). All mean differences between the PLS and Kombi samples and the corresponding representative samples are statistically significant at the 1% level, except for the share married in the PLS sample. For the Triss lotteries, the mean differences are statistically significant at the five percent level for Nordic born, college, and labor earnings >25K, but not for the other variables.

Table A3. Heterogenous Effects of Wealth on Earnings

	Lottery				Sex	
	PLS	Kombi	Triss-Lumpsum	Triss-Monthly	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Effect (100 SEK)	-1.221	-1.507	-0.912	-1.033	-1.295	-0.829
SE	(0.226)	(0.462)	(0.226)	(0.345)	-0.236	0.171
p	[<0.001]	[0.001]	[<0.001]	[0.003]	[<0.001]	[<0.001]
p equal effects		[0.618]			[0.110]	
Mean	192,148	217,931	205,250	184,452	230,124	158,549
Effect/mean	-6.4%	-6.9%	-4.4%	-5.6%	-5.6%	-5.2%
N	218,601	22,687	3,020	518	123,330	121,496

	Age at Time of Win			Self-employment		Education	
	21-34	35-54	55-64	Self-employed	Not self-employed	College	No college
	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Effect (100 SEK)	-1.198	-1.086	-1.077	-1.130	-1.059	-1.373	-0.939
SE	(0.300)	(0.221)	(0.258)	(0.639)	(0.155)	(0.348)	(0.160)
p	[<0.001]	[<0.001]	[<0.001]	[0.077]	[<0.001]	[<0.001]	[<0.001]
p equal effects		[0.945]		[0.915]		[0.259]	
Mean	203,604	246,118	121,174	154,706	197,251	276,376	166,490
Effect/mean	-5.9%	-4.4%	-8.9%	-7.3%	-5.4%	-5.0%	-5.6%
N	34,659	120,187	89,980	16,192	228,634	61,367	183,459

	Pre-win Earnings Tertiles: Pre-tax Labor Earnings			Pre-win Earnings Tertiles: Post-tax Earnings		
	Low	Medium	High	Low	Medium	High
	(14)	(15)	(16)	(17)	(18)	(19)
Effect (100 SEK)	-0.818	-0.810	-1.735	-0.571	-0.403	-0.802
SE	(0.159)	(0.165)	(0.393)	(0.109)	(0.095)	(0.198)
p	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
p equal effects		[0.079]			[0.154]	
Mean	81,774	183,412	317,614	109,530	150,524	224,840
Effect/mean	-10.0%	-4.4%	-5.5%	-5.2%	-2.7%	-3.6%
N	80,673	83,381	80,772	80,673	83,381	80,772

Notes: This table reports five-year estimates obtained by estimating equation (2) in various subsamples. The dependent variable is pre-tax labor earnings in columns (1)-(16) and after-tax labor income in (17)-(19). The prize amount is scaled so that a coefficient of 1.00 implies a 1 SEK increase in earnings per 100 SEK won. The table also reports the *p*-value is from an *F*-test of equal effects in the different subsamples. Standard errors are clustered at the level of the player.

Table A4. Nonlinear Effects of Wealth on Earnings

	Quadratic model	Spline regression with knot at 1M		Excluding prizes…			
		< 1M	> 1M	> 5M	> 2M	> 1M	<10K
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Effect (100 SEK)	-1.201	-1.477	-0.857	-1.163	-1.342	-1.400	-1.058
SE	(0.262)	(0.298)	(0.240)	(0.165)	(0.214)	(0.637)	(0.158)
p	[<0.001]	[<0.001]		[<0.001]	[<0.001]	[0.028]	[<0.001]
Effect $(\text{SEK}/1000)^2$	0.000						
SE	(0.001)						
p	[0.6117]						
N	244,826	244,826		244,732	244,320	243,431	43,852

Notes: This table reports five-year estimates designed to test for non-linear effects. The dependent variable is annual pre-tax labor earnings. Column (1) reports the resulting estimates when a quadratic term is included in the estimating equation (3). Columns (2)-(3) report the results from a spline regression with a knot at 1M SEK. Columns (4)-(7) show the resulting estimates when prizes above 5M, 2M, and 1M SEK, and prizes below 10K SEK are excluded from the sample. The prize amount is scaled so that a coefficient of 1.00 implies a 1 SEK increase in earnings per 100 SEK won. Standard errors are clustered at the level of the player.

Table A5. Effect of Wealth on Household Wealth and Capital Income

Panel A: Net Wealth in Triss-Lumpsum (Year of Winning)

	Winner (1)	Spouse (2)	Difference (3)	Household (4)	Spousal share (5)
Effect (100 SEK)	53.689	20.860	32.829	74.549	28.0%
SE	(4.542)	(4.061)	(7.708)	(3.849)	
p	[<0.001]	[<0.001]	[<0.001]	[<0.001]	
N	658	658	658	658	

Panel B: Net Wealth in the Kombi Lottery (Year of Winning)

	Winner (6)	Spouse (7)	Difference (8)	Household (9)	Spousal share (10)
Effect (100 SEK)	51.857	14.571	37.286	66.429	21.9%
SE	(5.124)	(3.059)	(6.012)	(5.923)	
p	[<0.001]	[<0.001]	[<0.001]	[<0.001]	
N	8,670	8,670	8,670	8,670	

Panel C: Capital Income in the PLS Lottery (Year after Winning)

	Winner (11)	Spouse (12)	Difference (13)	Household (14)	Spousal share (15)
Effect (100 SEK)	2.727	0.471	2.257	3.198	14.7%
SE	(0.148)	(0.107)	(0.174)	(0.191)	
p	[<0.001]	[<0.001]	[<0.001]	[<0.001]	
N	128,239	128,239	128,239	128,239	

Notes: This table reports results of estimating equation (2) separately for married winners, winners' spouses, and at the household level for each lottery. The dependent variable is registered net wealth for the Triss and Kombi lotteries (Panels A and B). The wealth measure does not include cash, cars, or other durables, merchandise, assets transferred to other family members, or money that has been concealed from the tax authority. Because wealth is only measured between 1999 and 2007, we have too few PLS winners to obtain meaningful estimates. Panel C therefore shows the effect on capital income instead. The prize amount is scaled so that a coefficient of 1.00 implies a 1 SEK increase in wealth or income per 100 SEK won. All regressions include baseline controls for both winners and their spouses. Standard errors are clustered at the level of the player.

Table A6. Comparing Winners and Spouses

Panel A: Married Winners

	Full sample		PLS		Kombi	
	Winners (1)	Spouses (2)	Winners (3)	Spouses (4)	Players (5)	Spouses (6)
Age	51.35	51.83	50.98	51.56	55.31	54.77
Born in the Nordic Countries	0.964	0.961	0.963	0.961	0.983	0.971
Female	0.527	0.473	0.542	0.458	0.366	0.634
Labor Earnings t = -1	219,665	204,508	216,182	203,078	253,600	216,555
Winner dummy as dependent variable						
p-value joint significance of controls	<0.001		<0.001		<0.001	
Adjusted R^2 (within couples)	0.051		0.056		0.131	
Amount won as dependent variable						
p-value joint significance of controls	<0.001		<0.001		<0.001	
Adjusted R^2 (within couples)	0.000		0.000		0.002	
N (couples)	142,102		127,937		12,461	

Panel B: Both Spouses Previously Played the Lottery

	PLS		Kombi	
	Winners (3)	Spouses (4)	Players (5)	Spouses (6)
Age	50.07	49.96	55.82	55.34
Born in the Nordic Countries	0.967	0.967	0.990	0.981
Female	0.490	0.510	0.450	0.550
Labor Encome t = -1	224,532	219,413	245,336	236,243
Winner dummy as dependent variable				
p-value joint significance of controls	<0.001		0.030	
Adjusted R^2 (within couples)	0.001		0.030	
Amount won as dependent variable				
p-value joint significance of controls	0.497		0.765	
Adjusted R^2 (within couples)	0.000		0.001	
N (couples)	74,730		1,163	

Panel C: Both Spouses Played in Same Lottery Draw

	PLS		Kombi	
	Winners (3)	Spouses (4)	Players (5)	Spouses (6)
Age	49.53	49.42	55.91	55.26
Born in the Nordic Countries	0.970	0.969	0.990	0.981
Female	0.486	0.514	0.438	0.562
Labor Earnings t = -1	219,950	214,237	245,800	235,811
Winner dummy as dependent variable				
p-value joint significance of controls	<0.001		0.017	
Adjusted R^2 (within couples)	0.001		0.024	
Amount won as dependent variable				
p-value joint significance of controls	0.748		0.883	
Adjusted R^2 (within couples)	0.000		0.003	
N (couples)	48,492		860	

Notes: This table shows summary statistics for married winners and their spouses. The table also reports the results from a regression with either an indicator variable for the winning spouse, or the amount won, as the dependent variable. The table shows the p-value from an F-test testing the joint significance of the control variables, as well as the adjusted R-square of the control variables. Panel A includes all married couples, whereas Panels B and C are restricted to PLS and Kombi and couples in which both the winner and spouse were between 21 and 64 at the time of winning. Panel B furthermore restricts the sample to households in which both spouses played the same lottery prior to the lottery event, and Panel C restricts the sample further to samples in which both spouses participated in the same lottery draw as the lottery event. Standard errors are clustered at the level of the player.

Table A7. Heterogenous Effects of Wealth on Household Earnings: PLS and Kombi

	Winner	Spouse	Difference	Household
	(1)	(2)	(3)	(4)
Panel A: Husband Wins the Lottery				
Effect (100 SEK)	-1.235	-0.506	-0.729	-1.741
SE	(0.481)	(0.306)	(0.520)	(0.616)
p	[0.010]	[0.098]	[0.161]	[0.005]
Household member	Husband	Wife		
N	64,998	64,998	64,998	64,998
Panel B: Wife Wins the Lottery				
	Winner	Spouse	Difference	Household
	(5)	(6)	(7)	(8)
Effect (100 SEK)	-0.599	0.085	-0.684	-0.514
SE	(0.314)	(0.581)	(0.674)	(0.647)
p	[0.057]	[0.883]	[0.310]	[0.427]
Household member	Wife	Husband		
N	62,346	62,346	62,346	62,346
p -value equal effects between panel A and B	[0.268]	[0.368]	[0.958]	[0.169]
Panel C: Primary Earner Wins the Lottery				
	Winner	Spouse	Difference	Household
	(9)	(10)	(11)	(12)
Effect (100 SEK)	-1.031	-0.580	-0.451	-1.611
SE	(0.477)	(0.324)	(0.552)	(0.600)
p	[0.031]	[0.073]	[0.414]	[0.007]
Household member	Primary earner	Secondary earner		
N	67,333	67,333	67,333	67,333
Panel D: Secondary Earner Wins the Lottery				
	Winner	Spouse	Difference	Household
	(13)	(14)	(15)	(16)
Effect (100 SEK)	-1.101	-0.091	-1.011	-1.192
SE	(0.308)	(0.569)	(0.635)	(0.659)
p	[<0.001]	[0.874]	[0.111]	[0.070]
Household member	Secondary earner	Primary earner		
N	60,011	60,011	60,011	60,011
p -value equal effects between Panels C and D	[0.901]	[0.454]	[0.506]	[0.638]

Notes: This table reports five-year estimates obtained by estimating equation (2) separately on winners, winners' spouses, and at the household level for winners that were married prior to winning the lottery. The dependent variable is pre-tax labor earnings. The sample is restricted to married couples in PLS and Kombi in which both the winner and spouse were between 21 and 64 at the time of winning. Panels A and B report the results separately depending on whether the husband or wife wins. Panels C and D report results separately depending on whether the primary or the secondary earner wins. The prize amount is scaled so that a coefficient of 1.00 implies a 1 SEK increase in earnings per 100 SEK won. All regressions include baseline controls for both winners and their spouses. Standard errors are clustered at the level of the player.

3. Outcome Variables

In this section, we provide additional information about outcome variables used in our analyses. All variables are obtained or derived from information in Statistics Sweden's administrative registers or annual wage survey. Data on wages and hours are discussed separately in section 5.

3.1. Swedish Income Taxation

We begin by providing some background information about the Swedish tax system during our period of study. The background information is important for understanding some of our sample restrictions and several of the choices we make when defining our outcome variables.

In 1990, the Swedish tax system underwent a major reform, which greatly streamlined and simplified the taxation of income. The major changes were: (i) a reduction in the number of tax brackets, (ii) reductions of the top marginal taxes to about 50%, (iii) a reduction in the number of deductions allowed and (iv) the abolition of the joint taxation of labor and capital income. Under the old system, a sufficiently large positive wealth shock would, through its positive impact on capital income, move the winner to a higher tax bracket. Winning the lottery thus raised marginal taxes on earnings, a complication that is absent under the new system.

Under the new system, pre-tax wage earnings is taxed separately from capital income and all wage-earners are allowed to apply a basic deduction (*grundavdraget*). Remaining income is then taxed at a rate determined at the municipal level (around 30%). Additionally, a state income tax (20%) is also levered on all incomes above a certain threshold. Since the reform, the tax system has undergone additional changes, all of which are relatively modest compared to those introduced by the complete overhaul of 1991.

3.2. Calculating After-Tax Incomes

In several of our analyses, we consider annual income variables measured net of taxes. We calculate after-tax income based on information of the Swedish tax system in Söderberg (1996), Skatteverket (1998-2010) and Du Rietz, Johansson, and Stenkula (2013). Our calculations use these sources to determine the size of the basic deduction, the tax brackets for state taxes and the state tax(es) applicable in each year. In our calculations, we assume a municipal tax rate equal to the average from the year in question.

When calculating after-tax incomes, an important conceptual question is whether benefits implicit in social security contributions (SSC, *arbetsgivaravgifter*) should be treated as income. In Sweden, SSC are mostly transferred directly by an individual's employer to the state, but part of the SSC accrues to the employee in the form of higher pension and sick-leave benefits. Our baseline measure of after-tax income does not include the value of future benefits implicit in the SSC, but we report (in footnote 12) the results for an alternative measure of after-tax income that does. In the following two paragraphs, we explain in more detail how this alternative measure was calculated.

Swedish employer-paid SSC is currently 31.42% and is a combination of 13 different components, whereof some can be seen as taxes and others as fees.[1] We follow Flood, Nordblom, and Waldenström (2013) and treat four of them explicitly as fees, so that the benefit part amount to about 70% of the total employer-paid SSC in 2010. This should be seen as an upper bound since some SSC components are only partly linked to future benefits, and the link varies over time. In addition, future benefits are taxed when they are paid out. We use a tax rate of 30% for the latent taxation of these future benefits.

As there are rules in the welfare system for how small and large benefit amounts one can receive, the composition of the SSC in a tax and benefit part also varies across income levels. Flood et al (2013) uses a 0.5 "base amount" (37,100 SEK in 1998) as the lower threshold and 7.5 base amounts the upper threshold. Below and above these respective income levels, additional wage increases does not affect the benefits and the SSC should be considered as a tax.

3.3. Main Income Measures

In this section, we define the main income measures used in the paper. All are measured annually. To reduce the influence of outliers, all income measures are winsorized at the 0.5th and 99.5th percentile. Due to complication with the taxation of capital income described above, we only consider earnings in 1991 or later as an outcome. We do, however, include lagged pre-tax labor earnings and the lagged value of the dependent variable as regressors in all regressions, even when the lag pertains to a year before 1991. To make sure our results are not driven by variation in the samples used for different outcomes, we set all main income variables to missing in a year if any the main income variables below are missing.

*Pre-tax labor earnings (*original name: *ArbInk).* This measure approximately corresponds to the sum of wage earnings, income from self-employment and income support due to sickness and parental leave (but not pension income or unemployment insurance payments). This is our primary earnings measure and the lagged value is included in our set of baseline controls.

*Wage earnings (*original name: *LoneInk).* This is a measure of wage earnings defined as the gross wage income paid out by an individual's employer, including sickness benefits.

*Self-employment income (*original name: *FInk or InkFNettoA).* Includes gross income from self-employment, including the part of sick-leave benefits that are paid by the employer. Income from "passive self-employment" is not included.

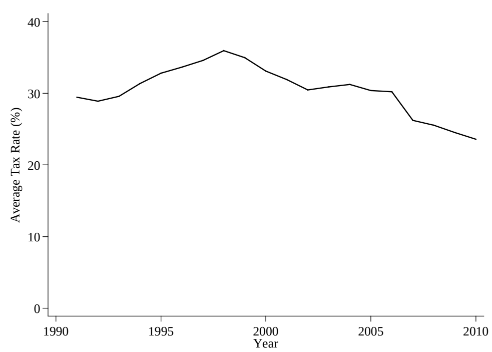
[1] The distinction between a tax and a fee is that the former has no direct link between the size of the contribution and the resulting benefit, whereas a fee has a distinct link between them.

Taxable labor income (original name: *CSFVI*). This variable includes all kinds of taxable work-related incomes, primarily pre-tax labor earnings, pension income and unemployment benefits. Pension income and unemployment benefits are included because these sources of income are taxed jointly with labor earnings.

Pension income (original name: *AldPens*). The measure of pension income includes public pension as well as pension income received from employer-paid pension insurance schemes. Income from any privately held pension insurance is not included.

After-tax labor income. We compute after-tax labor income by subtracting taxes from taxable earnings. As described in the previous two sections, we use detailed information about the Swedish tax system, relevant tax brackets and tax rates for every year to compute taxes. We compute two versions of after-tax earnings; with and without including implicit benefits in the SSC. The average tax rate (excluding SSC) in the pooled sample of lottery players is shown in Figure A6.

Figure A6. Average Tax Rate in Pooled Lottery Sample



Notes. The figure shows the average income tax rate in the pooled lottery sample for each year between 1991 and 2010.

3.4. Labor Force Participation

In the analyses presented in the main paper, we define labor force participation as earnings in excess of 25,000 SEK per year. We calculate labor force participation based on labor earnings, wage earnings, and self-employment income.

3.5. Employer and Occupation Switching

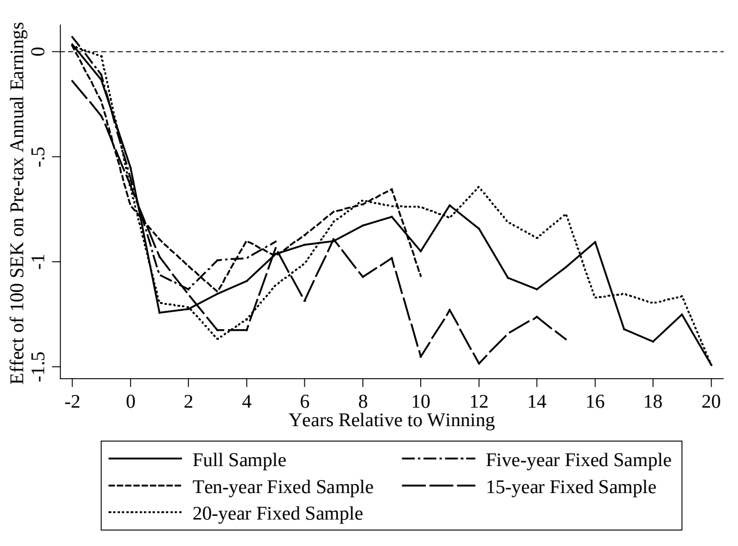
We code switching with respect to occupation, as well as five types of employer characteristics. Statistics Sweden's wage survey contains information on occupation from 1996 onwards. We consider occupation at the 1-digit level, thereby coding occupation into 10 different categories. We set occupation category to missing if a worker held occupations in different categories in a given year. We define occupation switching $t = 1,..,10$ years after lottery as the case when a worker holds a job in a different occupation category in year t and year t = -1. We impute occupation in the same way as we impute missing wages (see section 5).

Employer-employee matched data is available for the entire Swedish workforce from 1986. The data list all firms that a person was employed by in a given year. Since workers may have several jobs in a year, we focus on the employer that paid the highest income in a year. We code five different "switching-variables" that measure changes with respect to: 1) employer (firm-level); 2) workplace; 3) industry (1-digit); 4) municipality; 5) region. All variables are measured relative to the employer at t = -1, i.e. they are set equal to 1 in year $t > 0$ if the value is different than the value for the employer in the year prior to winning, and 0 otherwise.

4. Long-term Labor Supply Effects

Figure A7 shows that lottery wealth has a negative effect on labor earnings up to 20 years after winning. However, the sample changes with time from the lottery, and a potential concern is that composition bias gives a distorted view of how winners spend their wealth with time from the lottery. To address this concern, we estimate the effect of lottery wealth on labor earnings when the sample is held fixed. We observe labor earnings between 1991 and 2010, whereas lottery draws take place between 1986 and 2010. Figure A7 therefore only include winners that win between 1991 and 2005 for the five-year horizon, winners between 1991 and 2000 for the ten-year horizon and winners between 1991 and 1995 for the 15-year horizon. Since we observe labor earnings during a 20-year period only for people who won in 1986-1990, we use earnings during 1986-1990 in order to make inference about the earnings response during the first five years for this group.

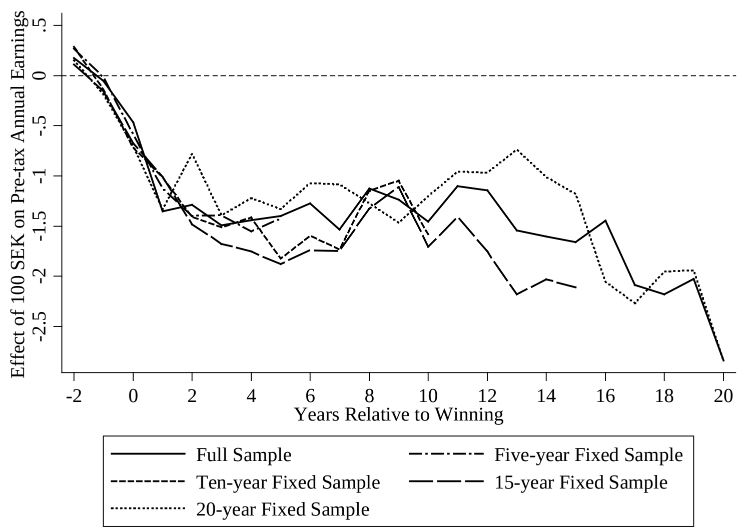
Figure A7. Long-term Labor Supply with Fixed Samples



Notes: The figure show the labor supply effect for different time horizons when the sample is held fixed. The five-year estimates include winners that won between 1991 and 2005, the ten-year estimates winners between 1991 and 2000 and the 15-year estimates winners between 1991 and 1995. The 20-year estimates include winners born between 1986 and 1990 and labor earnings measured prior to the tax reform in 1991.

Since winners on average are relatively old, a large fraction of the sample has retired 20 years after winning the lottery. Figure A8 therefore shows the corresponding results when the sample is further restricted to those that were at most 45 years of age at the time of winning. Figure A8 suggests that there might be a stronger labor supply response after 15 years. However, the long-term estimates for young winners are based on few observations and it is therefore unclear to what extent this pattern is real or due to sampling variation.

Figure A8. Long-term Labor Supply with Fixed Samples of Winners below Age 45



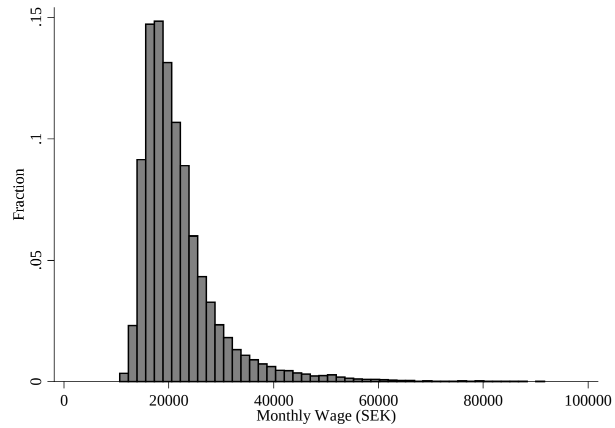
Notes: The figure show the labor supply effect for different time horizons when the sample is held fixed and all samples are restricted to winners below age 45 at the time of winning. The five-year estimates include winners that won between 1991 and 2005, the ten-year estimates winners between 1991 and 2000 and the 15-year estimates winners between 1991 and 1995. The 20-year estimates include winners born between 1986 and 1990 and labor earnings measured prior to the tax reform in 1991.

5. Wage and Hours Worked: Details and Robustness

Data on wages are available from an annual survey covering private sector blue-collar workers, private sector white-collar workers, and workers employed by the state, county councils ("landsting") and municipalities ("kommuner"), respectively. These data are available from 1985, except for wages for workers in county councils which are not available until 1990. Coverage is not complete in the private sector. The private sector data cover all firms with more than 500 employees whereas information for smaller firms comes from a stratified random sample by industry.

We use the average hourly pre-tax wage within a year across all employers a person had during the year (but we drop a few cases were more than 100 employers were listed for a given worker in a given year). Since wages are not observed in every year for every worker, we impute wages for year *t* from up to *t-3* to *t+3* when no observation on wages closer to *t* is unavailable. We abstain from imputing wages in the post-win period from the pre-win period, and vice versa. This imputation strategy increase coverage of wages for the working population (those with wage earnings above 25K SEK) the year before the win from 57 to 67 percent. A histogram of our main wage measure is shown in Figure A9.

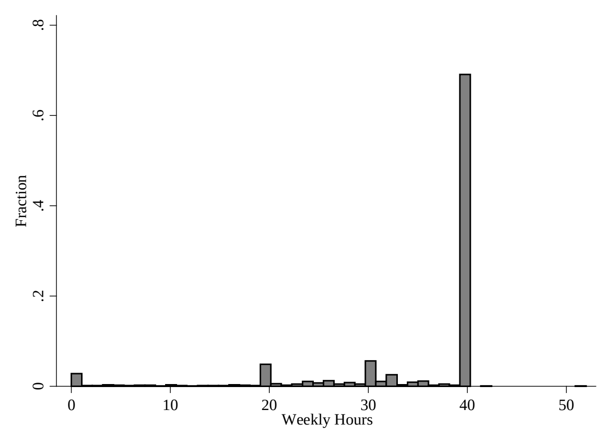
Figure A9. Distribution of Wages the Year before Winning the Lottery



Notes: This figure shows the distribution of monthly wages the year before winning the lottery. Missing wages have been imputed from up to four years before the year of the lottery (i.e., three years before the outcome was measured).

Statistics Sweden's wage survey also include a measure of the numbers of hours worked which we refer to as contracted hours. This measure is expressed in terms of "percent of full-time work", but we convert it to weekly hours assuming that fulltime corresponds to 40 hours per week. For people with several jobs, we set the variable to 40 if all listed jobs where full-time jobs, otherwise we set it to missing. As for wages, we impute missing values using information from up to three adjacent years. Figure A10 shows the distribution of contracted hours. There is a clear spike at 40 hours, but also a substantial fraction of workers who work part-time.

Figure A10. Distribution of Contracted Hours

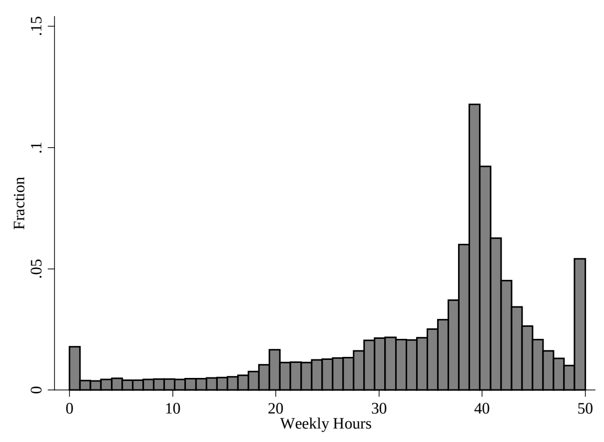


Notes: This figure shows the distribution of contracted weekly hours the year before winning the lottery. Missing values have been imputed from up to four years before the year of the lottery (i.e., three years before the outcome was measured).

As discussed in the main text, modest adjustment of labor supply on a number of margins, such as sick leave, parental leave, over-time, and unpaid vacation may not induce changes in contracted hours. Another drawback with contracted hours is that it will by definition be missing for people who leave the labor market. For this reason, we calculate the measure of earnings-based hours described in section III.B of the paper using the main wage measure based on imputations up to three years from a given year. Since wage earnings are observed for all individuals in the sample, we have the same coverage of earnings-based hours as for wages. In order to reduce the problem of outliers due to division bias (measurement error in wages casing an upward bias in hours worked), we winsorize earnings-based hours worked at 50 hours.

Figure A11 shows the distribution of our earnings-based measure of hours worked. As for contracted hours, there is a clear spike at full-time work, but the distribution is more dispersed than contracted hours. About five percent of the sample has the number of hours worked winsorized at 50 hours.

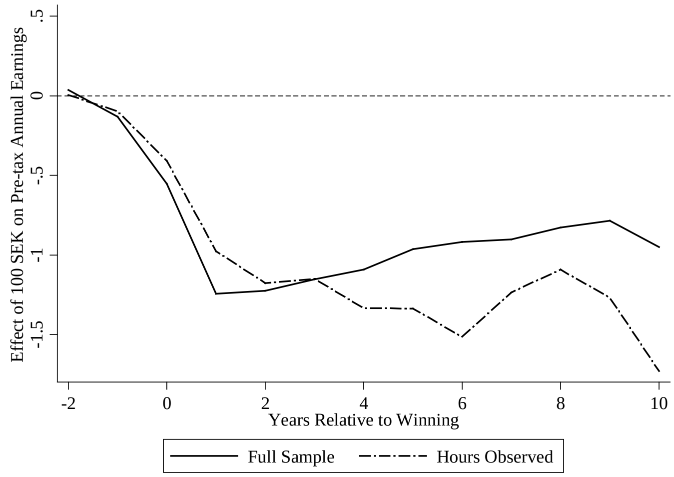
Figure A11. Distribution of Earnings-based Hours



Notes: The figure shows the distribution of weekly earnings-based hours worked the year before winning the lottery. Missing values have been imputed from up to four years before the year of the lottery (i.e., three years before the outcome was measured).

The sample for which we observe wages and hours is not fully representative of the pooled lottery sample. Figure A12 shows the wage earnings response for the full sample and the hours-sample. The wage earnings response is similar in the first four years after the lottery event, but smaller for the full sample thereafter.

Figure A12. Earnings Response in Sample with Observable Earnings-based Hours

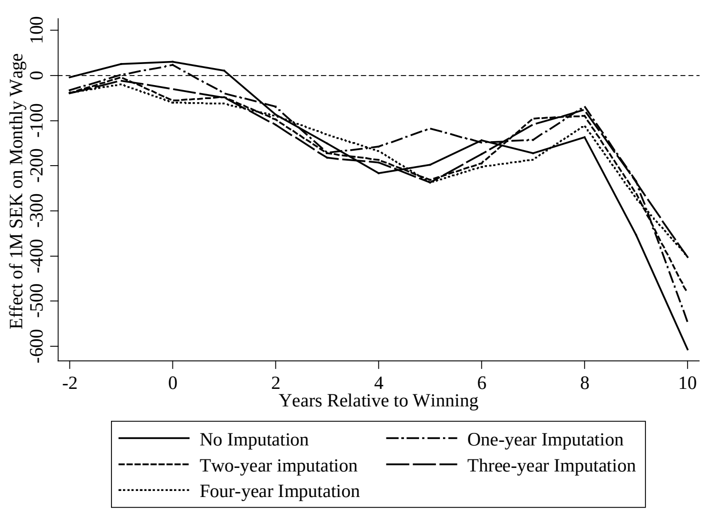


Notes. The figure reports estimates of equation (2) with wage earnings as the dependent variable for i) the full sample and ii) the sample for which we can infer earnings-based hours.

5.1. Robustness for Wages and Hours Decomposition

In this subsection, we report a number of robustness tests with respect to the measure of hours or wages used. Figure A13 shows how the estimated effect of lottery prizes on wages depend on whether and how wages are imputed. In addition to our main "three-year" wage measure, we show the results when we impute wages from one, two or four years prior to or after a given year. For the four-year measure, we also allow wages in post-win years to be computed from pre-win years, and vice versa. While the results vary to some degree based on the exact imputation method, the pattern is similar.

Figure A13. Robustness to Imputation of Wages

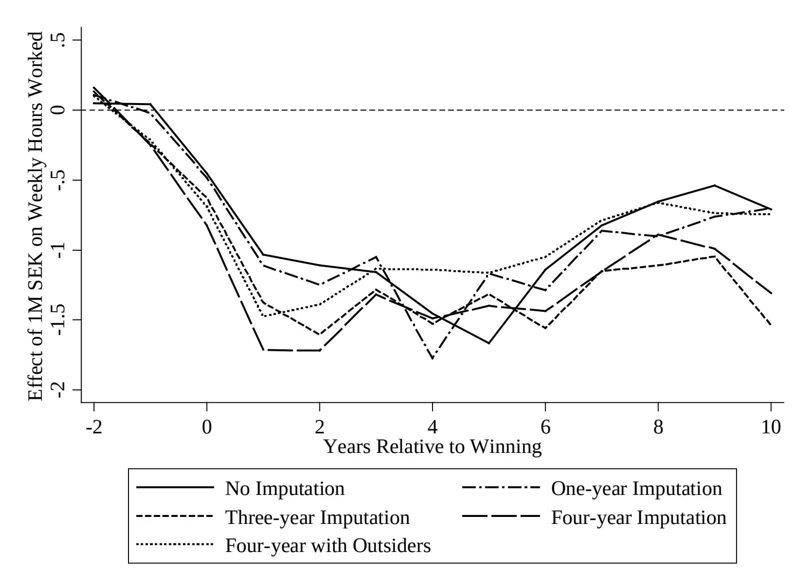


Notes. The figure reports estimates of equation (2) with wages based on different imputation methods as the dependent variable.

We now turn to the robustness with respect to the imputation of earnings-based hours using the same four ways to impute earnings-based hours as for wages. We also add a fifth measure ("Four-year with Outsiders") where we set hours worked to zero for individuals with missing wages but who are classified as non-working based on their annual wage earnings (below 25K per year).

Figure A14 shows the results for the five measures of earnings-based hours worked. The estimated effect on hours is strongest for the three-year measure, but the differences are small except for the very end of the study period where precision is lower due to few observations. Allowing for imputation from the pre-win period (which we allow in the four-year measures) does not change the results appreciably. Including workers outside the labor force diminishes the effect, despite the effect of lottery winnings on the extensive margin. The reason is that we in this case include people who did not work before the lottery win in the estimation sample; since the labor supply response is smaller for this group, the effect is attenuated.

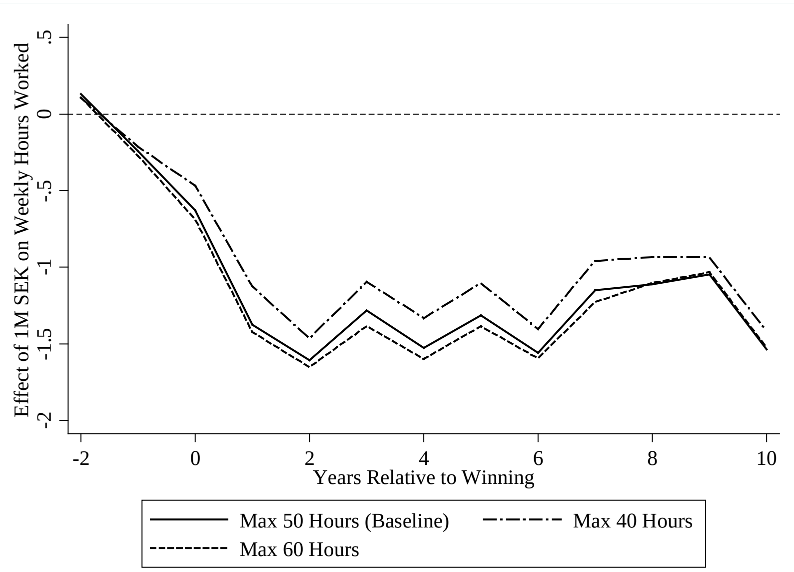
Figure A14. Robustness to Imputation of Earnings-based Hours



Notes. The figure reports estimates of equation (2) with earnings-based hours based on different imputation methods as the dependent variable.

We next turn to robustness tests regarding censoring and a comparison with contracted hours. In these cases we focus on our main ("three-year") measure of earnings-based hours. Figure A15 shows that the estimates are not particularly sensitive to the exact threshold used when winsorizing hours.

Figure A15. Robustness to Winsorizing Earnings-based Hours



Notes. The figure reports estimates of equation (2) using earnings-based hours with different winsorization of overtime as the dependent variable.

Figure A16 compares the results for our earnings-based measure of hours worked with contracted hours. We see a smaller response for contracted hours from four to seven years from the lottery win. To investigate the reason behind this difference, we create a combined measure based on contracted hours, but replace it with earnings-based hours whenever earnings-based hours is below 10 (which is the case for 10-15% of the sample). If wage earnings are very low, a worker cannot possibly have worked many hours, and we therefore have most faith in the earnings-based hours measure in these cases. The figure below shows that the difference between the earnings-based and contracted hours is much reduced when we use this combined measure as the outcome variable. We therefore conclude the difference stems mostly from those who work few hours according to the earnings-based measure.

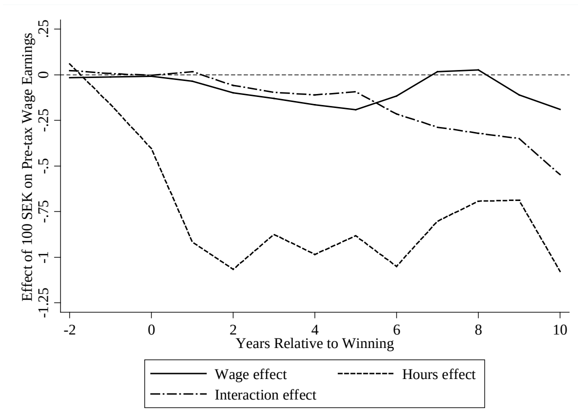
Figure A16. Robustness to Type of Measure of Hours Worked

Notes. The figure reports estimates of equation (2) with three different dependent variables: i) earnings-based hours worked, ii) contracted hours, and iii) a combined measure equal to earnings-based hours if weekly earnings-based hours are below 10, and equal to contracted hours otherwise.

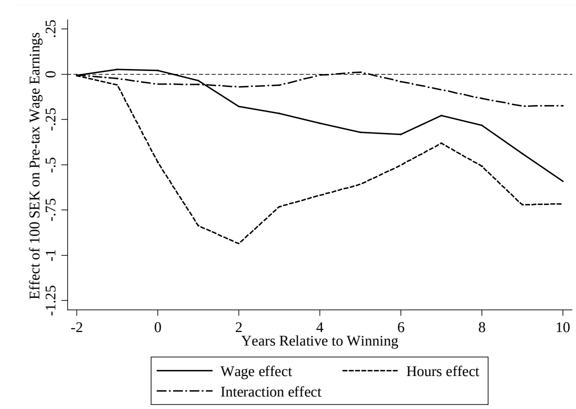
Having shown how the intertemporal pattern of responses depends on how we measure wages and hours, we now turn to the robustness of our decomposition of the wage earnings effect into wages and hours. Panel A in Figure A17 reproduces Figure 2D from the paper where the decomposition is based on the three-year imputed wages and earnings-based hours. Panel B shows the decomposition when earnings-based hour is replaced by contracted hours. In Panel C and D we use earnings-based hours but restrict the imputation to *t+1* and *t*+1 (Panel C) or no imputation at all (Panel D). Compared to the base case in Panel A, the alternative decompositions all show a smaller role for adjustment of hours for the long-term wage earnings response, but the hours component dominates the wage component at all time horizons for all decompositions.

Figure A17. Alternative Decompositions of Wage Earnings Effect

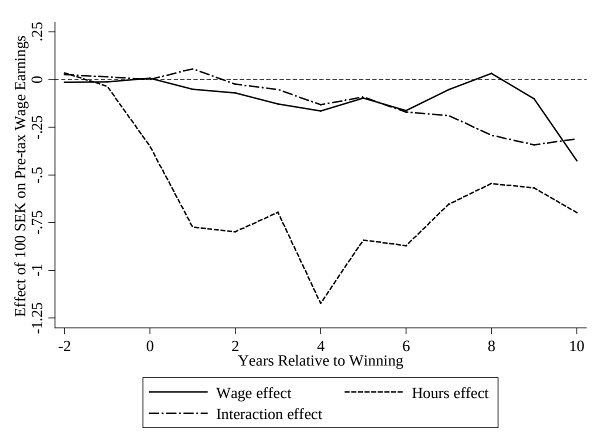
A. Three-year imputed wages and earnings-hours (same as Figure 2D)



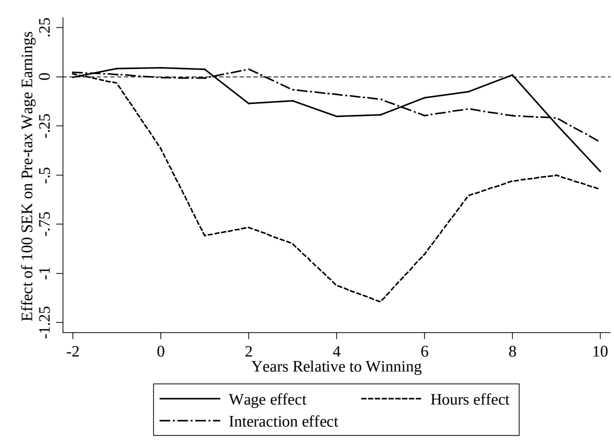
B. Three-year imputed wages and contracted hours



C. One-year imputed wages and earnings-based hours



D. No imputation of wages and earnings-based hours



Notes. The figure reports decompositions of equation (3) based on different measures of wages and hours worked.

6. The Swedish Pension System[2]

In this section, we describe the Swedish pension system in order to motivate why a binding retirement age equal to 65 is a reasonable modeling assumption. While the pension system allows for retirement from the age of 61, we show that the modal age of retirement during our period of study was 65, and that the far majority of people had retired at age 67.[3] The pattern in

[2] This section builds largely on Barr (2013) and Bohlin and Gidehag (2002).

[3] For some groups, retirement is common even before 61. For example, some state employees, politicians, firefighters, military officers and some scenic professionals can retire many years earlier and then receive a part of their income until they turn 65.

the data is consistent with the financial incentive not to retire early inherent in the public pension system, and with the discrete fall in employment protection at age 65 (before 2001) or 67 (after 2001).

6.1. The Swedish Pension Reform

The Swedish public pension system was reformed in 1998. The reform implied a shift away from what was mainly an unfunded pay-as-you-go system, to a pension system based on a defined contribution plan. The new system gradually replaced the old system from January 1, 1999.

Persons born 1937 or earlier only get pensions from the old system, whereas those born between 1938 and 1953 get benefits from both systems (with a proportionally lower share from the old system for younger cohorts). Persons born 1954 or later receive pension through the new system only.

We study labor supply between 1991 and 2010, implying that cohorts born between 1926 and 1955 reach age 65 during our sample period. In the pooled lottery sample, 27.0% are born prior to 1938 and receive pension from the ATP system, 48.3% are born between 1938 and 1953 and are covered by the interim rules and 4.3% are born 1954 or 1955 and receive pension from the post-reform system. Consequently, both systems are relevant in our context, but the majority of our sample will be more strongly affected by the rules in the old system. Since retirement incentives differ under the two regimes, we describe both the pre- and post-1998 pension system below.

6.2. The Old Public Pension System

The old pension system consists of two parts, *Allmän tilläggspension* (ATP) and *Folkpension*. Pension benefits in ATP are determined by earnings from the 15 years during which a person earned most, given that he or she had worked at least 30 years between age 16 and 65. The amount is lowered by 1/30 for each year without income. The final pension benefit corresponds to 60 percent of the average earnings (counting only annual income between one base amount and 7.5 base amounts[4]) over the 15 years with the highest earnings. Pensions are eligible from the age of 61 but diminish by 0.5 percent for each month before 65 benefits are received and increase by 0.7 percent for each month after 65, up until the age of 70. After that, delaying retirement does not increase pensions further. Hence, a worker that retires at 61 receives 76 percent of the pension received at 65 while waiting until 70 yields a pension of 142 percent.

The *Folkpension* is a small pension which is independent of labor market earnings (0.785 base amounts for married and 0.960 for unmarried persons per year). Retirees with no (or very little ATP) get a small extra pension *pensionstillskottet* which is decreasing in pensions received from the ATP system.

[4] As of 2010, one base amount is 42,400 SEK.

6.3. The New Public Pension System

The post-1998 pension system consists of three parts: the income pension, the premium pension and the guarantee pension. A key difference between the new and old system is that pensions are assessed based on lifetime earnings in the system: The income and premium pensions are both based on contributions paid by employers, with the bulk of the contributions (86.5%) allocated to income pensions.

The third part of the public pension system is guarantee pension, which works as a basic security for those with very little, or no pensionable income during their working life. It is not financed by contributions but instead through the government budget and is linked to prices instead of the aggregate wage increases. The pension is eligible from age 65 and is fully paid for those who have lived in Sweden for at least 40 years, and proportionally lowered for those that have lived in Sweden fewer years. The guarantee pension benefit is reduced when the income and premium pension increases.

The incentive to delay retirement is stronger in the new system. People in the new system that retire at age 61 receive 72 percent of the pension received at 65 while waiting until 70 gives 158 percent. Unlike the old system, earnings after retirement also add to the pension entitlement, and benefits are recalculated every year a new contribution is recorded.

6.4. Occupational and Private Pensions

In addition to the public pension system, there are occupational pensions that are established though collective agreements on the labor market. Most of these have a contribution rate of 4.5% up to the income ceiling (7.5 base amounts), and substantially higher contributions above the ceiling. Occupational pension often constitutes a large part of an individual’s total pension, especially for high income earners. In cases when no collective arrangement is in place, the occupational pension becomes much harder to predict. About 50% of all Swedes also have some form of private pension, at either the individual, company or industry level.

6.5. Early Retirement

It is also possible to retire early for medical or “labor market reasons”. For example, before 1991, the so called *58.3 pensions* implied that some employees were laid off and received unemployment insurance for 450 days before they reached retirement age. Early retirement has since the 1990s become more restricted, and is now only granted because of strict medical reasons. During the 1990s, it was also quite common to retire early with individual retirement contracts (*avtalspensioner*). The employment protection legislation makes it difficult to dismiss senior employees and it was sometimes more profitable to make an agreement that the employee should retire and get paid for the remaining years (Fölster et al 2001). With such a retirement contract, the employee gets a fraction of their present income until they reach the age of 65, and the employer also often contributes so that the final pension received after that does not diminish due to lost work-life income.

6.6. Employment Protection

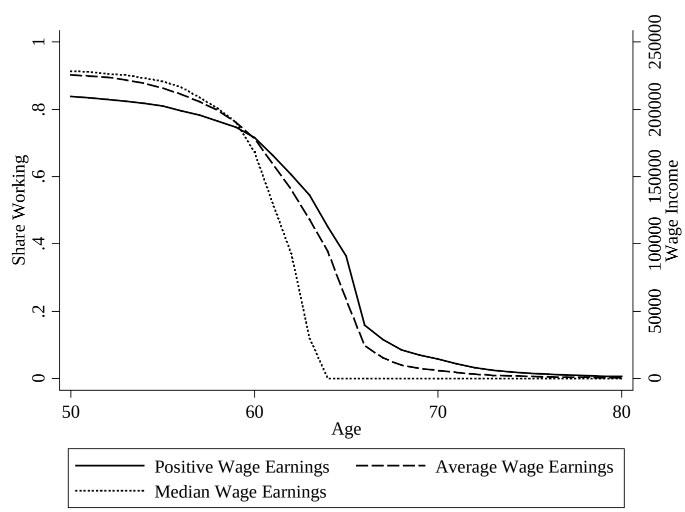
The decision to retire is not only affected by incentives in the pension system, but also by employment protection legislation. After age 65 – extended to age 67 in 2001 – employees are no longer protected by employment protection laws. Since wages typically increases with seniority, whereas productivity in many occupations decreases, employers may have an incentive to dismiss workers when they reach age 65 (or 67 after 2001).

6.7. Descriptive Statistics

As shown above, the public pension system currently rewards workers for postponing retirement until the age of 70. On the other hand, the discontinuous drop in employment protection at age 65 (and later age 67), may induce workers to retire at these ages. In addition, there is an incentive to retire at age 65 for some groups since it is only possible to receive guarantee pension after age 65, and because unemployment and sickness compensation is only paid out prior to age 65. In this section, we show that the assumption of a binding retirement age of 65 fits reasonably well with the patterns in the data.

Figure A20 shows annual wage earnings (measured 1991 to 2010) by age for a representative sample. As is clear from the figure, median wage earnings are zero after age 65, and average earnings are very small from age 67. Although there is no formal barrier to working after age 65, the pattern in Figure A18 nevertheless suggest that a binding retirement age is a reasonable approximation to patterns in the data.

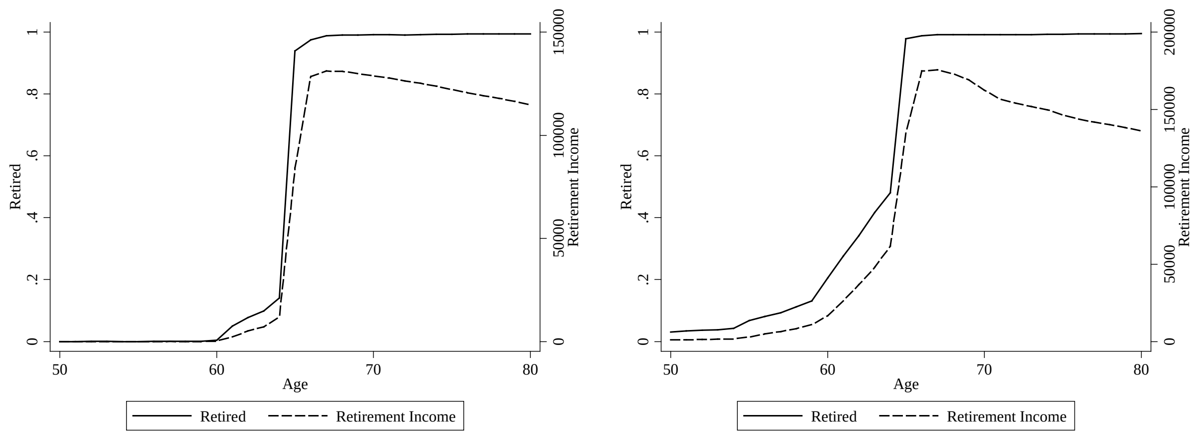
Figure A18. Wage Earnings in Swedish Representative Sample



Notes: The figure shows wage earnings for a representative sample of 50,000 individuals taken in year 2000. Wage earnings are measured between 1991 and 2010.

Figure A19 instead shows the evolution of pension in a representative sample. The left panel of Figure A19 shows income from public pensions and the share of people with non-zero retirement income. Consistent with the drop in wage earnings in Figure A18, there is a discontinuous jump in both the level and share of workers with pension income at age 65. The right panel shows the same statistics but also includes other types of pension income (some of which reflect part-time retirement). The right panel shows that the share of people who receive some kind of pension income starts increasing from age 55 onwards, although the increase is small before age 60.

Figure A19. Retirement in Swedish Representative Sample



Notes: The left panel shows average income from public pensions for the representative sample as well as the fraction that receive some public pension income. The panel to the right shows the corresponding figures when also other types of pension income are included. The sample is a representative sample of 50,000 individuals taken in year 2000 and pension income is measured between 1991 and 2010.

7. Additional Details about Model Simulation

7.1. Dynamic program

In simulating the model, it is useful to recast the model as a discrete-time dynamic program. In each period t, the individual chooses consumption, work hours, and next period's assets in order to maximize the following expression:

$$U_t(A_t) = \max_{c_t,h_t,A_{t+1}} \left\{\beta \log(c_t - \gamma_c) + (1-\beta)\log(\gamma_H - h_t) + \left(\frac{1}{1+\delta}\right) U_{t+1}(A_{t+1})\right\}$$
$$A_{t+1} = (1+\mathrm{r})(\mathrm{A}_t + \mathrm{w}_t h_t - c_t)$$
$$A_T \geq 0.$$

In the simulations, we exploit the dynamic programming property that, holding constant the choice of A_{t+1} (given A_t), one can solve for optimal choices of c_t and h_t in closed-form. To see this, treat A_t and A_{t+1} as constant. Then, the continuation utility is a constant and is not affected by choice of consumption and hours. To solve the model computationally, we start with the discrete-time transversality condition $A_T = 0$ and solve the model backwards.

7.2. Minimum-distance criterion and standard errors

The estimates from the simulated model are defined as $\boldsymbol{\pi}(\boldsymbol{\theta})$, where $\boldsymbol{\theta}$ corresponds to the vector of parameters to be estimated (i.e., $\boldsymbol{\theta} = (\delta, \beta)$); the corresponding reduced-form empirical estimates of each of these moments are defined as $\widehat{\boldsymbol{\pi}}$. The simulation procedure is repeated many times to find the combination of parameters that comes closest to matching the main results across all of these groups. We define "closeness" using the weighted minimum-distance criterion

$$m = (\widehat{\boldsymbol{\pi}} - \boldsymbol{\pi}(\boldsymbol{\theta}))'\widehat{W}^{-1}(\widehat{\boldsymbol{\pi}} - \boldsymbol{\pi}(\boldsymbol{\theta}))',$$

where $\widehat{W}^{-1}$ is a diagonal matrix of the inverse of the estimated sampling variance for each reduced-form parameter estimate. The parameter vector that minimizes the criterion above is given by $\widehat{\boldsymbol{\theta}}$, which gives the model-based estimates. The standard errors for this estimated parameter vector (which incorporate the sampling error in the reduced-form estimates) can be computed from the estimated variance-covariance matrix

$$V = (\hat{G}'\widehat{W}^{-1}\hat{G})^{-1},$$

where $G = \partial\boldsymbol{\pi}(\widehat{\boldsymbol{\theta}})/\partial\boldsymbol{\theta}$. Because 10 reduced-form empirical moments are used to estimate two model parameters, we can implement a specification test using the test statistic $\left(\widehat{\boldsymbol{\pi}} - \boldsymbol{\pi}(\widehat{\boldsymbol{\theta}})\right)' \widehat{W}^{-1}(\widehat{\boldsymbol{\pi}} - (\boldsymbol{\theta}))'$, which is distributed as $\chi^2(10-2) = \chi^2(8)$.

7.3. Robustness and Sensitivity Analysis

To assess the robustness of the main model-based estimates, we carry out several additional exercises. First, we re-estimate the full model estimating the maximum hours of work as an additional parameter. In main analysis this is set to be 1,880 hours, which is the maximum hours worked for a full-time, full-year worker in Sweden (working 40 hours a week with 5 weeks of vacation). Instead of setting this parameter externally, we can estimate this parameter by adding an additional empirical moment to target, which is the average annual hours worked). The results are shown in Table A8.

Table A8. Additional Simulation-based Estimates of Model (Three-Parameter Version)

Panel A: Parameter Estimates

	Estimate	SE
Consumption Weight (β)	0.866	(0.047)
Discount Rate (δ)	0.014	(0.037)
Max Hours Worked (γ_h)	1822.3	(46.0)
	$\chi^2(8)$	*p*-value
Goodness of Fit	3.385	[0.092]

Panel B: Model Fit

	Reduced Form	Model Prediction
Baseline	-0.58	-0.55
High wage	-0.58	-0.55
Low wage	-0.54	-0.56
100k SEK prize	-0.54	-0.55
2M SEK prize	-0.55	-0.55
Age 21-34	-0.73	-0.38
Age 35-54	-0.68	-0.53
Age 55-64	-0.38	-0.58

Panel C: Implied Wealth Effect by Age

Assumed Age-at-Win	Lifetime MPE
20	-0.169
30	-0.145
40	-0.119
50	-0.087
60	-0.036

Panel D: Implied Labor Supply Elasticities

Marshallian Elasticity (e_M)	0.010
Hicksian Elasticity (e_H)	0.096
Frisch Elasticity (e_F)	0.152

Notes: This table presents same set of results as Table 5, but in a model that allows for maximum hours parameter to be estimated, rather than imposing value of 1880 that represents full-time full-year work. In order to estimate this parameter, an additional moment is re-estimated to simulation-based estimation, which is average annual hours worked (1633.0, as shown in Table 5).

Next, we re-estimate the full model under alternative assumptions regarding some of the other calibrated parameters. We focus on the real risk-free rate, r, and the consumption floor, γ_c. Table A9 reports results for various values of these two parameters.

Table A9. Sensitivity Analysis of Simulation-based Estimates

	Baseline	Alternative Parameters			
	(1)	(2)	(3)	(4)	(5)
Interest rate (r)	0.020	0.010	0.040	0.020	0.020
Consump. floor (γ_c), in 000s SEK	20	20	20	0	40
<u>Parameter Estimates</u>					
Consumption Weight (β)	0.866	0.838	-0.901	0.866	0.866
	(0.048)	(0.080)	(0.025)	(0.047)	(0.048)
Discount Rate (δ)	0.014	-0.003	0.043	0.014	0.014
	(0.039)	(0.049)	(0.033)	(0.037)	(0.038)
<u>Lifetime MPE by Age-at-Win</u>					
20	-0.169	-0.155	-0.185	-0.169	-0.169
30	-0.145	-0.138	-0.153	-0.145	-0.145
40	-0.119	-0.117	-0.120	-0.119	-0.119
50	-0.087	-0.089	-0.082	-0.087	-0.087
60	-0.036	-0.039	-0.032	-0.036	-0.036
<u>Implied Labor Supply Elasticities</u>					
Marshallian Elasticity (e_M)	0.010	0.008	0.012	0.026	-0.006
Hicksian Elasticity (e_H)	0.096	0.097	0.095	0.112	0.080
Frisch Elasticity (e_F)	0.150	0.151	0.141	0.163	0.129

<u>Notes</u>: This table reports alternative simulation-based estimates for different assumptions on real interest rate (r) and the consumption floor (i.e., minimum level of consumption in the Stone-Geary utliity function described in the main text). Across different assumptions of these parameters, this table reports main parameter estimates that detrmine lifetime wealth effect and labor supply elasticity parameters.

Finally, in Table A10, we assess the role of functional form assumptions by moving away from the Stone-Geary benchmark model used in the main results. To do this, we recover alternative estimates of the Frisch elasticity under alternative assumptions about the elasticity of intertemporal substitution (EIS) and the uncompensated (Marshallian) elasticity. Under Stone-Geary utility, the EIS is 1 since consumption enters logarithmically in the per-period utility function, while the Marshall elasticity is very low because income and substitution effects balance out. Using the formulas in Ziliak and Knieser (1999) and Browning (2005), we recover alternative estimates of the Frisch for a range of different values of these parameters. Conceptually, this exercise is equivalent to estimating the Frisch elasticity under alternative functional form assumptions that would (in turn) imply these alternative values of the EIS and the uncompensated elasticity.

Table A10. Sensitivity Analysis of Frisch Elasticity Estimate

Intertemporal Elasticity of Substitution (IES)	Marshallian Elasticity (e_M)						
	-0.087	0.000	0.100	0.200	0.300	0.400	0.500
0.00	0.000	0.086	0.186	0.286	0.386	0.486	0.586
0.50	0.025	0.111	0.211	0.311	0.411	0.511	0.611
1.00	0.050	0.136	0.236	0.336	0.436	0.536	0.636
1.50	0.075	0.161	0.261	0.361	0.461	0.561	0.661
2.00	0.100	0.186	0.286	0.386	0.486	0.586	0.686

Notes: This table reports alternative estimates of Frisch elasticity to alternative assumptions on Marshallian (uncompensated) elasticity and Intertemporal Elasticity of Substitution (IES). This table is constructed by first calculating the Hicksian elasticity from the Marshallian and the lifetime income effect, using the estimate from life-cycle model for the latter. Then, the Frisch is formed by using the equation in Ziliak and Kniesner (1999) and Browning (2005) which relates the Hicksian and income effect to the Frisch through the IES and the ratio of assets to labor earnings (which is set to 6.7 based on estimates from lottery sample).

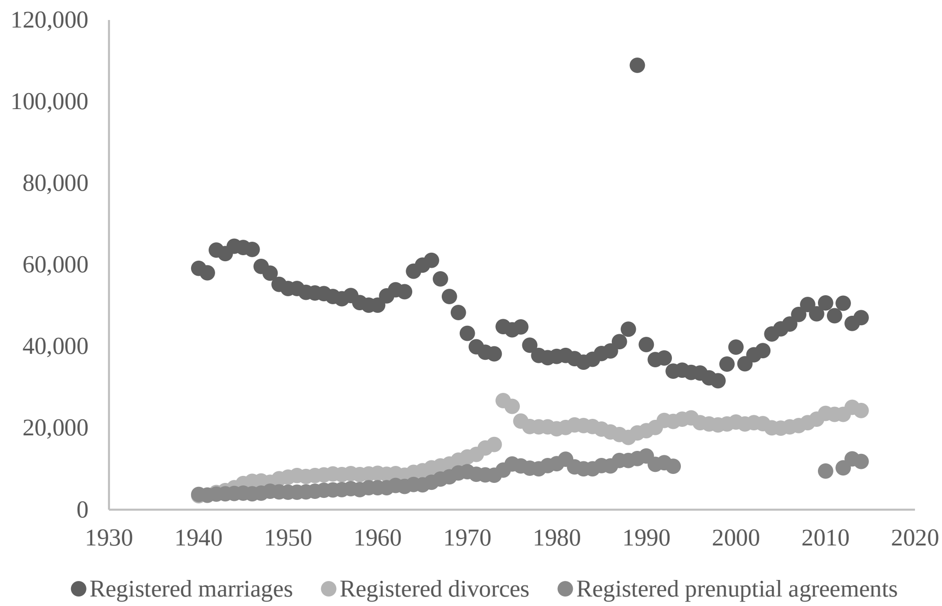
8. Swedish Marriage Law

Under Swedish marriage law, *Äktenskapsbalken* (SFS 1987:230), the basic principle is that assets owned by either spouse before the marriage, or acquired during marriage, is the private property of the owner *during* the time of the marriage (Ch 1 § 3). A lottery prize is thus the private property of the winning spouse, unless the money is deposited in a bank account controlled by both spouses. The only exception to this rule is that both spouses are required to contribute to the household according to their capacities, thus ensuring that no spouse lives below a certain acceptable standard given that the other spouse can help remedy such a situation (Ch 6 §§ 1-2).

However, in case of divorce, the default rule is that all assets (regardless of when they were acquired) are considered marital property (*giftorättsgods*) and split equally between spouses (Ch 11 § 3). If a married couple wishes to diverge from this default rule, they must actively establish a prenuptial agreement (*äktenskapsförord*) in which they specify either that *all* assets, current and future ones, or *particular* assets are to be exempted from what is considered marital property (Ch 7 §§ 1-3). Prenuptial agreements are to be signed by both spouses and can be established (or revoked) before or during marriage, as many times as desired (Ch 7 § 3).

As shown by Figure A20, the vast majority of Swedish married couples do not sign a prenuptial agreement despite divorce being common. While marital law clearly states that all assets should be split equally between spouses in the absence of a prenuptial agreement, there is nothing preventing spouses from splitting their assets in a different way should they agree to do so. So how do spouses actually split their assets in case of a divorce? Brattström (2011) conducted a survey of divorced couples in 1997, 2002 and 2007. The survey indicates that most couples (85%) carry out a division of marital property. Two-thirds of marital property divisions involve equal shares to both spouses, while some assets are excluded in a third of the cases. The most common reason for excluding certain property was an agreement at the time of the division. The existence of a prenuptial agreement was stated as the second most common reason, and conditioned wills and gifts from third parties as the third. Three quarters of all estate divisions are made without assistance from either the state or legal counseling.

Figure A20. Registered Marriages, Prenuptial Agreements and Divorces 1940-2014

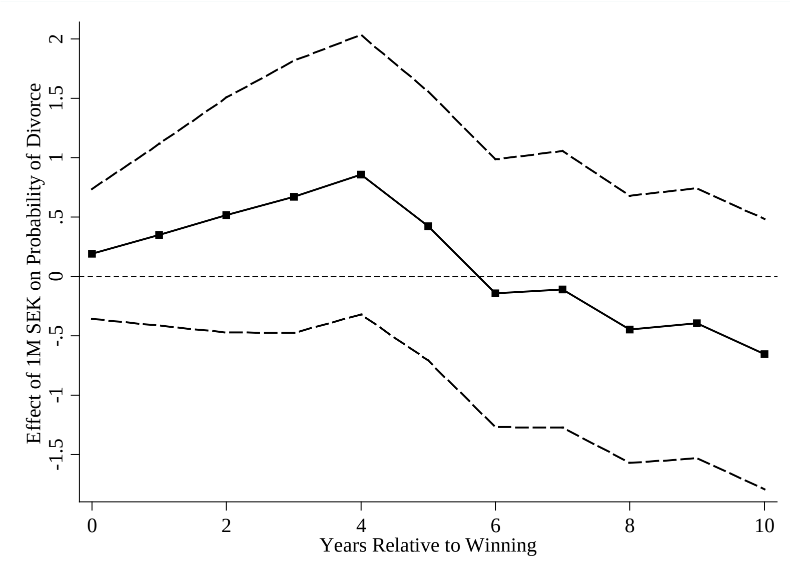


<u>Notes:</u> The same couple may sign as many prenuptial agreements as they like and Swedish statistics do not distinguish between a couple's first contract and later contracts. Neither do statistics distinguish between whether the contract is signed before or during marriage. A contract may also contain the opposite content, namely of revoking formerly individually registered assets. According to Agell and Brattström (2011, p. 139), about 10% of the number of prenuptial agreements are revocations where assets change from having been individual to becoming marital property again. The spike of registered marriages in 1989 is due to a change in Swedish survivor pension, which had the effect that many couples who had formerly been cohabitants decided to enter into marriage (see Persson 2015). Statistics on registered prenuptial agreements 1995-2008 and 2010 are missing. Data are obtained from Statistics Sweden (*SCB*), Agell and Brattström (2011) and the Swedish Tax Agency (*Skatteverket*).

9. Effect on Household Composition

A potential concern with our analyses of household labor supply is that winning the lottery affects divorce risk. Figure A21 shows the estimated effect of lottery wealth on the probability of divorce in each year after the lottery win for winners that were married prior to winning. There appears to be a small increase in divorce risk in the first four years after the lottery, but the effect is not statistically distinguishable from zero.

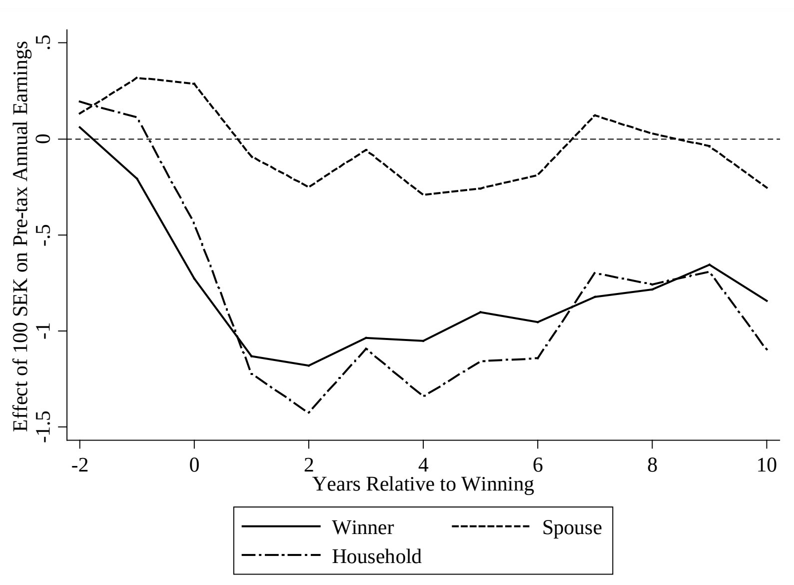
Figure A21. Effect of Lottery Prize on Divorce Risk



Notes. This figure reports estimates of equation (2) for winners that were married prior to winning and the dependent variable is an indicator for whether an individual has divorced the spouse he or she was married to in the year prior to winning. The solid line shows the point estimates and the dashed lines the bounds on the 95% confidence interval.

Since Figure A21 suggests that there might be a small increase in short-term divorce risk, we conduct a robustness test restricting the sample to married winners who did not divorce their spouse at the time of the win. As shown in Figure A22, the effect of lottery wins on household labor supply does not appear to change appreciably with this sample restriction.

Figure A22. Effect of Lottery Prize on Household Labor Supply of Married Couples



Notes. This figure reports estimates of equation (2) for winners that were still married to their initial spouse in the year labor earnings is measured, but run separately for winners and their spouses.

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