**Cesarini, Lindqvist, Notowidigdo & Ostling (2017)**

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| **Question** | **Using the winners from three different lottery systems in Sweden the authors study the changes in labour supply following an exogenous shock in wealth (unearned income).** |
| **Context – data** | Consensus on the magnitude of wealth effect on labour supply is limited. Lack of consensus bc technical challenge that is finding substantial exogenous wealth/unearned income effect (which links compensated and uncompensated responses) |
| **Method(s)** | * Construct ‘cells’ from the data within which the amount won in any lottery is random. * Regress an outcome variable of interest against cell-fixed effects & control vector & the lottery prize amount won (t=0: winning lottery year and one regression per year t>0 : follow beta) * Also include a modified specification 5-year (beta constant restriction) (en gros pool ttes les données sur 5 ans) estimate motivated by empirical evidence that response to wealth shock is immediate and quite stable over time. |
| **Main results** | * **Exogenous wealth shock results in near immediate, modest, and permanent reduction in labour earnings**.   - Effect on pre-tax labour earning (-1.1SEK/100) is mainly driven by reduction in wage earnings rather than reduction in self-emp. income.  - Effect: 40% lower if consider after-tax (0.57) and 40% higher if consider production value (-1.5).   * **Adjustment margins** takes place on both extensive and intensive.   - Estimates still suggest intensive margin substantially dominates, with earnings response mainly explained by fewer hours worked (= reduction in wage earnings).  - No evidence that unearned income shock induces change in type of employer/employment/location of work… consistent with solely reduced hours being main driver of intensive margin response.   * Limited heterogeneity across subgroups of interest (lottery/age/sex/income)   - No difference between men and women, at odds with literature.   * Lifetime wealth effects (MPE), vary with age and larger for younger workers. * Modest wealth effects imply estimated elasticities in the lower ranger of the literature.   - Estimate MPE=income effect *(= sum of dy/dL(=lottery gain) for all remaining yrs of working)* et Marshall=total *(implied effect on total hrs worked summed across remaining years)* -> Hicks with Slutsky equation. Marshall:0.001 / Hicks:0.01 / Frisch:0.15   * Estimates of wealth effects independently on married individuals’ labour supply underestimate the total household labour supply response.   - Both winners and spouses reduce labour supply.  - But consistently find the winning spouse responds more strongly than nonwinning spouse.  - Which is inconsistent with unitary model of households that predicts exogenous unearned income is pooled within the household. |
| **Literature** | * Compared to other papers: * Better representativeness: they manage to control for the exact number of tickets bought i.e.   variation in wealth is truly exogenous.   * Explore large variation in gains and link it to administrative data: asses the effects of large amounts and follow responses many years after winning. |
| **Limitations** | * Can always argue on their sample population **&** wealth data are +/- representative of the overall population & lottery is a specific type of unearned income exogenous shock but should be ok (according to them because produces results in line with theoretical models) * Tackling the intensive margin, they have trouble with computing the effective hours worked following the unearned income shock because selection problem arises = some actually leave the workforce; for the study it would be best to have how many hours such person would have worked hadn’t they left the WF! Which we cannot have… |
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| **Data** | - Main challenge: number of lottery tickets correlates with the amount won!  - construct "cells" (>fixed effects) within which the amount won is random. (ex: a cell in which ppl bought same nb of tickets > amount won has to be random inside)  - Complete random assignment of prizes within cells.  - Final data ranges from (1991 – 2010).  > Panels of data coming from the different lotteries  - ***Prize-Linked Savings Accounts*** *(PLS)*  - Each account is assigned one lottery ticket per 100 SEK in the account  - Two types of prices: fixed (cell=winners who won the exact same nb of prizes in a draw > amount won = random) and odds prizes (size of prize determined by account balance > cell= match individuals who won one odd prize to other winners of odd/fixed prizes so that within the cell the amount won is independent of potential outcome + exclude fixed-prize winners matched to odd-prize winners to avoid duplicates).  - ***Kombi Lottery***  - Monthly ticket subscription, subs choose the number of sub tickets (cell=match winning player to 100 random nonwinning players).  - ***Triss Lotteries***  - Scratch-ticket lottery, two categories of winners, cell = winning one prize in the same year and same prize plan.  - *Triss-Lumpsum* > lottery winnings as a lump-sum.  - *Triss-Monthly* > draw two other tickets that assign the prize duration and the monthly payments.  - Key identification strategy is that the variation in amount won within cells is random ie characteristics determined before the lottery should not predict the amount won once cell fixed effects are considered.  - **all identifying variation comes from within-cell comparisons**.   * Match the lottery winners and spouses to population-wide registers on labour market outcomes and demographic characteristics = creates overall panel for the study. |
| **Model(s)** | - 1/ Internal validity of underlying assumption = test that wealth is indeed randomly assigned conditional on the fixed effects.  - Also include a vector of baseline control variables.  - 2/ External validity (representativity problem of the estimation): concern is that players may not be representative of the general population > reweight the representative samples to match the age and sex distribution of lottery winners. Also concerned that lottery is a too specific type of unearned income (cannot fully rule out this pb) but results are not at odd with standard predictions.  - **Estimation strategy**: regress an outcome variable of interest against cell-fixed effects & control vector & the lottery prize won (L).  (One year = one regression).  - identifying assumption is that L is independent of potential outcomes conditional on the cells fixed effect vector.  - also include a modified specification (5-year beta constant restriction) estimate motivated by empirical evidence that response to wealth shock is immediate and quite stable over time.  - Also *test for heterogeneous effects*: by lottery / by age groups / by sex / by education and by income tercile (pre- and after-tax). |
| **Individual**  **level analysis** | - Evaluate individual-level responses to lottery wealth shocks.  - Consider different annual earnings measures.  - Decompose earning effects into extensive and intensive margin adjustments.  - Assess heterogeneity & non-linear effects.  ***1. Effect of Wealth on Annual Earnings***  - Primary earnings measure is pre-tax labour earnings (annual wage earnings + self-emp income + some income support)  - Beta estimated = annual reduction of income.  - In line with identifying assumption pre-lottery point estimates are statistically indistinguishable from zero (beta(t) de lottery price = 0 for t prior to winning lottery)  ­- Effect of lottery wealth on **annual** **earnings** is near immediate, modest (-1.5SEK for 100SEK won) in size and quite stable and permanent (slight increase 1-5y and stable 5-10).  - *1M prize* = -10,000 SEK = size of *5.5% average yearly income* (wage earnings).  - Declining effect over time vanishes if age restricted below 55 = people with more than 10yrs to age 65.  - Stable response is consistent with life-cycle model where discount factor = interest rate (macro2 r=rho: c=constant).   * **Measure using** **different income variables**:   - Effect on pre-tax (annual) **labour earning** is mainly driven by reduction in ***wage earnings***  - Reduction in ***self-employ. income*** is significant at 10% but way lower in size comparison (at odds with previous findings) *but* the ratio of this effect compared to self-emp mean (effect/mean) is stronger compared to (baseline) overall pre-tax mean ratio effect.  - 1M SEK = reduce self-emp. income by 7.7% of the annual average vs 5.5% for wage earners  - Effect on income support is very small and not significant.  - Consider ***production value*** = per-tax labour earnings + social security contributions = employers' total labour cost: reduction in labour cost for the employer is higher than reduced labour income for the employee  - Wealth effect on ***after-tax income*** & ***taxable labour income*** (labour earnings + U benefits + pension).  - Effect on after-tax income < pre-tax earnings => because. positive effect on pension income and U benefits = partially offsets reduction in labour earnings.  - Effect on after tax labour income is substantially smaller than on production value = reflection of extensive tax and transfer system.  ***2. Margins of Adjustment***   * Decompose overall effect of increased unearned wealth on annual labour earnings.   **# Extensive margin** (probability of participation in the Labour force)  Compute binary indicator of participating in the labour force (if annual income>set threshold).  - Winning lottery reduces labour force participation probability by about 2% per 1M SEK won (5-yrs estimate).  - Mainly driven by reduction in probability of wage earnings -2.2% rather than self-emp. Income (in line with wage earnings driving most of the reduction in labour earnings)  - Relative effect compared to mean is similar though.  => This (-2% in probability…) implies **much of the response of labour earnings comes from the intensive margin rather than the extensive**, and thus either due to lower salary **or/and** fewer hours worked.  - Retirement focus  - Receiving pension >25kSEK for winners aged >55yr. Lottery gain = small positive but insignificant effect on probability of receiving pension income above threshold.  - Early retirement:  - regress on leaving labour force = earning<25kSEK at 64 and 65 on subsample of age>55.  - find that 1M prize increases probability of leaving LF by 3.3% (significant).  **# Intensive margin (Hours & Wage)**  The *annual wage survey* has many problems for this study including:  - Incomplete coverage (50%) of the population of lottery winners.  - Reduced hours may be due to sick leave/unpaid vacation … but contracted hours may not change = cannot know with this survey.  - Survey only covers (by definition) the employed: individuals who left their jobs due to lottery’s induced wealth shock are absent from the survey = selection problem.  => Use register (=base created panel dataset) data to derive **earnings-based hours worked** measure! (Still does not mitigate the selection pb because if one works at t and leaves at t+1 this overstates the actual nb of hours worked at t+1, better than nothing…)  - Reduction in weekly hours precisely estimated 1M SEK = -1.3h per week.  - Reduction in pre-tax monthly wage less precise and limited 1M SEK = -147 SEK = 0.6% average monthly salary.  - Effect quite stable over time for both effects.  - Formally decompose *change* in wage earnings (=Delta\_w.h) between two components (w and h) *(comme dans papier1 sur labour share decomposition entre t-1 et t en deux composantes)*    > Use each of the three components as the dependent variables (keeping w-1 and h-1 as control).  - Five-year estimate indicates that (2nd component) **reduction in hours worked mainly drives fall in wage earnings (80%)**.  - No evidence that wealth shock affects type of employer, workplace, occupation, industry, or location of work = even though they are plausible factors explaining wage adjustment – evidence of no switching is consistent with hypothesis that changes in worked hours accounts for the bulk of the intensive margin response. |
| **Heterogeneous**  **&**  **Non-linear**  **effects** | **#** **By lottery**:  - Effect similar across lotteries + cannot reject hypothesis that 5-yr estimates for the four lotteries are equal.  - Response pattern for *Triss* lotteries is similar (=no significant bias to the present) & behaviour consistent with forward-looking dynamic.  **#** **By age**:  - Find that effects are similar by age groups following the win.  - Results tend to be weaker in subsample of 55-64 due to many individuals reaching retirement age.  **#** **By sex**:  - Literature = larger labour supply elasticity for women.  - Five-year estimate women's labour supply responses to wealth shocks are weaker than men (difference not statistically significant). Different from previous literature.  - Flexible coefficient estimate suggests that the difference attenuates with time.  **#** **By income tercile**: (pre- and after-tax)  - Both pre-tax and after-tax response is stronger for highest earners.  **# Non-linear effects**:  - Wealth should have non-linear effects on labour supply if workers face fixed adjustment costs  - In this case marginal effects of modest W shocks = smaller than those of substantial W shocks  - Quadratic model > point estimates suggest marginal effect smaller for larger prizes but difference not statistically significant |
| **Dynamic Labour**  **Supply Model** | **Model to recover model-based estimate of the long-run, lifetime effect of a lottery prize on after-tax labour earnings (lifetime Marginal Propensities to Earn out of unearned income) + obtain key labour supply elasticities** (Uncompensated Marshallian / Compensated Hicksian and Intertemporal Frisch).  - Estimate two parameters of the model (discount rate and relative weight on consumption in utility) using ‘standard simulated minimum-distance procedure’.  - Estimate implied lifetime MPE = sum of dy/dL across remaining working years (changes depending on assumed age-at-win) = income effect  - Younger winners model estimates imply most of the lifetime-earnings reduction occurs after the first ten years, cumulative ten-year effects significantly understate the lifetime wealth effects.  **#** **Labour supply elasticities**:  - Stone-Geary functional form assumption for utility => small uncompensated elasticity in magnitude.  - Hickisan elasticity at 0.10 < 0.31 in literature (Keane 2011).  - Frisch elasticity at 0.14 < range of estimates (0.27-0.53) in literature.  > Hicksian and Frisch elasticities related by intertemporal elasticity of substitution (IES) + income effect + ratio Wealth/Income. Modest estimates of income effect = constrain Frisch elasticity |
| **Household level**  **Analysis** | ***1. Winners’ spouses assessment***  - Register data contain the spouses of winners = test for and quantify difference between household and individual level responses.  Annual pre-tax labour earnings (=labour supply response) comparison between Married winner / Spouse / ‘Household’ (=Winner + spouse responses)  - Married winners reduce pre-tax annual labour earnings by 0.97 SEK / 100SEK won.  - Spouse by 0.41 SEK.  - Married household effect = -1.373 > individual-level response.  - Unmarried winners = -1.29 > married winners but < household-level response for married couples.  - ***Total household*** (unmarried + married household imo) effect = -1.3.  - Including response of nonwinning spouses (independently of sex) increases labour supply response  -1.066 (individual-level) > -1.306 (total household-level).  ***2. Married household = single-decision making unit ?***  - Test unitary model of the household hypothesis in which spouses are modelled as a single-decision making unit > prediction = identity of a spouse experiencing random wealth shock should not influence labour supply responses of each. (Variable is pre-tax labour earnings)  - Consistently find the **winning spouse responds more strongly than nonwinning spouse** : identity of the winner determines which spouse reduces labour supply the most : **inconsistent with unitary model that predicts exogenous unearned income is pooled** within the household. |