**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. |
| **Context – data** |  |
| **Method(s)** |  |
| **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 suggest intensive margin dominates, with earnings response mainly explained by fewer hours worked (= reduction in wage earnings).   * 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. * Estimates of wealth effects on married individuals’ labour supply underestimate the overall household labour supply response.   - Both winners and spouses reduce labour supply.  - But consistently find the winning spouse responds more strongly than nonwinning spouse.  - Inconsistent with unitary model that predicts exogenous unearned income is pooled within the household.   * Compared to other papers:   - Better representativeness.  - Explore large variation in gains and link it to administrative data: asses the effects of really  large amounts. |
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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.  - Complete random assignment of prizes within cells.  - Final data ranges from (1991 – 2010).  - ***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 > 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. |
| **Model(s)** | - 1/ Internal validity of underlying assumption = test that wealth is randomly assigned conditional on the fixed effects.  - Also include a vector of baseline control variables.  - 2/ External validity (representativity problem of the estilamtion): 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: comparing the two, lottery players do not differ in terms of income & marital status  - **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.  ­- Effect of lottery wealth on annual earnings is near immediate, modest (-1.5SEK for 100SEK won) in size and quite stable + 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 labour earning is mainly driven by reduction in ***wage earnings***  - Reduction in ***self-employ. income*** is significant at 10% but lower (at odds with previous findings) > but effect/mean is stronger compared to baseline.  - 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.  - Wealth effect on ***after-tax income*** = *taxable labour income* (labour earnings + U benefits + pension).  - Effect on taxable income < pre-tax earnings => because. positive effect on pension income and U benefits = offset reduction in labour earnings.  - Effect on after tax substantially smaller than on production value = reflection of extensive tax and transfer system.  ***2. Margins of Adjustment***  **# Extensive margin** (probability of participation in the Labour force)  Compute binary indicator of participating in the labour force (if annual income>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  - Relative effect compared to mean is similar though.  - 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)  Derive hours worked from wage earnings as different surveys do not cover the full sample.  - 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 (=w.h) between two components (w and h)  - Regress using three components of the wage earnings decomposition: between time t (t after lottery gain) and year previous lottery (-1).  - Five-year estimate indicates that reduction in hours worked mainly drives fall in wage earnings (80%).  - No evidence that wealth shock affects employer, workplace, occupation, industry, or location of work = 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).  - 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 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.  - Inconsistent with unitary model that predicts exogenous unearned income is pooled within the household. |