

Limited Asset
Market
Participation
and the
Elasticity of
Substitution

by Annette
Vissing-
Jørgensen
Journal of
Political
Economy
2002

Elasticity of
Intertemporal
Substitution

The Data and
Variables
Used

Limited Asset Market Participation and the Elasticity of Substitution

by Annette Vissing-Jørgensen
Journal of Political Economy 2002

Presented by Anastasia S. Zervou
for our Macro Group

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Introduction

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- Knowing how important role the interest rate have in people's intertemporal decisions is necessary for evaluating economic issues and policies, like the equity premium puzzle implications.
- Previous literature used loglinearized Euler equations based on Constant Relative Risk Aversion (CRRA) preferences to estimate the Elasticity of Intertemporal Substitution.
- Hall (1988) finds that EIS is very small and possible not different than zero. Attanasio and Weber (1993) find positive and significant numbers.
- This paper tries to re-examine the issue taking into account the fact of limited participation in asset markets.

EIS

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- EIS = Elasticity of $\frac{C_t}{C_{t+1}}$ with respect to the Marginal Rate of Substitution
- MRS between C_t and $C_{t+1} = \frac{U'_{C_t}}{U'_{C_{t+1}}}$
- Assume asset returns and next period C_{t+1} jointly conditionally lognormally distributed, then

$$EIS = \frac{dE_t(C_t/C_{t+1})}{dE_t(1 + R_{i,t})} \frac{1 + R_{i,t}}{C_t/C_{t+1}}$$

EIS

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- EIS tells me how much consumers change their expected consumption growth rate in response to changes in the expected return of assets held.
- This way of calculating the EIS is shown by Attanasio and Weber (1989) to approximately hold under the more general Epstein-Zin preferences.

Main Idea

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- There is no reason for expecting households which don't hold an asset to adjust their consumption in response to changes in the asset's return.
- If non-asset holders are included in estimations then there is a downward bias in EIS.
- This doesn't mean there is heterogeneity across consumers.
- It is just because some people don't hold assets that is why they don't react in asset rate changes.

Findings

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- Stockholders (NYSE return): $EIS \approx 0.3-0.4$ and significant
- Bondholders (T-bill): $EIS \approx 0.8-1$ and significant
- Values of EIS are higher for households having larger assets holdings
- Non-stockholders, Non-bondholders: EIS insignificantly different to zero

The Data

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- Consumer Expenditure Survey, 1980:1-1996:1
- In each quarter 5,000 households interviews
- Each household is interviewed 5 times, the one interview 3 months after the other, the first one not reported
- At each interview the household reports consumption of the previous 3 months
- Financial information collected at the last interview

Asset Holding Variables

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Categories: "stocks, bonds, mutual funds and other such securities", "US savings bonds", "saving accounts" and "checking accounts"

- Separate stock holders from non-stock holders and bond holders from non-bond holders:
 - Stock holders: "stocks, bonds, mutual funds and other such securities": 21.75 percent of households
 - Bonds holders: "stocks, bonds, mutual funds and other such securities" or "US savings bonds": 31.40 percent of households
- Three layers of each category:
 - Stock holders: A) \$2- \$3,587 B) \$3,587 - \$20,264 C) more than \$20,264, in real 84 dollars
 - Bond holders: A) \$2- \$867 B) \$967 - \$9,881 C) more than \$9,881

Consumption Variable

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Semiannual consumption growth rates of non-durables,
excluding housing, medical care cost and education cost,
deflated with BLS deflator =

$$\frac{C_{m+6} + C_{m+7} + C_{m+8} + C_{m+9} + C_{m+10} + C_{m+11}}{C_m + C_{m+1} + C_{m+2} + C_{m+3} + C_{m+4} + C_{m+5}}$$

Asset Returns Variable

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- Stock Returns: Semiannual real gross returns based on value-weighted NYSE =
$$(1 + R_{m+2})(1 + R_{m+3})\dots(1 + R_{m+7})$$
- Riskless returns: Semiannual returns based on monthly T-bill returns

Instrumental Variables

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- $\log(\text{dividend-price ratio})$
- $\log(\text{real value-weighted NYSE return})$ lagged
- $\log(\text{real T-bill return})$ lagged
- government bond horizon premium lagged
- corporate bond default premium lagged

where government bond horizon premium =

$$\frac{1 + R_t^{\text{long-term-gov}' t\text{-bond}}}{1 + R_t^{\text{short-term-gov}' t\text{-bond}}}$$

and corporate bond default premium = $\frac{1 + R_t^{\text{long-term-corporate-bonds}}}{1 + R_t^{\text{long-term-gov}' t\text{-bond}}}$

Estimation

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$$\frac{1}{H_t^s} \sum_{h=1}^{H_t^s} \Delta \ln C_{t+1}^{h,s} = \sigma^s \ln(1 + R_{s,t}) + \delta_1^s D_1 + \delta_2^s D_2 + \dots + \delta_{12}^s D_{12}$$

$$+ \alpha^s \frac{1}{H_t^s} \sum_{h=1}^{H_t^s} \Delta \ln(\text{familysize})_{t+1}^{h,s} + u_{t+1}^s$$

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where

- H_t^S is the number of stockholders in the cross section at date t , which denotes six-month periods
- $\Delta \ln C_{t+1}^{h,s} = \ln\left(\frac{C_{t+1}^{h,s}}{C_t^{h,s}}\right)$ and $\frac{1}{H_t^S} \sum_{h=1}^{H_t^S} \Delta \ln C_{t+1}^{h,s}$ is the average of all semiannual log consumption growth of stockholders
- σ is the Elasticity of Intertemporal Substitution
- $D_1 \dots D_{12}$ are seasonal dummies
- $R_{s,t}$ are the real net stock returns (calculated by multiplying six months returns)

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The method used is GMM taking into account:

- $MA(5)$ error terms, because of partially overlapping time periods
- Heteroskedasticity of arbitrary form because of varying number of observations each period
- IV's because $1 + R_{s,t}$ includes multiple months' returns and u_{t+1}^s is $MA(5)$
- Test for overidentification restrictions to hold

Results

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TABLE 2
GMM ESTIMATION OF LOG-LINEARIZED EULER EQUATIONS: REAL TREASURY BILL RETURN AND REAL VALUE-WEIGHTED NYSE RETURN,
SEPARATE ESTIMATIONS (CEX, 1982-96, Semiannual Data)

	INSTRUMENT SET 1		INSTRUMENT SET 2		INSTRUMENT SET 3			
	$\hat{\sigma}$	Wald Test Equals σ	$\hat{\sigma}$	Overidentification Test	Wald Test Equals σ	$\hat{\sigma}$	Overidentification Test	Wald Test Equals σ
A. Euler Equation for Stocks								
1. All Household Sizes								
All	.098 (.071)		.066 (.062)	.086		.068 (.059)	.314	
Stockholders	.299 (.146)		.281 (.114)	.260		.200 (.091)	.018	
Nonstockholders	.057 (.079)		.017 (.070)	.048		.049 (.070)	.568	
Bottom layer	.046 (.186)		-.054 (.163)	.570		.052 (.158)	.828	
Middle layer	.175 (.274)		.350 (.207)	.547		.173 (.261)	.027	
Top layer	.486 (.325)		.417 (.235)	.203		.292 (.188)	.027	
Nonstockholders vs. stockholders		3.255 (.071)			4.340 (.037)			3.296 (.069)
Nonstockholders vs. top layer		2.146 (.143)			2.378 (.123)			2.941 (.086)
2. Single-Individual Households								
All	.202 (.172)		-.008 (.106)	.025		.261 (.139)	.439	
Stockholders	.698 (.496)		.323 (.264)	.005		.681 (.326)	.969	

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Nonstockholders	.077 (.143)	-.115 (.137)	.071	.160 (.123)	.250
Nonstockholders vs. stockholders	1.733 (.188)			1.958 (.162)	3.866 (.049)
B. Euler Equation for Treasury Bills					
1. All Household Sizes					
All	.372 (.232)	.362 (.225)	.097	.264 (.220)	.143
Bondholders	.932 (.368)	.839 (.360)	.215	.783 (.353)	.147
Nonbondholders	.105 (.270)	.087 (.257)	.024	.005 (.244)	.382
Bottom layer	.986 (.662)	.798 (.612)	.492	.726 (.580)	.244
Middle layer	.287 (.550)	.336 (.544)	.476	.277 (.523)	.627
Top layer	1.648 (.515)	1.672 (.505)	.356	1.530 (.505)	.067
Nonbondholders vs. bondholders	4.029 (.045)			3.192 (.074)	4.127 (.042)
Nonbondholders vs. top layer	8.055 (.005)			8.905 (.003)	7.871 (.005)
2. Single-Individual Households					
All	.681 (.456)	.524 (.450)	.032	.282 (.411)	.053

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Bondholders	2.624 (.885)	2.759 (.880)	.163	1.617 (.824)	.007
Nonbondholders	.048 (.479)	-.028 (.475)	.039	-.105 (.460)	.103
Nonbondholders vs. bondholders	8.371 (.004)			7.527 (.006)	4.722 (.030)

NOTE.—Numbers in parentheses are standard errors for $\hat{\sigma}$ and p -values for the Wald test. For the overidentification test, the entries are p -values, and the test has two degrees of freedom for each of instrument sets 2 and 3. Twelve monthly dummies are included as explanatory variables and instruments. The estimations for all household sizes furthermore include $\Delta \ln(\text{family size})$ as an explanatory variable and instrument. In addition the instrument sets include the following variables. Instrument set 1: log dividend-price ratio. Instrument set 2: log dividend-price ratio, lagged log real value-weighted NYSE return, and lagged log real Treasury bill return. Instrument set 3: log dividend-price ratio, default premium, and bond horizon premium.

Conclusion

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- Estimates of EIS differ across asset holders and non-asset holders
- Estimates are high and significant for bondholders and stockholders, while there are small and insignificant for non-asset holders.
- There are some problems with overidentifying restriction not holding for stockholders which might implies misspecification.