A Canonical Correlation Analysis of Financial Risk-Taking by Australian Households

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Abstract

This paper examines the relationships between a range of alternative proxies commonly used to represent financial risk-taking, including self-reported risk-taking attitude and direct stock and business ownership, and a set of personal attributes, including age, education, sex, household structure, household income, and net assets. This allows us to throw light on the complex interrelationships between financial risk-taking attitudes and behavior, the purported socioeconomic and demographic determinants of risk-taking attitudes, and some specification issues that commonly apply in this area of research.

Literature Review

An individual's aptitude for financial risk-taking is inherently unobservable. Consequently, some studies infer risk tolerance from the holding of risky assets, including equities (Paas, Bijmolt, & Vermunt 2007; Wang & Hanna 2007), or engaging in business ownership, as entrepreneurial activity typically involves making risky decisions (Polkovnichenko 2005; Yao, Hanna, & Lindamood 2004). Yet others utilize household survey panel data that include questions on self-reported individual attitudes to financial risk (including the US Survey of Consumer Finances, German Socioeconomic Panel, and the Australian HILDA Survey).

For the most part, lifecycle factors, such as age, income, education, and wealth, feature prominently in the literature as determinants of financial risk-taking or risk aversion. Most studies typically find that at the higher bounds of wealth, individuals tolerate higher levels of risk; whereas, at the lower bound, individuals with negligible wealth tolerate only lower financial risk (Riley & Chow 1992).

Generally, most studies also find that risk aversion tends to increase with age up until about 65 years and thereafter decreases (Olivares, Diaz, & Besser 2008; Yao & Curl 2011), possibly because of income uncertainty surrounding retirement and health expenses. Income and education are also generally positively associated with financial risk-taking. This is because higher incomes lead to greater disposable income and higher financial literacy because of the learning required to make long-term decisions enabled by employment and earnings, and higher levels of education may lead individuals to acquire skills in gathering and processing information about financial markets (Jianakoplos & Bernasek 2008; Lusardi & Mitchell 2007). Lastly, anecdotal evidence of the relationship between risk aversion and gender suggests that women are more risk averse than men.

Overall, there is limited work of this type in Australia, with Jefferson and Ong (2010) and Austen, Jefferson and Ong (2010) being exceptions. Most recently, West and Worthington (2012) use data from the HILDA survey and find that having a bachelor's degree or higher, being self-employed, being in very good or excellent health, and having net wealth in excess of $1 million suggest an increased likelihood of risk tolerance. Conversely, a higher likelihood of risk aversion is associated with being young, having an educational qualification of Year 11 or lower, being female, having children in the household, and being in the lowest net wealth category.

Method

The use of canonical correlation analysis is appropriate as it aims to identify any latent linear relationships between individual financial risk-taking and demographic and socioeconomic characteristics.

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The set of dependent variables that contribute to a composite measure (called a canonical variate) on financial risk-taking are identified from the literature and include the response to an attitudinal question on financial risk-taking, whether they have a positive value in direct equity investments, and whether they have a positive value for business assets. We also identify the set of personal attributes that contribute to the composite measure using the literature and include age, education, sex, household structure, household income, and net assets.
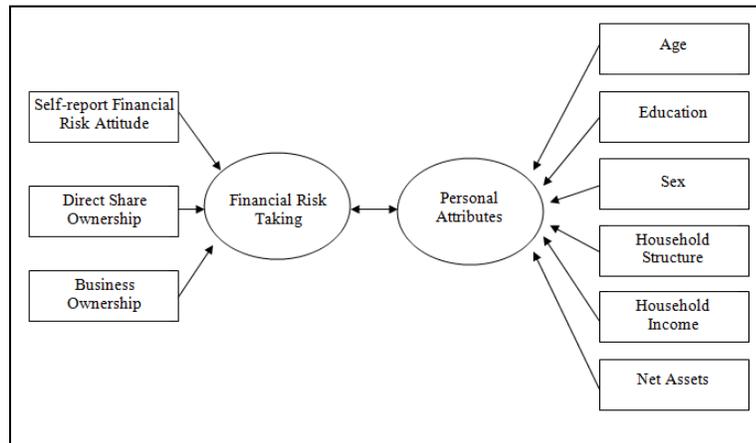
Figure 1. Canonical Relationship between Financial Risk-Taking and Personal Attributes

Figure 1 depicts the canonical model. In general, canonical correlation is more suitable here than multiple regression as it is capable of handling more than a single dependent variable. In addition, as canonical correlation assesses the relationships between two sets of variables rather than separate relationships for each dependent variable, it better allows for the complexity of human behavior and reduces the probability of committing statistical errors. We use a balanced panel of respondents randomly sampled from the 11,698 respondents in the 2010 HILDA Survey. The random sampling allows us to overcome the problem of very large samples having the tendency to indicate statistical significance in all cases.

Findings

Table 1 contains the canonical loadings for the dependent and independent variates for only the first canonical function. In the first dependent variate, the three variables have loadings equal to or exceeding 0.60, indicating a strong degree of intercorrelation among the three variables, suggesting that all three measures are strongly representative of financial risk-taking. However, the ranking of the average share of canonical loading indicates that direct share ownership followed by self-reported risk attitude are the best and second-best indicators of financial risk-taking attitudes.

The first set of independent variates display quite a different pattern, with three negative loadings and three positive loadings, ranging from -0.417 to 0.868. The extraction of the variates in canonical correlation is to maximize the predictive objectives, so it is not surprising that the three variables with the highest loading are net assets (0.868), household income (0.514) and education (0.469), as increases in these variables are recognized in the literature to contribute most to financial risk-taking. Similarly, the negative loadings are consistent with the literature, in that increasing age (-0.111), being female (-0.085), and having children or being in a lone person household (-0.417) contribute to an aversion to financial risk-taking. Interestingly, age and gender each only account for less than one percent of the observed variation in financial risk-taking attitudes.

Table 2 includes the cross-loadings for the three canonical functions. The cross-loadings involve correlating each of the original observed dependent variables directly with the independent variable, and vice versa. For the first canonical function, we can see that the three dependent variables exhibit a moderate correlation with the independent canonical variate: 0.343, 0.381, and 0.335 respectively. By squaring these terms, we find the percentage of the variance for each of the variables explained by the others. The results show that 11.8 percent of the variance in self-reported financial risk-taking, 14.5

percent of direct share ownership, and 11.2 percent of business ownership is explained by the first function.

In terms of the independent variables cross-loadings, we can see that net assets have a moderate correlation of 0.485 with the dependent canonical variate, followed by household income (0.287) and education (0.262). From the squared cross-loadings, we can see that approximately 24 percent of the variance in net assets is explained by the dependent variate. Age, sex and household structure display an inverse relationship with the function (-0.062, -0.047 and -0.233 respectively).

Table 1

Calculation of the Redundancy Indices for the Canonical Functions

Variate/Variables	Canonical Loading	Canonical Loading Squared	Average Share of Loading	Rank in Loading Share	Canonical R^2	Redundancy Index
Dependent variables						
Self-reported	0.615	0.378	31.4%	2		
Direct share ownership	0.683	0.467	38.8%	1		
Business ownership	0.600	0.360	29.9%	3		
Dependent variate		1.205			0.311	0.125
Independent variables						
Age	-0.111	0.012	0.8%	5		
Education	0.469	0.220	15.4%	3		
Sex	-0.085	0.007	0.5%	6		
Household structure	-0.417	0.174	12.2%	4		
Household income	0.514	0.264	18.4%	2		
Net assets	0.868	0.754	52.7%	1		
Independent variate		1.432			0.311	0.074

Table 2

Canonical Cross-Loadings

Parameter	Function	Function Cross-Loading Squared
Correlations between the independent variables and dependent canonical variates		
Self-reported financial risk-taking	0.343	0.118
Direct share ownership	0.381	0.145
Business ownership	0.335	0.112
Correlations between dependent variables and independent canonical variates		
Age	-0.062	0.004
Education	0.262	0.068
Sex	-0.047	0.002
Household structure	-0.233	0.054
Household income	0.287	0.082
Net assets	0.485	0.235

Implications

This is important work for a number of reasons, all of which depend on the degree of financial risk aversion prevailing in the population and its impact on the investment decisions of households. Consider, for example, the ongoing retirement of Australia's baby boomers and concerns about the extent to which mature-age Australians have the capacity for financial self-reliance during retirement. In part, this capacity is a function of the investment decisions made by these households, which in turn depend on the tolerance households have for financial risk. As shown, older Australians are more averse to risk, and this will necessarily limit the options available for increasing wealth later as against earlier in the lifecycle. Likewise, education (as a proxy for financial literacy), gender, and household structure are also key determinants of risk-taking attitudes, and these will exert a major impact on wealth outcomes. These have important implications for retirement incomes policy in Australia.

Nevertheless, while age and gender are common in extant analyses of financial risk-taking, our results indicate that their impact is only very minor, and certainly less than that arising from education, income, and net assets. This suggests that the policy focus of previous research on differences in age and gender may be misdirected and that differences in education, household income, and net assets (likely to vary by age and gender) actually explain the variation in risk-taking attitudes. The study also provides guidance on the specification of variables proxying financial risk-taking in future research in this area. Reassuringly, while there is a high degree of correspondence between the measures indicating financial risk-taking, it also suggests that actual behavior, in this case, direct share ownership, is a better indicator than the self-reporting of individual attitudes. Lastly, this study complements existing research on the changes to financial risk tolerance in other countries and provides valuable insights into financial education and investment advice in Australia.

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