



Financial literacy and participation in the derivatives markets[☆]



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ABSTRACT

We set out in this study to determine whether individuals with higher levels of financial literacy are more likely to be active participants in the derivatives markets. Our empirical results, based upon an official National Survey undertaken by the Financial Supervisory Commission of Taiwan, reveal that even after controlling for stock market participation rates, financial literacy represents a significant benefit to individuals since it helps them to lower the entry barriers to purchasing complex derivatives products. We also find that household wealth, gender, residential location and diverse sources of information have significant effects on participation rates in the derivatives markets. Furthermore, when taking into consideration issues of accessibility or measurement error, the positive effects of financial literacy on derivatives market participation are found to remain largely unchanged.

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1. Introduction

When compared to the wealth of studies on stock market participation within the extant literature,¹ there appears to have been considerably less focus placed on the determinants of household participation in complex derivatives markets, which are almost never redundant assets for individuals. The main research question pursued in this study represents an important issue for policymakers and government officials alike, since it has been argued that an increase in the use of derivatives transactions among individuals for hedging and diversification purposes will lead to a corresponding increase in social welfare (Stout, 2011).

Another important benefit of derivatives markets for an economy is that these markets incorporate information into asset prices much more quickly and efficiently; for instance, when it is difficult to engage in the short selling of stocks, individuals can choose to purchase put options in order to take advantage of adverse information relating to stock prices, ultimately leading to the markets becoming more efficient and preventing a slowdown in the

speed of information transmission.² In other words, with a better understanding of the determinants of participation by individuals in derivatives trading, it may be possible to identify the necessary policy recommendations for promoting improved informational efficiency within the market, ultimately resulting in enhanced social welfare. Furthermore, as documented by Calvet et al. (2004), the introduction of non-redundant derivatives products encourages people to participate in financial markets for hedging and diversification purposes, thereby leading to lower risk premia through a reduction in the covariance between dividends and consumption by participants.

Given the importance of gaining a good understanding of the participation by individuals in the derivatives markets, our aim in this study is to contribute to the extant literature by investigating whether the financial literacy of individuals plays a key role in their participation in the derivatives markets, since financial literacy is seen as an important determinant of the ability of individuals to process economic information and make a series of complex financial decisions.³ As general consumers are presumed to have quite limited knowledge and ability with regard to investment in complex derivatives products – which can be viewed as an indi-

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¹ See Mankiw and Zeldes (1991), Blume and Zeldes (1994), Haliassos and Bertaut (1995), Bertaut and Starr (2000), Attanasio et al. (2002), Brav et al. (2002), Guiso et al. (2003), Vissing-Jorgensen (2003), Guiso and Jappelli (2005), Guiso et al. (2008), Cardak and Wilkins (2009) and Bricker et al. (2011).

² Theoretically, if it is difficult to take up short positions in stocks, then the issuer/seller of a put option (typically a large securities firm) would quote prices reflecting this difficulty, essentially because this firm may have to hedge its options exposure; thus, given the difficulty in shorting the underlying share, the put option may not be so “cheap” for the buyer.

³ Examples include Cole et al. (2011), Jappelli and Padula (2013), Calcagno and Monticone (2015), Jappelli and Padula (2015) and Finke et al. (2016).

rect participation cost – this factor potentially explains their non-participation in such markets. We therefore hypothesize that financial literacy will help to lower entry barriers, thereby enabling individuals to participate more readily in complex derivatives markets.

There has been a distinct lack of research effort placed into the relationship between financial literacy and trading by individuals in leveraged derivatives products. Complex derivatives products create high entry barriers, such that individuals with lower financial literacy will find it difficult to participate in, and benefit from, the use of derivatives for the purpose of hedging financial risks; for instance, individuals with lower levels of financial literacy are less likely to use VIX derivatives (such as VIX futures and VIX options) as a hedging instrument against market volatility.^{4,5} Taking put options as another example, in cases where it is difficult to engage in the short selling of stocks, individuals with lower levels of financial literacy are less likely to possess knowledge on the use of put options as a means of realizing public information on poor firm performance.

We apply Taiwanese data for our study of the relationship between financial literacy and derivatives market participation, essentially because the market for derivatives products is actively traded in Taiwan and is considered to be a relatively diverse market in the emerging markets as it provides individuals with an extensive choice of investment opportunities. For example, whilst index options contracts in Taiwan are ranked in fifth place on a global scale, of the 78 derivatives exchanges reported to the Futures Industries Association, the Taiwan Futures Exchange was ranked nineteenth.⁶ Taiwan also has a huge market size in the asset and wealth management industry (US\$ 160 billion in 2016).

We use a unique sample dataset obtained from a nationwide survey carried out by the Financial Supervisory Commission of Taiwan (FSC) to construct a measure of financial literacy relating to investments, risk management and derivatives.⁷ We then go on to test whether individuals with higher levels of financial literacy tend to participate more actively in the derivatives markets than individuals with lower levels of financial literacy.⁸ In other words, given that financial literacy can be viewed as a type of indirect information cost that is incurred when participating in derivatives trading, we investigate whether improving the financial literacy levels of individuals can enhance such participation.

We use a list of eight questions relating to investments, risk management and derivatives usage to assess individual financial literacy levels, since this construction methodology enables us to measure certain aspects of financial knowledge closely relating to derivatives products. We adopt the derivatives purchase experiences of individuals as the dependent variable, whilst the set of

explanatory variables used in the regression analyses comprises of financial literacy, the level of willingness to take investment risk, the household wealth of individuals, various information sources and specific information categories of interest, along with socio-demographic controls (age, gender, education level, marital status, occupational status, residential location and individual income).

Our regression results, which reveal significant and increasing relationships between financial literacy and derivatives market participation, provide support for the argument that complex derivatives products impose high entry barriers on individuals, with such individuals requiring relatively high financial literacy levels to overcome these barriers and participate in the derivatives markets. In order to control for the degree of accessibility to the derivatives markets, we carried out logistic regression analyses on subsamples in which the respondents had at least a financial advisor or experience in opening a brokerage account.

We also investigated the effect of financial literacy on derivatives market participation, conditional on the stock market participation experience of individuals being taken into consideration, by specifying a bivariate probit model. Alternative measures of financial literacy were also constructed for the regression analyses using a set of 37 questions covering the categories of 'cash management and savings', 'credit and loan management', 'financial and investment planning' and 'insurance and risk prevention'. Overall, the conclusions drawn from our empirical analysis remained unchanged.

A common view within the related literature is that derivatives provide individuals with instruments for the management of financial risks, whilst individual investors can also achieve payoffs from derivatives which they would otherwise be unable to achieve without considerable difficulty.^{9,10} In other words, derivatives make the markets more complete, with the end result being that the economy is more productive and social welfare is higher. Our empirical results show that individuals with higher levels of financial literacy are more likely to enjoy the benefits of derivatives usage.

The remainder of this paper is organized as follows. A review of the related literature is provided in Section 2, followed in Section 3 by a description of the survey dataset and variable construction. The empirical results – and subsequent checks for their robustness – are presented in Section 4. Finally, the conclusions drawn from this study are presented in Section 5.

2. Literature review and hypothesis development

Given that the lack of participation by individuals in the stock markets has been shown to impose significant welfare losses on an economy,¹¹ numerous attempts have been made in the prior related studies to determine why it is that, even when considering indirect investments, only small numbers of individuals are found to actively participate in stock market trading.¹² For example, using US survey data on consumer finances, Haliassos and Bertaut (1995) suggested that two promising explanations for non-participation were inertia and a departure from expected-utility

⁴ The underlying asset of VIX derivatives is the CBOE volatility index (VIX) which is also referred to as the 'investor fear gauge'. The CBOE VIX is compiled using the market prices of S&P 500 index options, with the primary aim of providing the market with a measure of expected volatility in the S&P 500 index over the subsequent 30-day period.

⁵ Although it is also possible to trade volatility using options trading strategies, such as straddles and strangles, these strategies are not pure instruments of volatility trading as their profits/losses are affected by changes in both volatility and the underlying asset price.

⁶ At the end of 2016, the total trading volume in the Taiwan Futures Exchange was more than 240 million contracts, with average daily trading volume in excess of 0.99 million contracts. Furthermore, more than 1.6 million individuals had trading accounts in the Taiwan Futures Exchange by the end of 2016.

⁷ The Financial Supervisory Commission, which is subordinate to the Executive Yuan of Taiwan, is an independent government agency responsible for maintaining stability in Taiwan's financial markets and regulating accounting, securities and futures, banking and insurance. This organization is similar to the Securities and Exchange Commission (SEC) in the US.

⁸ We greatly appreciate the reviewer's suggestion to measure certain aspects of financial literacy.

⁹ The development of the Black and Scholes (1973) formula has changed derivatives trading over the past four decades, such that the derivatives markets have experienced exponential growth, both in the total number of underlying assets and in their trading volume.

¹⁰ Even if individuals were able to achieve payoffs from derivatives, they would undoubtedly be achieved at a much greater cost.

¹¹ See, for example, Cocco et al. (2005).

¹² The participation rates by individuals in the stock market are lower than the expected participation rates predicted by the traditional asset pricing models, such as the 'consumption capital asset pricing model'; indeed, several studies have shown that less than a quarter of US households own or invest in individual company shares; see Crockett and Friend (1963), Blume, Crockett and Friend (1974), Blume and Friend (1978), King and Leape (1987), Mankiw and Zeldes (1991) and Haliassos and Bertaut (1995).

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