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Hedging efficiency in the Greek options market before and after the financial crisis of 2008

Mark B. Shackleton^{a,1}, Nikolaos Voukelatos^{b,*}

^a Department of Accounting and Finance, Lancaster University, Lancaster LA1 4YW, UK

^b Kent Business School, University of Kent, Canterbury CT2 7PE, UK

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ABSTRACT

Abstract This study examines the hedging effectiveness of the emerging Greek options market before and after the financial crisis of 2008. We test the hypothesis of market efficiency by analyzing violations of FTSE/ASE-20 index option returns with respect to standard option theory, estimating option risk-premia, and testing the statistical significance of the returns to delta and delta-vega neutral straddles. Our empirical results suggest that, despite a certain level of mispricing, the Athens Derivatives Exchange maintained a relative level of efficiency before 2008. However, the economic crisis has had a significant impact on the Greek options market, as evidenced by more pronounced violations of theoretical predictions observed in option returns and risk-premia. These findings have direct implications for the risk management of international portfolios, since the feasibility and effectiveness of hedging exposure in Greek investments is found to have declined precisely when it is needed the most.

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1. Introduction

One of the principal functions of derivatives markets is to facilitate hedging and risk management activities by trading contracts the prices and payoffs of which are contingent on the price path of the underlying asset. Options markets, in particular, provide a low-capital way for firms to manage their

* Corresponding author. Tel.: +44 0 1227827705; fax: +44 0 1227761187.

E-mail addresses: m.shackleton@lancs.ac.uk (M.B. Shackleton), n.voukelatos@kent.ac.uk (N. Voukelatos).

¹ Tel.: +44 0 1524594131; fax: +44 0 1524847321.

risk exposure, while options' payoff functions also allow for a higher level of flexibility compared to forward or futures contracts. However, although in theory options constitute ideal hedging instruments, their actual efficiency in risk management or speculative investment strategies will ultimately depend on the efficiency of the market in which they are traded.

The increased and continuously changing risks that firms are exposed to post-2008 have highlighted the importance of efficient options markets in dynamic short-term hedging portfolios. The motivation for this study stems from this growing importance of options markets with respect to managing risk exposure and gauging markets' expectations in a turbulent economic environment. In addition, the extent to which the financial crisis of 2008 has affected Greece in particular suggests that the task of multinational firms hedging exposure to investments in the Greek market constitutes an even greater challenge still.

This study examines the efficiency of the Athens Derivatives Exchange (ADEX) in Greece. We focus on one of the main definitions of market efficiency, namely that option prices reflect 'true' asset values which do not offer returns that deviate from those justified by their risk exposure. To this end, we examine the returns of individual options as well as those of option strategies which are, under model assumptions, risk-immune. Throughout our analysis, the emphasis is on detecting potential violations of basic option pricing theory which, if present, would allow for arbitrage in ADEX and, more importantly, limit the ability of multinational and domestic investors to hedge their exposure to investments in Greece.

The significant enlargement of the European Union during the past decade, and the substantial amounts of Foreign Direct Investment towards its developing members, have generated an increasing interest in emerging European markets. The literature so far has mainly focused on the role of emerging equity markets in international portfolio allocation and the potential benefits of diversification (see for instance Syriopoulos, 2004, 2011; Voronkova, 2004), and to a lesser extent on the hedging effectiveness of futures markets (e.g. Kenourgios, 2005; Lafuente and Novales, 2003). However, the efficiency of emerging options markets and their use in international portfolio hedging strategies has received little attention.

The effectiveness of options as hedging instruments directly depends on the extent to which option prices conform to a set of theoretical properties. Coval and Shumway (2001) demonstrate that, under a set of realistic assumptions, option returns must be increasing in strike price, while calls should earn a return in excess of that of the underlying asset and put returns should be below the risk-free rate. Although Coval and Shumway (2001) document that options written on the S&P 500 index are indeed consistent with the above theoretical predictions, Ni (2009) and Driessen and Maenhout (2006) find that these properties are not supported for options written on S&P 500 individual stocks and calls written on the FTSE 100 index, respectively. Furthermore, Bakshi et al. (2000) report several violations with respect to the theoretical prediction of calls (puts) moving in the same (opposite) direction as the underlying asset in the case of S&P 500 options.

In addition, since options are risky assets, standard capital asset pricing theory predicts that they should earn a risk-premium related to their systematic risk. However, empirical evidence on the ability of the Capital Asset Pricing Model (CAPM) and the Black and Scholes (1973) option pricing model to explain options' risk-premia has been less than conclusive. For instance, Coval and Shumway (2001) suggest that option returns do not appear to vary linearly with their respective market betas, indicating that omitted factors are potentially priced, a finding that is disputed by Broadie et al. (2009) for a sample of deep out-of-the-money (OTM) S&P 500 puts. Furthermore, Jones (2006) reports that idiosyncratic variance alone cannot fully explain short-term put returns, suggesting that a multi-factor model is necessary to understand risk-premia associated with options, while Broadie et al. (2009) find that at-the-money (ATM) put and straddle returns appear to be consistent with jump models.

The effectiveness of options markets in risk management activities can be further evaluated by examining the returns of option portfolios that are constructed to be theoretically immune to risk. For instance, Liu (2007) examines hedging effectiveness in the UK and finds that the hypothesis of risk-immune option portfolios (delta and delta-vega neutral straddles) earning the risk-free rate is supported for ATM and in-the-money (ITM) portfolios, but OTM straddles on the FTSE 100 appear to earn significantly negative returns, potentially as a result of delta and vega neutrality not being maintained throughout the straddles' holding period. We adopt a similar methodology as part of our

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