A model for international capital markets closure in an economy with incomplete markets and short sales

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ARTICLE INFO

ABSTRACT

Using a two-country dynamic optimization model, we investigate the impact of exchange risk, incomplete information and short sales constraints on international portfolio decisions around market closure. Using optimal control theory, we provide solutions and simulation results. Our model can be applied to solve several problems in financial economics in the presence of market closure, information asymmetry and short sales constraints.

1. Introduction

The international economic environment is characterized by a partial segmentation of capital markets for investors and/or agency costs and short selling constraints. Several reasons explain periodic trading demand shifts at the open and the close of the trading in financial markets around market closure. The inability to trade affects the optimal portfolios of investors. Therefore, information and short sales constraints play a central role in explaining the high demand to trade at market closure.

Wu, Li and Wei (1996a) extend Merton's (1987) model to account for heterogeneous expectations and short sale restrictions in the decision process for capital allocation. They show that the equilibrium asset returns are affected by information costs, short selling constraints and divergent beliefs. The analysis shows that the dispersion in beliefs increases the shadow costs of incomplete information as well as market inefficiency.

Wu, Li and Wei, (1996a) find that short sale restrictions mitigate the inefficiency of the market portfolio due to divergent beliefs. This is because short sales can reduce the opportunity cost of ignorance. The shadow cost includes two components. The first component is the product of pure information cost due to imperfect knowledge and heterogeneous expectations. The second component represents the additional cost caused by the short-selling constraint. The shadow cost associated with the short-selling constraint should come into the picture even in the case of homogeneous beliefs due to the difference

in investor j's information set. In the case of divergent beliefs, the shadow cost of short sales would not be the same for all investors. Short-sale restrictions increase the likelihood that an investor will not devote the resources to become informed about a security. This tends to lower the expected payoff from acquiring the information about a security.

Short-sale constraints affect investors' use of information in financial markets. Investors who face short-sale constraints may not be able to trade based on their private information, so asset prices will not fully reflect their views. Theoretical models based on short-sale constraints examine the effects of these constraints on information use by market participants. They study the implications for investment decisions and equilibrium prices. Short-sale constraints affect investors' use of information in their investment decisions, as well as their incentives to acquire information. For example, an important short-sale constraint is to prevent investors, such as mutual fund and pension fund managers from short-selling.

The traditional single-asset literature on information and securities markets (e.g., Grossman and Stiglitz (1976, 1980), Kyle (1985)) suggests another reason for non-zero holdings: uninformed investors may take non-zero positions since there is a benefit to trading as a contrarian to price to absorb the trades made by noise/liquidity traders.

A leading theory of capital market trading and pricing contends that investors refrain from participating in the market for stocks for which it is too costly to acquire information, resulting in a risk premium for

stocks in which participation is low. Hirshleifer et al. (2015) show that in rational settings with asymmetric information, neither implication obtains even in weakened or approximate form. Uninformed investors hold a risk- adjusted market portfolio, they do not have negligible holdings of assets they know little about, they do not eschew assets they have never heard of, and there is no risk premium for nonparticipation. Furthermore, in contrast with theories of information risk, there is no risk premium for information asymmetry.

Nezafat et al. (2015) develop a model of information acquisition and portfolio choice under short-sale constraints. They show that short-sale constraints reduce information acquisition. They show that both the constraints on short-selling and the reduced information acquisition affect investment decisions. The effects of short-sale constraints on investment decisions and asset prices are driven largely by the effects on information acquisition. These effects vary depending on the return and risk characteristics of the risky assets. The model offers explanations for the level and distribution of short interest, the relation between short-selling and stock returns. Their model provides new predictions on the asset pricing implications of short-sale constraints. Azman-Saini et al. (2010) study foreign direct investment and provide the international evidence. Beber and Pagano (2013) study short-selling bans around the world global financial crisis. Boehmer and Wu (2013a) analyse short selling and the price discovery process. Boehmer, Jones and Zhang (2013b) investigate shackling short sellers around the 2008 shorting ban.

Verona (2014) shows that information costs make investment lumpy at the micro level, even in the absence of non-convex adjustment costs. When collecting information is costly, the firm optimally chooses to do it sporadically and to be inactive most of the time.

Brock and Kleidon (1992) develop a simple model of market closure with perfect information. Bellalah and Wu (2002) extend that model to account for the effects of incomplete information. However, to our knowledge, no model in the literature examines the international portfolio choice around closure of capital markets when investors face simultaneously information costs and short sales constraints. Those constraints are often observed in periods of high volatility and mainly around crisis and market closure. This is the main purpose of this paper to present a model that can help investors in their optimal portfolio choice, especially around turbulent periods.

We examine implications of the discontinuity in trading regimes as represented by the open and the close of capital markets in the presence of incomplete information and short sales constraints.

We develop a model for the periodic market closures at these points in time. For simplicity, we assume that information costs and short sales costs are exogenous. They are added to the expected return on a stock to compensate investors for the costs incurred to get informed about the securities.

The model can be extended to account for information costs but this would complicate the solution.

The dynamics of the underlying stocks assumed in this paper are also used in Bellalah and Wu (2002). We also model the short sales costs as in Bellalah et al., (2016).

This paper investigates the impact of information costs and short sales constraints at market closure for an investor who holds a portfolio with foreign and domestic stocks. The management of this international portfolio requires to solve a dynamic problem in the presence of exchange risk, market closure, incomplete information and short sales constraint.

Using a two-country dynamic optimization model, we investigate the impact of exchange risk, incomplete information and short sales constraints on international portfolio decisions.

This paper is organized as follows. Section 2 provides a model of international.

Investment and portfolio management under market closure, incomplete information, exchange rate risk and short sales. Section 3 develops a solution to the optimal portfolio problem for the general

case and the Iso-elastic utility function. Section 4 provides simulation results of the optimal solution as a function of information and short sales costs.

2. The model and the optimal portfolio strategy under incomplete information and short sales

International portfolio diversification depends on several factors. These factors include barriers due to the partial segmentation of international capital markets as a consequence of regulations, information considerations, transactions costs, short selling and unfamiliarity with foreign markets. The segmentation may leave some room for profitable international investments.

International portfolio diversification may be due to the effect of exchange risk on corporate international investment. Some authors argue that exchange risk can create a difference in the cost of capital of firms located in different currency zones, affecting hence the flow of international investment. The use of an exchange risk premium (or discount according to the context) may be justified by some deviations from purchasing power parity as well as international differences in consumption baskets.

Other explanations of international portfolio diversification are associated with the existence of national boundaries and for the geographic proximity.

There are several reasons explaining periodic trading demand shifts at the open and the close of the trading, most of which are based on the effect of the periodic inability to trade. The inability to trade modifies the optimal portfolios of investors. Investors engage expenses to collect, to analyze and to get informed about the domestic and foreign markets. Therefore, information may play a central role in explaining the high demand to trade at market closure. This situation fits well with Merton's model of capital market equilibrium with incomplete information, CAPMI. Merton (1987) assumes that investors hold only securities of which they are aware. This assumption is motivated by the observation that portfolios held by actual investors include only a small fraction of all available traded securities.

In Merton's model, the expected returns increase with systematic risk, firm -specific risk, and relative market value. The expected returns decrease with relative size of the firm's investor base, referred to in Merton's model as the degree of investor recognition. The model shows that an increase in the size of the firm's investor base will lower investors' expected return and, all else equal, will increase the market value of the firm's shares.

This paper studies some of the issues around market closure for an investor who holds a portfolio with foreign stocks and domestic stocks within a context of information uncertainty and short sale constraints. The portfolio is affected by exchange risk and market closure. The management of this international portfolio needs to solve a dynamic problem in the presence of market closure, exchange risk, asymmetric information and short sales. The investor is not allowed to modify the optimal proportions of his wealth during the close period. However, he can consume at a different rate in the closed period with comparison to the open period.

Using a two-country dynamic optimization model, we examine the effect of exchange risk and incomplete information on international portfolio management. We suppose that the economic environment is characterized by a partial segmentation of international capital markets for investors and or agency costs and short selling constraints.

Transaction costs can be added but this will complicates further the analysis.

Consider a two-country model where an investor holds stocks in the two countries: the domestic and the foreign country. The optimal investment proportions in his home and foreign stocks are dependent on market closure. Different explanations for the increased transactions demand at the open and the close of the stock exchange are proposed in the literature. The greater demand to trade at open and