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Modigliani-Miller Theorem and its implications on Romanian agricultural policies

Eugeniu Tudor, Ana Michaela Andrei, Adrian Bădescu, Irina Georgescu

Bucharest University of Economic Studies,
Department of Computer Science and Economic Cybernetics, Bucharest, Romania

Abstract

In this paper we propose and apply three models on statistical data of some Romanian farms, to verify the action of the Miller-Modigliani theorems: Mahagaonkar- Qiu procedures that test the effects of the capital structure on the market value of the firm and the effects of the financial leverage on the weighted average cost of capital; another econometric model which tests contemporaneous and delayed effects of total debts on the market value of the firm.
In order to apply Mahagaonkar- Qiu methodologies and, because of the fact that in Romanian farms there is a high heterogeneity from the point of view of the physical capital endowment and of the exploitation surfaces, we have to perform clustering analyses using artificial neural networks of Self-Organizing Maps type, based on five financial indicators of the firm.

1. Introduction

In the 50s, Franco Modigliani and Merton Miller were the first to systematically study the relationship between the value of the firm and its financial structure. Their theorem which appeared in 1958 is the corner stone of modern corporate finance. They assert that on a frictionless perfectly competitive market, it is irrelevant whether a firm finances the investments by issuance of shares or loan (issuance of bonds).

Modigliani and Miller (1958) prove there are insignificant connections between the financial leverage and the capital cost and in 1966 they prove that there is no evidence on the effects of leverage or dividend policy on the convex capital cost function. In fact, there are several situations when financial decisions influence the firm value. Modigliani and Miller (MM) tried to prove their theorem on energy industry datasets and they hardly found correspondences between the leverage and the capital cost. Davenport (1971) makes an empirical experiment on the

United Kingdom dataset, using three groups of industries: chemical industry, food industry and metal working industry. He finds out that the capital cost is independent of its structure.

Of course there is evidence against MM theorem. Weston (1963), Masulis (1980), Pinegar and Lease (1986), Lee (1987) show that the capital increases with the financial lever value. Miller (1988) states that he has hoped to solve the empirical problems, but he did not achieve much. In spite of some attempts to empirically prove MM theorem, Myers (2001) asserts that this is difficult to test on empirical data.

The financial lever (the ratio debt/stock or equity capital) may have positive or negative effects on the return of stocks, depending on the relation between the interest rate and the profitability rate of the firm (Travaglini 2002). Travaglini (2002) analyses the conditions in which the hypothesis on the irrelevance of the firm's financial structure on its value holds. Mahagaonkar and Qiu (2009) and Levati et al. (2012) make attempts to experimentally test MM theorem by means of general equilibrium theory. They aim to answer the question whether or not the capital structure influences the firm value. DeAngelo and Stulz (2013) enrich the MM model by including financially constrained parties and households which use liquid financial claims to have unrestricted access to capital. They prove that high leverage is optimal for banks when the households are willing to pay a premium to have immediate access to capital. Gersbach et al. (2013) prove that a macroeconomic version of MM 1 theorem holds if we impose minimum equity capital requirements. Adrian and Shin (2010) discuss the reasons for the procyclicality of the leverage, i.e. during booms the leverage is high and during crises it is low. They empirically prove in (Adrian and Shin 2013) that the intermediary leverage is negatively connected to the banks' value at risk. They also prove theoretically that in a contracting framework the leverage is procyclical.

We mention some applications of MM theorem. For a dataset of the USA Electric Utilities and Oil Companies, Mondher (2011) shows that the relation between leverage and firm value is influenced by the firm's payout ratio. Lee and Tu (2011) use MCDM techniques such as DEMATEL, ANP and VIKOR in order to make a hierarchy of the value of South Asian companies by means of MM theorem.

The main two MM theorems are:

MM Theorem 1: a. The market value of the firm is independent of its capital structure (the ratio Debt/Shares).
b. Since the interests are not taxed, if there is a tax on the revenue of the corporation with the taxation rate τ, the levered firm has a greater total revenue with τB the value of the fiscal benefit, where B is the value of debt.
MM Theorem 2: a. The dividend policy of the firm has no effect on consumption.
b. The market value of the firm is independent of its dividend policy.

The conclusion of several researchers of this theory is that these theorems are consequences of the no-arbitrage principle: if any investor may realize the same financial transactions as the firm does and at the same price, then the investor can annul the effects of financial policy of the firm, without having losses or risks.

Our objective is to empirically prove the validity of the MM1 and MM2 theorems by means of three models. The first two models are adaptations for small and medium-sized agricultural companies of Qiu and Mahagaonkar (2008) work and the third model approximates the delayed effect of the debts on the market value of the firm.

The paper is organized as follows: Section 1 is the introduction; Section 2 contains the models used to prove the action of the MM theorems; Section 3 debates clustering methods, Section 4 tackles an empirical approach and data analysis; Section 5 comprises results, main conclusions and topics for further research.

2. Models for proving the MM theorems action

In this section, we experiment three methodologies, two belonging to Qiu -Mahagaonkar (2008) and the other being proposed by Andrei et al. (2013). Qiu -Mahagaonkar methodology highlights the effects of capital structure on the value of the firm. The influence of the capital structure on the market value of the firm can be analyzed in two ways: the MM theorem and the U shape cost of capital. The Modigliani-Miller theorem states that the value of the firm is independent of the capital structure; whereas the U shape cost of capital implies that the cost of capital first decreases with the value of bonds (the credit value), and then increases after the ratio of bonds exceeds some threshold.

In order to prove one of the above theories, they use the linear mixed-effects regressions:

$$V_i = \nu + u_i + \beta_1 B_i + \beta_2 B_i^2 + \beta_3 t + \varepsilon_i \qquad (1)$$