Asset Pricing Model and Economic Activity of Firms

PITHAK SRISUKSAI
School of Economics,
Sukhothai Thammathirat Open University,
9/9 Changwattana Road, Pakkret District, Nonthaburi, 11120,
THAILAND

Abstract: - This study derives the asset pricing model by introducing the economic activity of firms in the business cycle model which explores the expected returns of stocks and sheds light on the equity premium risk. Such a model follows the discrete-time optimization to come up with the asset pricing model that includes the economic activity variable. The result shows that the considerable factors affecting the rate of stock returns at a time $t+1$ are the rate of time preference, the firm investment at a time $t+1$, the stock price, and the growth rate of private consumption at the time t. Therefore, the economic activity of firms influences the expected returns on stock in a positive direction. In contrast, the growth rate of consumption has the opposite impact on the expected rate of stock returns.

Key-Words: - Asset Pricing, Optimization, General Equilibrium, Bellman Equation, Euler Equation, Taylor Approximation

Received: May 4, 2023. Revised: August 5, 2023. Accepted: August 26, 2023. Published: September 26, 2023.

1 Introduction

The correlation between stock price and macroeconomic variables, especially aggregate consumption is still challenged for investment decision-making in the stock markets. Since the funds to be invested are expected to generate high returns later, they should be the remaining income from consumption or the savings from postponing consumption to the future. If households bring any funds to invest in the stock market, they expect that the stock price should be low at the time they buy, and it will rise at the time they sell. In other words, the asking price of the stock should be higher than the bid price of one to generate returns for investors. Investing in the stock market is important to households because they want to allocate scarce resources for smooth consumption over time. That is, increasing or decreasing in the current consumption will affect the future consumption. This is why all stocks have high returns during the period of extremely volatile consumption. On the other hand, they have low returns through low and smooth consumption, for instance, insurance. Moreover, the investment in the stock market is the loss of marginal utility from reducing the current consumption and buying equity stocks at current prices. It is similar to the expected benefit from the marginal utility of consumption on the conditional forecast that the next period’s consumption will increase from the future sale of the stocks. That's why each type of stock has different returns, i.e. any stocks, in good times and high consumption level, or less marginal utility of consumption, are therefore less desirable than stocks in bad times and a low level of consumption, or highly marginal utility as [1], [2], [3], [4]. Thus, the consumption in each period regularly affects the stock prices differently. In addition, there are several products for consumption in a good time which cause less useful stocks than ones in a bad time. This situation leads the stock prices during good times to be lower than another one. As a consequence, the expected returns in good times are always higher than the expected returns in bad times. In summary, the stock prices have different relations with consumption in each period. The existing challenge of micro-foundation of asset pricing is still the relationship between stock price and consumption in each period.

Table 1. Annual Equity Premium for Major Countries

Country	Period	Real Market Return (%)	Relatively Riskless Return (%)	Equity Premium (%)
U.S.	1889-2005	7.67	1.31	6.36
U.K.	1900-2005	7.4	1.3	6.1
Japan	1900-2005	9.3	-0.5	9.8
Germany	1900-2005	8.2	-0.9	9.1
France	1900-2005	6.1	-3.2	9.3
Sweden	1900-2005	10.1	2.1	8.0
Australia	1900-2005	9.2	0.7	8.5
India	1900-2004	12.6	1.3	11.3

Source: *[3], [5], [6]*.

Such correlation helps to examine the impact of aggregate consumption on stock returns. Furthermore, the current price of stock has an exactly inverse relationship with the expected return of a stock. Equally importantly, the effects of changes in aggregate consumption on changes in stock returns produce asset pricing and equity premium model. Table 1 documents the difference between the annual returns on risky assets and the annual returns on risk-free assets, which is particularly known as the equity risk premium. It is illustrated that the equity risk-premium of annual returns occurred in eight major stock exchanges over the last 105 years, which is a comparison between the annual return on the stock market of each country and the return on a relatively riskless security. This turns out that the excess returns to equity holdings of the Indian capital market were the highest premium at 11.3 percent, followed by Japan (9.8), France (9.3), Germany (9.1), Australia (8.5), Sweden (8.0), the U.S. (6.36), and the UK (6.1), respectively. Concerning Thailand's equity premium, the stock returns have been highly volatile over the last 25 years. That is, it had positive monthly returns in some periods; in turn, it showed negative value in other periods, especially during 2008–2009. Moreover, when comparing the monthly equity returns with the yields of the one-month treasury bills between 1995-2019, the equity premium which turned out to the positive and a few excess returns was about 0.89 percent per month. The average rate of stock return of the stock exchange of Thailand during that period was 1.08 percent per month, while the yield on the one-month Treasury bills (risk-free rate of return) was 0.19 percent per month. It implies that the risk premium of Thailand's capital market is considerably lower than the significant countries.

Explaining the stock returns and equity premiums of such stocks has significantly resulted in the model development of exploring the relationship between stock prices and aggregate consumption. Such a relationship is still very challenging which is based on the concept that households will postpone their current consumption for future consumption by bringing the remaining resources at the present to invest or save. As a result, they expect that the rewards will later be obtained in the future. The well-known model is commonly referred to as the Consumption-based Capital Asset Pricing Model (C-CAPM). Nevertheless, the development of the C-CAPM is still flawed. This is because such a model cannot account for the equity returns and the equity premium in the U.S., Taiwan, South Korean, and Thailand stock markets. This is why the exploration of the relationship between aggregate consumption and the stock returns in explaining the equity premium via the development of the C-CAPM remains a major challenge for economists who have motives to shed light on the link between economic activity and the returns of stocks. As a result, this assertion, based on the derived model of financial economics to reveal the rate of stock returns and the pattern of excess returns to equity holdings that are related to economic activity, is very valuable for the asset pricing model.

2 Literature Review

The previous studies related to the equity premium are mainly theoretical research. Initially, the most well-known paper of, [7], demonstrates the correlation between stock price and consumption in an endowment economy similar to, [8]. The only difference in both studies is the assumption of endowment, [7], assumed that the endowment levels evolved according to a Markov process, but, [8], assumed that the growth rate of endowment changed gradually following the Markov process. However, the remarkable results on the equity premium of the two models are the same. In other words, [9], showed that any security with negative covariance between the stochastic discount factor and the stock returns led the expected rate of stock returns to be higher than the rate of returns on risk-free securities. As shown by, [10], any asset that depended on the covariance between the growth rate of aggregate consumption and the gross rate of return paid off a higher expected rate of returns than the risk-free rate for bearing risk. That is, asset payoff co-varies positively with consumption. Thus, this implied that an asset return is high if its marginal utility at a time $t+1$ is low. Conversely, an asset return is low if the marginal utility at a time $t+1$ is high. More importantly, the work of, [8], also found that the excess returns in the model economy were higher than the ones in the U.S. economy. In fact, for the actual data over the period 1889-1978, the risk compensation from the economic model was 0.35 percent. Unlike the risk premium from the U.S. stock market, it equals 6.18 percent. Therefore, the difference between these compensations is called the "equity premium puzzle". Table 1 documents the equity premiums in eight major stock exchanges in the past 115 years, which are still a puzzle.

Many studies have attempted to develop models to explain the equity premium puzzle, but there are no financial economics models to appropriately account for such premiums, [9], [11], developed an asset pricing model by changing the standard utility function to a power utility function. The finding of model testing with the General Moment Method (GMM) stated that the pricing model did not fit the equity premium from 1978 to 1995. In addition, the C-CAPM pricing model was further derived to shed light on the risk premium of stocks by combining the production function with the household utility function in a general equilibrium model. The study, [10], derived a financial model by adding a habit formation and capital adjustment cost into a real business cycle model. As a result, such a model well explains the risk compensation and the stock returns. However, if habit formation or capital adjustment cost was added, the risk premium of securities was not explained suitably as before. In addition, [4], found that taking account of the bid-ask spread variable in a model of, [7], the equity premium could be better described than the C-CAPM of, [8]. In, [1], the authors also explored that an unexpected idiosyncratic risk was a key factor in determining stock returns due to an insufficient risk diversification of securities. Even though most investors invested in a large number of stocks to eliminate the unsystematic risk of each stock, the number of stocks was not enough to completely get rid of these risks. Moreover, the speculators who tried to seek an abnormal pricing of stocks faced the specific risks of the stocks and the unusual events affecting the stock price.

In addition, the equity risk premium is still challenged concerning the financial economics model. In, [2], the study examined Lucas's C-CAPM to shed light on the equity premium in Taiwan and South Korea's capital markets. The result demonstrated that such a model could not explain the stock returns and the equity premium. In, [12], the study attempted to test the C-CAPM with a Thailand data set for the period 1980-1989. The findings illustrated that the risk-free rate of returns based on the derived model was more than the one based on the actual data set. This led the study to conclude that the C-CAPM may not be correct. Consistent with the findings of, [13], there was no equity premium puzzle in the Stock Exchange of Thailand over the period 1986 – 1996. Not surprisingly, [14], took into account the asset pricing model with the money supply variable; however, it did not fully describe the risk compensation of the Thai stock market.

3 Research Methodology

The asset pricing model is derived from a pricing model related to the economic activity of the firm under the real business cycle model to describe the rate of stock returns and compensation for bearing the risk of stocks. This paper carries out the research by using mathematical methods and discrete time optimization to develop an asset pricing model within a general equilibrium analysis under an imperfect competition market. In other words, this is a model set up to determine the price of stocks with economic activity variables in the stock market. by applying the Lagrangian equation, and Bellman equation and calculating Euler's equation and the Envelope condition before calculating market equilibrium and its application to stock price.

4 The Model

The economic environment based on this model set-up consists of representatives of two economic sectors as follows: 1) the Infinitely-lived homogenous households and 2) the Infinitely-lived heterogeneous firms in the economic system. Furthermore, there is only one type of investment stock in this economy, namely common stock. Hence, an infinitely representative household maximizes the expected lifetime utility subject to periodic budgetary constraints at each time, and firms with different characteristics (the infinitely heterogeneous firms) maximize the present value of expected cash flows subject to their budget constraints. Both households and firms carry out all economic activities in a perfectly competitive market, thus all prices are taken as given. The homogeneous households must decide how much to consume at each period, and how much to invest in stocks at each period. The households will receive money from labor wages, common stocks, and dividend payments at any time t. At the same time, those firms must decide on the amount of dividends to be paid to households, the number of workers to be hired to work, and decide on the investment amount of the firm to allocate funds from which the firms are financed by debts and the sale of produce. Therefore, all agents in both sectors are optimizations together which leads to effective resource allocation under the general equilibrium in this economy.

4.1 Household

The economic model is an extension of the work of, [15]. There are infinitely-lived identical households that exist forever. Hence, a model describing the economic behavior of all households can be represented by a single agent. Moreover, under the limited time of the household, it is divided into leisure time l_t and working time, h_t. For simplicity, $l_t + h_t = 1$ Therefore, the utility function of a representative household can be defined over stochastic sequences of consumption and leisure as the following equation.

$$E_t\left\{\sum_{t=0}^{\infty}\beta^t U\left(c_t, 1-h_t\right)\right\};\ 0<\beta<1 \qquad (1)$$

Where $E_t(\bullet)$ is the expectation operator conditional on information available at time t. c_t stands for the consumption at the time t. h_t represents the hours worked at the time t. β denotes the subjective discount factor.

The household utility function is a curved function derived from the change in consumption. and changes in work. This implies that the first and second partial derivatives of the utility function with respect to both arguments are as follows: $U_c > 0, U_h > 0, U_{cc} < 0, U_{hh} < 0$ and $U_{cc}U_{hh} - \left(U_{ch}\right)^2 > 0$. Considering the budget constraints, a representative household receives income from wages, stock selling, and dividend payment at the time t He or she will allocate for consumption, investment, and payment of lump-sum taxes. The investment in this economy is the only type of investing in equity stocks at the time $t+1$. Therefore, the equation expressing the household budget constraint can be written as follows:

$$w_t h_t + \sum_i b_{it} + \sum_i s_{it}\left(d_{it} + p_{it}\right) = \sum_i s_{it+1} p_{it} + c_t + T_t \qquad (2)$$

Denote i as firm i. w_t is the wage rate at the time t. p_{it} represent the price of equity stock i at time t. d_{it} represents the dividend payment received from stock i at the time t. s_{it} represents the equity stocks for the firm i at the time t. T_i are lump-sum taxes financing the tax benefits received by firms.

Taking all prices as given, the representative household will choose the consumption at the time t, the number of working hours at the time t, and investing in common stocks at the time $t+1$ to maximize the expected discount utility function subject to budget constraints. This leads to the optimal choices of the first-order conditions and the solution for the optimization problem is the Euler Equations as follows:

$$\max_{\{c_t, h_t, s_{it+1}\}} E_t\left\{\sum_{t=0}^{\infty}\beta^t U\left(c_t, 1-h_t\right)\right\};\ 0<\beta<1 \qquad (3)$$

subject to

$$w_t h_t + \sum_i b_{it} + \sum_i s_{it}\left(d_{it} + p_{it}\right) = \sum_i s_{it+1} p_{it} + c_t + T_t$$

Euler Equations are as follows:

$$\left\{\frac{U_h\left(c_t, 1-h_t\right)}{U_c\left(c_t, 1-h_t\right)}\right\} = w_t \qquad (4)$$

$$\beta E_t\left\{U_c\left(c_{t+1}, 1-h_{t+1}\right)\left(\frac{d_{it+1} + p_{it+1}}{p_{it}}\right)\right\} = U_c\left(c_t, 1-h_t\right) \qquad (5)$$

Denote R^s_{it+1} as the returns on stock i at time $t+1$, then it can be define as

$$R^s_{it+1} = \frac{p_{it+1} + d_{it+1}}{p_{it}} \qquad (6)$$

Substituting Equation 6 into Equation 5, then the Euler Equation becomes

$$\beta E_t\left\{\frac{U_c\left(c_{t+1}, 1-h_{t+1}\right)}{U_c\left(c_t, 1-h_t\right)} R^s_{it+1}\right\} = 1 \qquad (7)$$

Equation 4 shows that the wage rate is equal to the expected value of the proportion of marginal utility of working hours and the marginal utility of consumption. or the wage rate equals the marginal rate of substitution between working hours and household consumption at the time t. Importantly, Equation 7 expresses that the expected value of the marginal rate of intertemporal substitution between the next period consumption and the consumption at time t equals the inverse of the stock return.

4.2 Firms

In this economy, there are also infinitely heterogeneous firms that produce a large amount of consumption goods through their production function. They take labor h_{it} and capital k_{it} as factors of production. The capital depreciation rate is δ. Additionally, all firms face idiosyncratically stochastic productivity, ε_{it}, according to, [16]. Therefore, the production function is the following.

$$F\left(\varepsilon_{it}, k_{it}, h_{it}\right) = \varepsilon_{it} k_{it}^{\theta} h_{it}^{1-\theta} \tag{8}$$

k_{it} represents the capital for the firm i at time t. h_{it} is the labor for the firm i at the time t. ε_{it} is idiosyncratically stochastic risk of the firm i at the time t. θ is a capital share. Such stochastic risk is assumed further to follow a first-order autoregressive Makov process.

$$\varepsilon_{it} = \tilde{\varepsilon} + \tau\varepsilon_{it-1} + \mu_{it}\ ;\ \mu_{it} \sim N\left(0, \sigma_{\mu}^{2}\right)\ ;\ 0 < \tau < 1 \tag{9}$$

μ_{it} is independently and identically distributed for the firm i at a time t with mean zero and constant variance, i.e. $\mu_{it} \sim N\left(0, \sigma_{\mu}^{2}\right)$. Firms i accumulate capital through investment as follows.

$$k_{it+1} = \left(1-\delta\right) k_{it} + I_{it} \tag{10}$$

I_{it} is the investment of the firm i at time t. A firm that has an adjustment cost is equal to $\psi\left(\frac{I_{it}}{k_{it}}\right) k_{it}$, whose function is characterized by a decreasing return to scale in capital. For simplicity, this study is defined $\psi(\bullet)$ as a deterministic function in which technology shocks can be incorporated into the model. When each firm carries out its business by maximizing the value of the firm that is equal to the present value of future cash flows. Consequently, the maximization problem of firms can be written in the form of a recursive equation in which a firm will maximize its market value as follows:

$$V\left(\omega_0, k_{i0}\right) = \max_{\left\{I_{it}, \mathrm{L}_{it}\right\}} E_0\left\{\sum_{t=0}^{\infty} M_t D_{it}\right\} \tag{11}$$

M_t denotes the stochastic factor. D_{it} defines as dividend payment of a firm i at time t for holding equity stock. Then,

$$D_{it} = Y_{it} - \psi\left(\frac{I_{it}}{k_{it}}\right) k_{it} - w_t h_{it} \tag{12}$$

Defined $W_t = W\left(\omega_t\right)$ as the process of equilibrium wage. Therefore, given $k_{it}, \varepsilon_{it}, \omega_t, H_t$ as the state variable. Let's denote H_t as the summary of the next period information. I_{it}, k_{it+1}, h_{it} are the control variables. Hence, the Bellman Equation can be written as the following.

$$V\left(\omega_t, k_{it}\right) = \max_{\left\{I_t, \mathrm{L}_t\right\}}\left\{\varepsilon_{it} k_{it}^{\alpha} h_{it}^{1-\alpha} - \psi\left(\frac{I_{it}}{k_{it}}\right) k_{it} - w_t h_{it}\right\} + E_t\left\{\frac{M_{t+1}}{M_t} V\left(\omega_{t+1} k_{it+1}\right)\right\} q \tag{13}$$

subject to

$$k_{it+1} = \left(1-\delta\right) k_{it} + I_{it} \tag{14}$$

$$\varepsilon_{it} = \tilde{\varepsilon} + \tau\varepsilon_{it-1} + \mu_{it} \tag{15}$$

The first-order conditions are computed to find the optimality. Moreover, Euler Equations and Envelope conditions are solved to get the producer equilibrium. Thus,

$$\psi'\left(\frac{I_{it}^{*}}{k_{it}}\right) = E_t\left\{\frac{M_{t+1}}{M_t} V_{k_{it+1}}\left(\omega_{t+1} k_{it+1}\right)\right\} \tag{16}$$

$$\psi'\left(\frac{I_{it}^{*}}{k_{it}}\right) = E_t\left\{\frac{M_{t+1}}{M_t} \frac{V\left(\omega_{t+1} k_{it+1}\right)}{k_{it+1}}\right\} \tag{17}$$

The production in this economy also assumed that the outputs come from constant returns to scale of production function and investment technologies following the Q-theory of Investment as, [17], [18]. This means that the marginal q is equal to the average. Therefore,

$$\frac{\partial V\left(\omega_t k_{it}\right)}{\partial k_{it}} = \frac{V\left(\omega_t k_{it}\right)}{k_{it}} \tag{18}$$

Denote that $p_t = E_t\left\{\frac{M_{t+1}}{M_t} V\left(\omega_{t+1} k_{it+1}\right)\right\}$

Thus,

$$\psi'\left(\frac{I_{it}^*}{k_{it}}\right)=\frac{p_{it}}{k_{it+1}} \tag{19}$$

Equation 19 reveals that the ratio between the optimal investment rate of a firm and its marginal q. That is, it is an example of the relationship between the economic activity of the firm and its stock price. In addition, this means that the investment adjustment costs of a firm are significant for an asset pricing model to account for the empirically plausible volatility of stock returns. If $\psi'\left(\frac{I_{it}}{k_{it}}\right)=\frac{I_{it}}{k_{it}}$ so, then the unit price of capital equals one. Therefore,

$$p_{it}=k_{it+1} \tag{20}$$

4.3 Equilibrium

The modeled economy derives from the household's resource allocation, the firms' resource allocation, and market-clearing conditions. In terms of the product market, the equilibrium in the product market can be displayed as

$$C_t+I_t=Y_t \tag{21}$$

$$C_t+\sum_i\left(k_{it+1}-(1-\delta)k_{it}\right)=\sum_i\varepsilon_{it}k_{it}^{\theta}h_{it}^{1-\theta} \tag{22}$$

where

$$\sum_i k_{it}=k_t$$

$$\sum_i h_{it}=h_t$$

The stock market:

$$\sum_i s_{it}=1 \tag{23}$$

In a competitive market, all prices are taken as given as follows: the stock prices (p_t), wage rates (w_t), investment allocation at the time t, working hours at the time t, capital at the time $t+1$, consumption at the time t, investment in the stock market at the time $t+1,\{I_t,h_t,k_{t+1},c_t,s_{t+1}\}_{t=0}^{\infty}$. Thus, the household's decision and firm's decision satisfy the optimal condition, the stochastic discount factor equals the intertemporal marginal rate of substitution between consumption at time $t+1$ and consumption at time t.

4.4 Asset Price Implication

An asset pricing model can be derived from the Euler Equation 7 which is the standard asset pricing model. To simplify the model of stock returns with economic activity, the utility function with constant elasticity of the substitution function is defined as follows:

$$U(c_t)=\frac{c_t^{1-\sigma}-1}{1-\sigma},0<\sigma<\infty \tag{24}$$

Where σ is the relative Risk Aversion parameter. Define gross return on stock as $R_{it+1}^s=\frac{p_{it+1}+d_{it+1}}{p_{it}}$

Then, Equation 7 can be rearranged as the following:

$$1=\beta E_t\left[\left(\frac{c_{t+1}}{c_t}\right)^{-\sigma}\left(\frac{p_{it+1}+d_{it+1}}{p_{it}}\right)\right] \tag{25}$$

Once $p_{it}=k_{it+1}$; hence, Equation 25 can be written as follows:

$$\beta E_t\left[\left(\frac{c_{t+1}}{c_t}\right)^{-\sigma}p_{it+1}+d_{it+1}\right]=k_{it+1} \tag{26}$$

Rearranging the Equation 26, we get

$$\beta E_t\left\{(1+g_c)^{\sigma}R_{it+1}^s\right\}p_{it}=k_{it+1} \tag{27}$$

Denote $\beta=\frac{1}{1+\rho}$, so

$$(1+\rho)k_{it+1}=E_t\left\{(1+g_c)^{-\sigma}R_{it+1}^s\right\}p_{it} \tag{28}$$

Where ρ is the rate of time preference.

As a result, Equation 28 can be written in the form of the log-linearized equation of expected stock returns as follows. Define x as any variables, then $g_x=\frac{x_{t+1}}{x_t}$. $\hat{x}_t$ stands for a deviation from the steady state of x at the time t, such that $\hat{x}_t=\frac{x_t-x}{x}$. Equation 28 is approximated by applying the method of Taylor's Approximation; hence, expected stock returns becomes

$$E_t\hat{R}_{it+1}^s=1+\rho+\hat{k}_{it+1}+2\sigma\hat{g}_c-\hat{p}_{it} \tag{29}$$

As can be seen, Equation 28 and Equation 29 represent the factors that affect the stock returns, namely the rate of time preference, the investment at the time $t+1$, the stock price at the time t, and the growth rate of aggregate consumption. This implies that the economic activities of firms have a positive impact on the future return on stocks, and the effect of consumption growth rate on stock returns is a positive direction. In contrast, the influence of current stock prices on stock returns is negative.

5 Conclusion

The objective of this study is to examine the asset pricing model with the economic activities derived from the business cycle model for describing the rate of return and risk premium of common stocks. Such a model shows the relationship between the economic activities and the stock returns in forms of nonlinearity and linearity. This comes up with the new asset pricing model. In the modeled economy, there are infinitely-lived homogeneous households that maximize utility function subject to budget constraint. and infinitely-lived heterogeneous firms that maximize the present value of future cash flows subject to budget constraints. After that, the general equilibrium of this economy is computed. As a result, this study solves for the asset pricing model which noticeably included the economic activity of that firm. The main findings demonstrate that the rate of time preference, the investment in the next period, the stock price at the time t, and the growth rate of aggregate consumption have significant impacts on how much the stock prices change. Therefore, this conclusion is considerably different from previous studies, especially the investment of the firm. As a result, the role of economic activity of firms should be examined in future research to shed light on why the equity premium is still a puzzle.

References:

[1] Campbell, J. Y., Lettau, M., Malkiel, B.G., Xu, Y. (2001). Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk. The Journal of Finance, Vol.56 (1), pp.1-43.

[2] Chen, M. & Bidarkota, P.V. (2004). Consumption Equilibrium Asset Pricing in Two Asian Emerging Markets. Journal of Asian Economics, Vol.15(2), pp.305-319.

[3] Dimson, E. and Marsh, P. & Staunton, M. (2002). Long-Run Global Capital Market Returns and Risk Premia. Available at SSRN: https://ssrn.com/abstract=299335or http://dx.doi.org/10.2139/ssrn.299335

[4] Fisher, S.J. 1994. Asset Trading, Transaction Costs and the Equity Premium. Journal of Applied Econometrics, Vol.9, s71-s94.

[5] Mehra, R. (2007). The Equity Premium in India. Oxford Companion to Economics in India, B. Kausshik, ed. Oxford University Press, New York.

[6] Mehra, R. & Prescott E. C. (2008) CHAPTER 1 - The Equity Premium: ABCs, Editor(s): Rajnish Mehra, In Handbooks in Finance, Handbook of the Equity Risk Premium, Elsevier, pp.1-36. https://doi.org/10.1016/B978-044450899-7.50004-X

[7] Lucas Jr., R.E. (1978) Asset prices in an exchange economy, Econometrica, Vol.46 (6), pp.1429–1445.

[8] Mehra, R., Prescott, E. (1985). The equity premium puzzle. Journal of Monetary Economics, Vol.15, pp.145–161.

[9] Hansen, L. P., and K. J. Singleton. (1983). Stochastic Consumption, Risk Aversion and the Intertemporal Behavior of Asset Returns. Journal of Political Economy, Vol.91, pp.249–268.

[10] Jermann, U., (1998). Asset Pricing in Production Economies. Journal of Monetary Economics, Vol.41, pp.257–275.

[11] Hansen, L. P., and K. J. Singleton. (1982). Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models. Econometrica, Vol.50, pp.1269–1288.

[12] Khanthavit, A., & Priebjrivat, A. (1993). A Test of Conditional CAPM Preliminary Findings for the Thai Capital Market. Kasetsart Journal of Social Sciences, Vol.14(1), pp.109–116. Retrieved from https://so04.tci-thaijo.org/index.php/kjss/article/view/244078

[13] Sedthapinun, T. 2000. C-CAPM and Equity Risk Premium in Thailand. Thesis of Master of Economics, Thammasat University.

[14] Poongam, K. 2004. Equity Premium in Business Cycle Model in Thailand. Thesis of Master Economics, Thammasat University.

[15] Srisuksai, P. and Vanitcharearntham, V.(2016). Asset Pricing with Idiosyncratic Shocks. Applied Economics Journal, Vol. 23 (1), pp.35-58.

[16] Kogan, L and Papanikolaou, P. (2012). Economic Activity of Firms and Asset Prices. Annual Review of Financial Economics, Vol.4, pp.361-384.

[17] Tobin, J., (1969). A General Equilibrium Approach to Monetary Theory. Journal of Money Credit Banking, Vol.1(1), pp.15-29.

[18] .Hayashi, F.,(1982). Tobin's Marginal q and Average q: A Neoclassical Interpretation. Econometrica, Vol. 50, pp.213–224.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The author only carried out in the present research, at all stages from the statement of the problem to the final findings and conclusion.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself.

No funding was received for conducting this study.

Conflict of Interest

The author has no conflicts of interest to declare that are relevant to the content of this article.