Do stock market prices reflect the relevant information from government policies? Evidence from the Food, Conservation, and Energy Act of 2008

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The efficient market hypothesis (EMH) states that stock market prices always incorporate and reflect all relevant information (Fama, 1970). The EMH is rooted on the literature of the rational expectations theory, which states that the predictions of economic agents of the future value of economic variables are correct on average and are not systematically biased (Muth, 1961). Either the financial market is efficient or not is an issue because the related theory and empiric works are divided. There are studies in favor of the capital market efficiency that use stock market data such as the studies in the Fama (1970) review. When investing in equity mutual funds, the investor cannot expect to earn an abnormally higher return (Malkiel, 1995). Allen and Karjalainen (1999) show that technical analysis for when to buy and sell stocks does not outperform the overall market. There are empirical evidences that anomalously highlight broad cases of market inefficiency. The EMH is tested for anomalies with the security market value variables (Basu, 1977), the firm size variable (Banz, 1981), the price momentum variable (Jagadeesh and Titman, 1993), the earnings and accruals variables (Sloan, 1996), the industry characteristics (Moskowitz and Grinblatt, 1999), and the country macroeconomic specifics (Schneider and Gaunt, 2011).

In this policy evaluation study, we test the EMH with the information conveyed by the $288 billion Food, Conservation, and Energy Act of 2008 (2008 Farm Bill). Importantly, some of the major purposes of the 2008 Farm Bill are to hedge for risk by subsidizing adjustment payments to crop insurance program and to support the development of bio-based and renewable energy sources (USDA, 2008). Interestingly, the market efficiency implies that “goods” trade at

their fair value although many government policies are designed to manipulate the economic variables faced by firms. This study contributes to the limited literature focused on the efficiency of the financial market for agriculture and energy related stocks; and the literature geared at government policy evaluation.

Our objective is to scrutinize the risk premium variation effect of the 2008 Farm Bill on the stock price of publicly traded firms. Specifically, we evaluate if the risk management information embedded in the 2008 Farm Bill is priced in the stocks of firms participating in subsidized industries, namely agriculture in one part and energy in another part. Especially, we comparatively forecast the risk premium variations of firms which participate in the subsidized industries with matching firms from unsubsidized industries, with regards to their financial attributes.

Given the contradiction about the EMH empirical findings, we propose a methodological framework based on industrial organization, the Capital Asset Pricing Model (CAPM; Treynor, 1961; Sharpe, 1964; and Lintner, 1965), the Propensity Score Calibration (PSC) method (Sturmer et al., 2005), and the Fama-MacBeth (FMB) cross-sectional time series regressions of Fama and MacBeth (1972).

We use keywords of the 2008 Farm Bill language to regroup the U.S. publicly traded firms by their North American Industry Classification System (NAICS) code according to sector organization (Fritz, Hausen and Schiefer, 2004; French, 2012), into five categories. In the category of 2008 Farm Bill subsidized industry sector, first, the agriculture firm category is based on specific programs such as the Average Crop Revenue Election, the Farmers Market Promotion Program, the Commodity Food Project grants, the Food and Nutrition Programs and the Healthy Food Enterprise Development Center. Second, the energy firm category is defined

by special program participation that includes the energy firms involved with the Renewable Energy Systems and the Energy Efficiency Improvements Program but excludes the other energy firms not participating in the 2008 Farm Bill such as the petroleum providers. Especially, the firms involved with the Rural Energy for America Program, the Rural Energy Self-Sufficiency Initiative, and the many Bioenergy programs are included. To account for the inter linkage of these two categories through combined initiatives such as the Commodity Credit Corporation (CCC) and the Biomass Crop Assistance Program, a third category merges the previous two. Fourth, we distinguish the financial institution category to account for financially "better informed" firms due to their macroeconomic exposure during the global financial crisis period 2008-2012. A fifth category encompasses the control group of firms in the unsubsidized and financially "lesser informed" firms excluded from the other four by mean of their NAICS code. We use the CAPM to estimate the correlated volatility measure "beta" between the expected return that determines asset price and the riskiness level due to relevant information. For each category, CAPM provides the "beta" for propensity score matching of the stocks.

We use the PSC method to comparatively adjust effect estimates for unmeasured confounding with validation data. For the first PSC step, we use the propensity score matching (D' Agostino, 1998) of stock riskiness (beta) for bias reduction in the comparison of the treatments of being subsidized for the first, second and third categories; and of being "better informed" for the fourth category, to the non-randomized control group of the fifth category. The second step is the calibration of the PSC; a measurement error regression that corrects for unobserved confounders because of lack of information; such as in the instance of a bank holding company in the category four that could also be involved in a subsidized company of category one or two or three; and of imperfectly measured predictor, as the "beta" of the CAPM

is a basic risk exposure identifier that does not account for all known risk factors. Specifically, the CAPM does not account for size, book-to-market ratio, and macroeconomic variables but the risk free rate of return.

We use the FMB method to interpret the variations of risk premium amongst factors from the PSC method. In the first step, the FMB method executes a cross-sectional regression of firms for each time period to obtain estimates of the parameters. In the second step, the FMB method executes a time series regression of the estimates to obtain the final estimates of the parameters, the standard errors, and the t-statistics. Besides the financial characteristics of the firms, we also consider time fixed effects to account for specific informational events such as the increase of the CCC program section 9005 from $75 million in fiscal year (FY) 2009 to $105 million in FY 2012.

Accessory data are from the full text of the 2008 Farm Bill of the U.S. Government Printing Office and the NAICS repositories of the U.S. Census Bureau. Financial markets data are from the Center for Research in Security Prices (CRSP). Financial statements data are from Compustat files. Our sample consists of NYSE, AMEX, and NASDAQ prices of ordinary common shares of the period 2007-2012 merged with the Compustat variables such as Number of Shares Outstanding, Current Assets, Total Assets, Capital Expenditures, Common Ordinary Equity, Cash and Short Term Investments, Debt, and Current Liabilities. The sample covers about 59% of the observations for about 67% of the market capitalization.

Our preliminary results indicate that the return performances of 2008 Farm Bill subsidized firms are not statistically different from those of firms from the control group. This result clearly indicates that the risk structures of the subsidized and the unsubsidized cannot be distinguished. The traditional risk factors such as market capitalization, book-to-market ratio,

and capital structure do not estimate if the subsidized risk management tools such as the adjustment payments to crop insurance program and to support the development of bio-based and renewable energy sources actually make the firms within these activities less risky. The significantly differing results concern the time fixed effects. The stock prices of firms in the subsidized categories spike while the trend of their expected returns present a trough when large subsidies are distributed, such as in 2009 and 2012.

Although this study of causal effect of policies is not fully conclusive with regards to its target, the preliminary findings call for further investigations with the potential of rewarding results. The central issue of evaluating the 2008 Farm Bill exposure effect of the publicly traded firms on the possibly positive outcome calls for methods. Modeling the critical possibility that each firm could be exposed to varied level of subsidies, we experiment with other policy evaluation methods such as the Local Average Treatment Effect (Angrist, Imbens and Rubin, 1996) and the Rubin Causal Model (Holland, 1986) as potential alternatives and robustness checks.