The Power of Profit

Ali Anari · James W. Kolari

The Power of Profit

Business and Economic Analyses, Forecasting, and Stock Valuation

Springer

Ali Anari
Texas A&M University
Mays Business School
College Station TX 77843
USA
manari@mays.tamu.edu

James W. Kolari
Texas A&M University
Mays Business School
College Station TX 77843
USA
jkolari@mays.tamu.edu

ISBN 978-1-4419-0648-9 e-ISBN 978-1-4419-0649-6
DOI 10.1007/978-1-4419-0649-6
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2009938545

To Faye, Karie, Armita, and Wes

Preface

In recent years the USA and global economy have been shocked by financial crises that severely damaged credit markets and financial institutions. The upshot has been unprecedented in post-Great Depression era declines in output, capital stock, and profits among business firms around the world. Critics point to a variety of potential culprits to explain the current economic and financial crises, such as poor corporate governance mechanisms, excessive management compensation incentives, short-run wealth maximization, irresponsible financial practices, lack of regulatory oversight of systemic risk, and macroeconomic and monetary policy breakdowns. Naturally, a debate is emerging about how to instill more prudent management practices in an effort to avoid repeating the catastrophes of the last few years. These difficult times therefore provide an opportunity to consider new ideas and see whether they are useful in better managing business practices in the future.

This book seeks to contribute to this debate by carefully examining the role of profit in business firms in particular and the economy in general. It combines the efforts of a macroeconomist (Ali Anari) and finance professor (James W. Kolari), who share a common interest in business and economic analysis, forecasting, and stock valuation. The authors' previous work experiences in business firms, as well as consulting and academic research activities, motivated the development of a profit system model that takes into account interactions between fundamental business variables, including output, capital stock, profit rate, profit margin, and total profit. The profit system model is a tool that business firms can use to analyze and forecast these fundamental variables. To our knowledge, no such model exists that integrates these important business variables, even though they are inextricably dependent on one another. We believe that the profit system model has many practical applications to business firms and industries, in addition to the aggregate business sector and national economy. Also, stock investors can utilize the profit system model for estimating and forecasting the valuation of the stock market as a whole in addition to individual firms' stocks. It is our hope that readers will implement this new model in their daily business and investment practices and find other innovative applications also.

We would like to thank our editor, Nicholas Philipson, for his enthusiastic support during this project. We met briefly with him in Houston a few years ago, explained the basic ideas to him, and immediately gained a friend who understood what we were trying to do. Also, we thank Charlotte Cusumano, who provided editorial assistance.

Contents

Chapter 1
The Role of Profit in Advanced Market Economies

During our careers as business economists before entering university research programs, we observed that profitability criteria are key variables not only in investment decisions but also in production decisions *after* investments are made and goods and services come on stream. Profitability not only determines the level of investments but also the level of output. In our academic careers, we have found that, while there is an extensive theoretical and empirical literature on the relationships between profitability criteria and capital formation activities,[1] as manifested by project evaluation courses in universities, scant attention has been paid to the relationships between profits and production activities *after* capital formation projects are implemented. Consequently, a major gap in the literature exists to the extent that the predictive and analytic power of profit has not been fully exploited on both the microlevel of the firm and the macrolevel of the economy. Given the importance of profit in advanced market economies, where the bulk of national output is produced by the business or for-profit sector, this book investigates how profit measures can be utilized to better understand business activities. To exploit the power of profit, we propose a profit system model of the firm founded on three premises:

1. *Profit rate determines capital formation investment*. At the project evaluation stage, investment projects are selected based on the firm's required hurdle rates of return on capital (hereafter profit rates) to attain the firm's objective. Alternative firm objectives include profit maximization, sales maximization, and so on,

[1] For further discussion on the role of profit as a driving force in capital formation activities in business firms, see Smith (1776), Ricardo (1815), Marx (1867), Schumpeter (1934), Keynes (1936), Solow (1957), Sraffa (1960), Friedman (1962), Baumol (1974), and Samuelson (1974). Keynes' (1936) assertion that investment and employment opportunities depend on the marginal efficiency of capital sparked substantial research on the relationship between required profit rates and capital formation, for example, see neo-Keynesian and neoclassical studies by Jorgenson (1963, 1967, 1971), Hall and Jorgenson (1967), Lucas and Prescott (1971), Abel, Mankiw, Summers, and Zeckhauser (1989), and Feldstein (1996). Relatedly, the cost of capital is a key determinant of investment in models of capital formation based on Tobin's q ratio of the value of a company given by financial markets to its total assets, for example, see Alchian (1955), Brainard and Tobin (1968), Tobin (1969), Abel (1979), Summers (1981), Hayashi (1982), Shapiro (1986), and Asimakopulos (1971, 1991).

A. Anari, J.W. Kolari, *The Power of Profit*, DOI 10.1007/978-1-4419-0649-6_1,

subject to various constraints by the firm's stakeholders, including shareholders, workers, suppliers, customers, and others.

2. *Profit rate determines the level of output*. After capital investments are made, firms combine fixed stocks of capital with different quantities of labor in order to attain their required profit rates. Firms continually compare realized profit rates with ex ante hurdle profit rates used to select investment projects. Realized profit rates lower than target or hurdle rates lead to reduced production activities or abandonment of unprofitable activities. They also consider expected profit rates on alternative investment projects if on-going economic activities are abandoned and resources tied up are released and employed in alternative economic activities. Of course, higher ex post realized profit rates compared to ex ante hurdle profit rates lead to higher levels of output by existing and entering firms.
3. *Profit rate, profit margin, total profit, sales, and capital stocks of a firm are determined simultaneously*. Profit rate, profit margin, and total profit depend on the levels of sales and capital, which in turn depend on profit rate and profit margin. Each of these fundamental variables is determined by the other three variables.

Employing two approaches – mathematical economics and accounting definitions – we derive in Chapter 2 a fundamental relationship among five key economic and business variables: output, capital stock, profit rate, profit margin, and total profit. We show that a firm's output is equal to the product of profit rate and the market value of capital stock divided by profit margin, while the value of capital stock is equal to the product of profit margin and output divided by profit rate. Models of profit rate, profit margin, and total profit are derived from the same fundamental relationship also. A number of other relationships among the five fundamental variables are derived in which the impact of inflation on these variables is studied. The set of profit system models of output, capital stock, profit rate, profit margin, and total profit together constitute an integrated model of a business firm in which the values of each of these variables depend on the values of the other variables. We show how this profit system model of the firm can be extended to include the labor market for the firm. The empirical representation of this integrated profit system model is a dynamic system of equations which can be applied to firms, industries, or the whole business sector depending on the level of aggregation.

Chapter 3 uses the profit system to build a macroeconomic model of the business sector. The business sector in the model is the sum of all for-profit business firms' activities in the nation. We augment this business sector model with a nonprofit sector model that includes the government sector, nonprofit organizations, and the owner-occupied housing sector. The combination of the business sector and nonprofit sector models represents the whole national economy. This model is subsequently applied to the US economy for macroeconomic forecasting, monetary and fiscal policy analysis, and business cycle analysis. In brief, based on annual data for the period 1959–2008, we find that the model can closely mimic historical in-sample series of US nominal and real output for the business sector, nonprofit sector, and national economy, as well as the capital stock, profit rates, profit margins, and total profit for the business sector. It can also be used to explore the channel of inflation

transmission through capital stock and associated expected profits in the business sector. We subsequently employ the model for forecasting purposes under different monetary policy regimes represented by Federal funds rate targets and alternative fiscal stimulus assumptions. The severe economic contraction and financial crises in 2008 are included in these analyses. Our empirical results show that profit is a pivotal variable driving US output and investment that should be included in macroeconomic analyses of the national economy. Based on these findings, we conclude that our parsimonious profit system model of the economy using a small set of variables performs well in terms of in-sample analyses and out-of-sample forecasts.

Chapter 4 applies the profit system model to the aggregate corporate sector. Our corporate sector model is developed along lines similar to the business sector model in Chapter 3, which is broader in scope due to the inclusion of corporate and noncorporate business. Some inputs from the national macroeconomic model are utilized, including national output, the Federal funds rate, and the growth rate of nonfinancial debt outstanding. Aside from forecasting fundamental business variables, a major motivation for building a corporate sector model is to use it in aggregate stock valuation of the corporate sector.

Chapter 5 presents the results of applying the profit system model to 12 US industries. In-sample estimates and out-of-sample forecasts of fundamental business variables are provided to demonstrate the application of our model to a wide variety of business firms.

Chapter 6 shows how to apply our profit system model of the corporate sector to the valuation of the aggregate stock market. Our profit system stock valuation model is based on the well-known discounted cash flow (DCF) approach to valuation. Using data for the period 1959–2008, the profit system model provides in-sample estimates and out-of-sample forecasts of DCF inputs, including total corporate profits, the growth rate of profits, and the profit rate. These data for the corporate sector are developed in Chapter 4. To our knowledge no other stock market valuation model is supported by a formal business model of the business sector to estimate and forecast profit variables that are essential ingredients in DCF valuation. We develop both long-run and short-run stock valuation models and compare the results to the actual values of aggregate US stock market indices. The results suggest that our profit system stock valuation model can be used to analyze stock market movements and provide insights into whether aggregate stock market indices are over- or undervalued relative to fundamental values predicted by profits. Also, short-run and long-run forecasts of stock market values can be produced.

Chapter 7 applies the profit system model to two large US corporations that are included in the Dow Jones Industrial Average Index. For these two firms we extract long-run trends in the fundamental business variables of sales, profits, and capital stocks. The relationships between the stock values of these corporations and the long-run paths of their discounted profits over time are then investigated using DCF methods developed in Chapter 6. We also discuss potential firm-level applications of our profit system to strategic business planning, budgetary control, and capital budgeting decisions.

Chapter 8 provides a summary and implications. The macro–micro approach chosen for the empirical application of our profit system model – that is, initially applying the model to the aggregate US economy and then to the corporate sector, industries, and individual firms – is advantageous. The model is applied to the aggregate US economy to obtain forecasts of the Federal funds rate and growth rate of nonfinancial debt outstanding. These financial variables help capture the influence of the financial sector on the real economy. Also, we find that their forecasts are important inputs to the corporate sector, industry, and individual firm models. While the macroeconomic application of the model is interesting from the standpoint of providing a simple, parsimonious model of the national economy, readers who are not interested in macroeconomic issues can skip to subsequent chapters that focus on corporate sector, industry, and firm analyses.

The empirical results in Chapters 3, 4, 5, 6, and 7 strongly support our theoretical profit system models on both the macrolevel and the microlevel. These results should not be surprising. The importance of profits arises from the fact that they summarize all information on the supply and demand sides of goods and services. Profits contain expense information related to the quantities and prices of inputs on the supply side and revenue information related to the quantities and prices of outputs on the demand side as well as other information on input and output markets. Generally speaking, the more capitalistically developed and free an economy, the larger the share of national output produced by the business sector. Over the past two centuries, the economic transformation of developing economies to industrialized market economies has raised the significance of the business sector in national economies. More recently, global economic problems in 2008 and 2009 have caused profits for many business firms to fall precipitously to relatively low levels in historic terms. How will firms adjust to falling profits? What effects will the economic and financial crises have on future business capital investment, output, profit rates, profit margins, total profits, and employment? Our profit system model can be used to gain insights into these and other related questions.

Exploiting the power of profit for business and economic analysis, forecasting, and stock valuation is the goal of this book. In this way we seek to contribute to our understanding of profit and its impacts on business activities.

Chapter 2
Profit System Models of the Firm, Industry, and Business Sector

This chapter proposes an integrated profit system model of the firm consisting of dynamic relationships among fundamental business variables. The first part of the chapter derives theoretical profit system models of production, capital stock, profit rate, profit margin, total profit, and employment for firms in the business sector, in addition to related models of employee compensation and other business variables. The second part of the chapter provides empirical profit system models that capture the relationships between these variables as a system of dynamic equations. These empirical models can be applied to individual firms, industries, and the whole business sector.

For managers of firms, these new empirical models provide a battery of methods to better understand the interrelationships between sales, fixed tangible assets, and profits. Importantly, the models can be used to not only analyze recent business decisions but forecast critical operating variables too. What production is needed by a firm to meet forecasted sales? How much investment in new capital is needed to meet forecasted capital stocks? What profit guidance is expected for the next period? On the industry and business sector levels these empirical models can be used by a wide variety of interested parties for business and economic analyses, forecasting, policy analyses, impact studies, and stock valuation. We demonstrate a number of these practical uses in forthcoming chapters.

2.1 Theoretical Foundation of Profit System Models of the Firm

We begin with the simple identity that firm output is equal to the product of the profit rate and market value of capital stock divided by the profit margin. This production identity can be rearranged to easily derive models of capital stock, profit rate, profit margin, and employment in the business sector. Together, these models constitute an integrated profit system model of firms.

There are two approaches to derive our profit system model of production: a mathematical economic approach and an accounting approach. Readers who are not interested in the mathematical economic approach can skip to the accounting approach.

A. Anari, J.W. Kolari, *The Power of Profit*, DOI 10.1007/978-1-4419-0649-6_2,

2.1.1 Mathematical Economic Approach to Obtaining a Profit System Model of Production

Output for a firm is commonly represented by the Cobb–Douglas production function:[1]

$$Y_t = A_t K_t^S H_t^{1-S}, \tag{2.1}$$

where Y is the output, A is the total factor productivity, K is the amount of capital, H is the amount of labor hired, and S is a parameter less than 1. Output can be defined as either sales or value added (e.g., dollar revenues from goods and services sold minus dollar costs of goods and services purchased). Assuming that each unit of output is priced at \$1 and that the wage rate is equal to the marginal product of labor, the *accounting profit function* (Z) conventionally computed by business firms is

$$Z_t = A_t K_t^S H_t^{1-S} - (1-S)A_t K_t^S H_t^{-S} H_t = SA_t K_t^S H_t^{1-S} = SY_t, \tag{2.2}$$

where the dollar value of the marginal product of labor $(1-S)A_t K_t^S H_t^{-S}$ equals the wage rate. Note that S is capital's share of output or profit margin (i.e., profit divided by output).

Dividing equation (2.2) by K_t yields the profit rate R_t as

$$R_t = \frac{SY_t}{K_t}. \tag{2.3}$$

Hence, a profit system model of production can be written as

$$Y_t = \frac{R_t K_t}{S_t}. \tag{2.4}$$

Thus, output in the Cobb–Douglas production function is equal to the product of the profit rate and capital stock divided by the profit margin for a business firm. In the Cobb–Douglas production function, the profit margin or capital's share of output S is a constant. However, as shown in equation (2.4), we assume (for practical reasons explained shortly) that the profit margin is a variable that varies over time S_t.[2] This key assumption changes equation (2.3) to a model of profit rates with time-varying S_t as follows:

$$R_t = \frac{S_t Y_t}{K_t}. \tag{2.5}$$

---

[1] See Solow (1957) and Felipe and Holz (2001).

[2] In a recent paper McGratten and Prescott (2000) allow profit margins to vary in the Cobb–Douglas function.