The Impact of Organizational Slack and Lag Time on Economic Productivity: The Case of ERP Systems

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ABSTRACT

Much like research on the productivity paradox of the 1980s, empirical research has not provided a clear association between investments in enterprise resource planning (ERP) systems and improved productivity, even though these systems were designed, developed, and marketed as productivity improvement tools. This paper explores the relationship between organizational slack and productivity improvements resulting from investments in ERP systems. The authors provide support for the proposition that during the period of time surrounding implementation, firms build organizational slack; and following implementation organizational slack is absorbed and productivity increases. Furthermore, the authors find that even though manufacturing firms drive the decrease in organizational slack during the post-ERP period, the magnitude of the increase in productivity is significantly larger for non-manufacturing firms.

KEYWORDS

ERP Impact, ERP Implementation, Enterprise Resource Planning (ERP), Productivity

1. INTRODUCTION

Enterprise resource planning (ERP) systems erupted as one of the more significant IT investments of the past twenty years. This industry is projected to grow to over $40 billion by 2020 (Allied Market Research, 2015), and is listed as third out of fifty-one global technologies and applications in a 2011-12 survey of senior IT executives from over 750 organizations located in the United State, Europe, Asia, and Latin American (Luftman et al., 2013). While these systems were marketed as tools to improve productivity by integrating business processes across functional areas, research on ERP systems generally found no association between spending on ERP systems and improved productivity. This paper examines this relationship further by exploring the concept of organizational slack.

Organizational slack (Cyert and March, 1963; 1992), provides an operational model to explore the lag effect offered by Brynjolfsson (1993) as a possible explanation for the productivity paradox. Many ERP projects require a major commitment of both capital and human resources over a time period that can span months or even years depending on the size of the organization and the number of modules implemented. During that time, the behavior of the firm can change significantly, as organizations often reengineer their business processes to meet the needs of the new system.

This paper explores the proposition that implementation of an ERP system initially leads to an increase in organizational slack rather than an increase in productivity; and that once the implementation process is completed, this organizational slack is absorbed, leading then to increases
in productivity. To test this proposition, data was collected from LexisNexis, resulting in 125 sample firms announcing the implementation of ERP systems. Both the slack and economic productivity measures were regressed on the decision to implement an ERP system. The results provide strong support for the proposition that during implementation, slack increases; and that in the time period following implementation slack decreases while economic productivity increases.

These results suggest that Brynjolfsson’s (1993) time lag explanation for the productivity paradox of the 1980s may also apply to the ERP paradox of the 1990s. In other words, firms do realize improved productivity as a result of investments in ERP systems. However, the improvement lags behind due to the behavior of the firm during the implementation process, which in turn creates organizational slack.

The remainder of this paper is organized as follows: Section 2 develops the theory and hypothesis, Section 3 presents the research design and methodology, Section 4 presents the results, and Section 5 provides a discussion of the results and final conclusions.

2. THEORY AND HYPOTHESIS DEVELOPMENT

2.1. The Productivity Paradox

The productivity paradox has motivated many empirical studies in the fields of economics, management science, and information systems. Dedrick et al. (2003) provides a critical review of several of these studies, beginning with the early studies in the 1980s that found no connection between IT investment and productivity at the firm, industry or overall economic level (Loveman, 1994; Roach, 1987; 1989; 1991; Strassmann, 1990). Later studies using more rigorous and refined research methods, concluded that the productivity paradox does not hold, and that greater investment in IT is associated with greater productivity growth at both the firm and country level (Bosworth and Triplett, 2001; Bresnahan, 1999; Brynjolfsson, 1993; 1996; Brynjolfsson and Hitt, 1995; 1996; 1998; Jorgenson, 2001; Jorgenson and Stiroh, 2000). Dedrick et al. (2003) further concluded that although several firm level studies show an association between IT investment and productivity, most have failed to show a clear link to profitability. This was especially true for service firms where output measurement is difficult, and where relationships between productivity and profitability are less discernable than for manufacturing firms. It has been generally assumed that more productive firms will enjoy higher profitability than their competitors. Dedrick et al. (2003) further suggest that failure to document a clear link to profitability stems from the inability of researchers to quantify and incorporate the various unobservable factors that determine a firm’s competitive position and outcomes.

Brynjolfsson (1993) offered four possible explanations for the productivity paradox: (1) mismeasurement of outputs and inputs, (2) lags due to learning and adjustment, (3) redistribution and dissipation of profits, and (4) mismanagement of information and technology. Subsequent studies have focused on one or more of these explanations. For instance, Brynjolfsson and Hitt (1996) focused on the mismeasurement explanation by using a neoclassical production theory approach to determine the contribution of IT investments. They found that gross marginal product for computer capital was at least as large as other types of capital investment, indicating that computers do contribute significantly to firm-level output. In a study focused on the redistribution explanation, Hitt and Brynjolfsson (1996) suggest that in a competitive marketplace, firms will pass financial gains on to consumers through decreased prices, thus resulting in higher productivity and consumer value, but lower profits. Stratopoulos and Dehning (2000) conclude that increasing investment in IT and a high failure rate for IT projects, which they consider to be a proxy for mismanagement, off-set the productivity improvements realized by successful IT projects in many empirical studies. Relatively
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