



Misallocations and policy constraints on mergers in the modern manufacturing sector



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ABSTRACT

Resource misallocation has resulted in differences in inter-economy total factor productivity (TFP). However, the factors driving different levels of resource misallocation still need to be investigated. This paper argues that firm exits through mergers can be an important source of change in the level of resource misallocation. Traditional policy regulations for the key manufacturing sectors are based on either the four-firm concentration ratio (CR4) or the Herfindahl–Hirschman Index (HHI), which measure the market concentration. This paper takes a different approach. It first deduces the optimal input allocation by measuring aggregate resource misallocation; this approach allows us to identify productivity-improving merger events and complements the market concentration indexes, which have traditionally been the focus of attention. We then construct a unique dataset in the TFT-LCD industry to analyze the change in productivity resulting from the merger between two major TFT-LCD producers, Chimei and Innolux, in the first quarter of 2010. The proposed and actual team of Chimei and Innolux record a remarkable efficiency jump by achieving optimal input allocation immediately after this merger. We further interpret this scenario as a firm that is smaller and more efficient pre-merger, acquiring a larger weaker producer in a prominent IT manufacturing sector.

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1. Introduction

In recent years, we have seen great improvement in the explanations for inter-economy differences in total factor productivity (TFP). The supply of reliable micro datasets has allowed factor misallocation to be identified as the major source of economy-wide TFP differences. In this vein, [Restuccia and Rogerson \(2013\)](#) recently surveyed research related to resource misallocation and elucidated the explanations of productivity gaps across countries or sectors. However, carefully reviewing this recent emergence of research on misallocation shows that the major focus is on the measurement and comparison of production input misallocation across different economies. Those embedded factors driving aggregate resource misallocation are yet to be investigated. In this research, we thus investigate one potential source of misallocation: we discuss how the exit of producing firms through mergers improves or exacerbates the aggregate optimal allocation of production inputs within the highlighted sector. In extending the general effects of input misallocations as delineated by [Restuccia and Rogerson \(2008, 2013\)](#), we obtain solid evidence to support justifications for a change of production schemes in the modern manufacturing sector.

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In extending the current research on measures to include potential misallocation in the modern manufacturing sector, a natural question arises: why should we care about misallocation in the modern manufacturing sector? We care because many governments in developing economies treat this sector as a source of growth or industrialization, and severe controls on entry and exits usually intensify misallocation across production firms.¹ Academic studies inquiring into the emergence of industrial policies have debated whether more active policies could be instrumental in fostering aggregate productivity growth. There is increasing evidence that government intervention has undesirable effects on distorted markets. For example, [Baldwin \(1969\)](#) followed by [Stigler \(1971\)](#) casts doubt on the view that infant industries should be protected or that controls are necessary over entry, which are both policies sought by a limited number of firms possessing political power. However, [Stiglitz et al. \(2013\)](#) argue that the market economies of the United States and Europe might have collapsed without active government intervention. The debate on industrial policy still exerts influence on the recent waves of mergers and acquisitions. The key issue is whether government intervention involving the unilateral prohibition of industrial merger activity would actually harm productivity. Based on the above argument elaborated from the current literature, inconclusive decision schemes could be detrimental to potential productivity gains from a merger that may facilitate better production input utilization. Current criteria for regulating market concentration would only contribute to partial facts unrelated to the potential productivity improvement after a merger. Judging from the limited but potentially distorted information set by the absolute line of post-merger HHI ceilings, this paper endeavors to complement the decision criteria for merger regulation. Accordingly, we provide a framework for evaluating productivity gains or losses attributable to the government-permitted mergers of production firms, where productivity changes could be caused by superior or inferior managerial synergies post-merger.

Several studies in the literature discuss the noticeable differences between firms in terms of productivity. Firms may experience shocks that, in turn, cause them to use their production inputs more optimally; those idiosyncratic shocks may also result in industry-level or country-level differences in productivity. Conventional neoclassical thinking has long neglected inter-firm differences in the optimal usage of production inputs and typically considers an environment in which firms equalize the marginal contribution of the last unit of production input with the procurement cost in a perfectly competitive input market. However, recent studies have identified various types of product input utilization that may deviate from the theoretically computed optimal input allocation. This type of inability to optimally utilize production inputs in an industry can result in a shortfall of industry-level outputs.² In addition, the literature has noted that market distortions affect the differences in TFP in many countries, regardless of whether they are rich or poor, fast or slow growing. Some distortions reflect intentional government policies such as capital subsidies or preferential tax treatments that favor particular firms or business activities. Other distortions reflect exclusive seller's power that can lead to substantial monopoly rents. The work done by [Peek and Rosengren \(2005\)](#) shows that this type of misallocation is a severe issue in Japan. [Greenwood and Krusell \(2007\)](#) develop a model and argue that the level of financial development affects the allocation of resources across different producers within an industry. [Hsieh and Klenow \(2009\)](#) focus on resource misallocation in India and China and primarily attribute production efficiency loss in these countries to differences in government policies. These distortions both theoretically and empirically influence differences in TFP across industries in different countries.

Interestingly, whereas many aspects of the TFP gap between different economies as caused by resource misallocation have been extensively studied, the economic literature has almost entirely neglected the intrinsic factors driving these levels of misallocation. [Uras and Wang \(2016\)](#) have taken the lead in investigating the influence of cross-industry production flexibility on measured input misallocation, emphasizing the importance of technique misallocation for industry-level TFP. [Uras and Wang \(2016\)](#) provided a micro-foundation of technique misallocation, which arises from heterogeneous technique capabilities; these diverse capabilities can be attributed to a varied firm-level stock of innovation expertise. In this paper, we take an alternative perspective on whether firm exits through mergers may be crucial determinants of misallocation.³

To guide discussion on the optimal usage of production inputs, we introduce the concept of “resource misallocation” as illustrated by [Hsieh and Klenow \(2009\)](#) to the current research. Thus, we adapt their gauge of resource misallocation to develop a measure of efficiency improvement based on input reallocation. The Lucas span-of-control model is introduced to govern the returns to scale within the TFT-LCD industry. The developed TFP measure thus integrates the contribution of firm-level specific productivity to so-called organizational capital and the industrial span of control for firms in the Taiwanese TFT-LCD industry. When discussing the TFT-LCD industry, given its crafted production processes, one cannot avoid noticing the sizeable contribution of firm-specific productivity or organizational capital to the production of output. In addition, although perhaps to a lesser extent, the developed TFP measure can also be applied to analyses in other newly industrialized economies. Our measure of production efficiency is supported by a unique dataset of detailed firm-level information, as we collected a novel micro dataset for the Taiwanese TFT-LCD industry. The main empirical challenge in studying the TFT-LCD

¹ The protection of infant industry argument originated in relation to “tariff barriers” from 1816 through 1945. For example, trade tariffs in the United States were among the highest in the world. [Warwick \(2013\)](#) indicates that industry policies focused on industry structural adjustments have resulted in industry upgrades in several OECD countries including France, Japan, the Netherlands, and the United States.

² Conventional classical models employ aggregate production at the national or industrial level and ignore the interplay between firm dynamics and economic fluctuations in the growth and development field. The modern literature discussing heterogeneous firms stems from the basic theoretical framework by [Eaton and Kortum \(1999, 2002\)](#) and [Melitz \(2003\)](#).

³ Whereas [Uras and Wang \(2016\)](#) emphasize the role played by technique misallocation, our analysis studies misallocation caused by firm exits through mergers.

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