



# Firm investment and exporting: Evidence from China's value-added tax reform<sup>☆</sup>



Qing Liu<sup>a,\*</sup>, Yi Lu<sup>b</sup>

<sup>a</sup> School of International Trade and Economics, University of International Business and Economics, Beijing 100029, China

<sup>b</sup> Department of Economics, National University of Singapore, 1 Arts Link, 117570, Singapore

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## ABSTRACT

This paper contributes to the literature by identifying the causal effect of firm investment on exporting behavior. The identification hinges on regional variations in the 2004 value-added tax pilot reform in China, which generated positive investment shocks. The instrumental variable estimation results show that firm investment significantly and substantially increases the likelihood of exporting, and this effect is largely due to the positive effect of firm investment on firm productivity. Finally, the paper documents some heterogeneity of the effect across industries with different degrees of competition and financial constraints.

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## 1. Introduction

*“The key unanswered question is how firms obtain the characteristics that allow them to easily enter the export market.”* Bernard and Jensen (2004)

A robust finding from recent firm-level analyses is that exporters are more productive than non-exporters (for a review of empirical evidence, see Bernard et al., 2012). The leading explanation is that firms with better characteristics (such as productivity) self-select into export markets (for a review of firm heterogeneity theories, see Redding, 2011). However, a question that continues to intrigue researchers is how firms obtain superior characteristics to facilitate their entrance into the export market, as exemplified in the above quotation.

Recent literature has emphasized the importance of firm investment in technology upgrading for successful exporting (see, for example, Damijan et al., 2008; Cassiman et al., 2010; Iacovone and Javorcik, 2012). However, there is an inherent empirical challenge to establish the causality from firm investment to exporting; that is, investment and

exporting decisions are jointly determined. For example, Atkeson and Burstein (2010), Lileeva and Trefler (2010), Aw et al. (2011), and Bustos (2011) all model the simultaneous selection of investment in technology upgrading and exporting. Meanwhile, another complication in the identification is that there could be reverse causality from exporting to investment. For example, Criscuolo et al. (2010) find that among several thousand U.K. enterprises across all industries in 1994–2000, those engaging globally spend more resources on innovation.

This paper contributes to the literature by using a quasi-natural experiment to identify the causal effect of firm investment on firm exporting. In 2004, China started to reform its value-added tax (VAT) system in six broadly defined industries in the three northeastern provinces.<sup>1</sup> Under the new taxation system, the purchase of fixed assets can be deducted from the tax base, which substantially lowers the cost of fixed assets (e.g., by 13 to 17%) and hence generates substantial tax incentives for firms to invest. Previous studies (e.g., Chen et al., 2011) have shown that the VAT reform indeed increased firm investment.

Our empirical analysis uses regional variations generated by the 2004 VAT reform, that is, the reform was first piloted in only 3 of 31 provinces, as an instrument for firm investment. Meanwhile, to further improve our identification, we adopt a plausibly exogenous instruments framework developed by Conley et al. (2012), which relaxes the strict

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\* Corresponding author.

E-mail addresses: [qliu1997@gmail.com](mailto:qliu1997@gmail.com) (Q. Liu), [justinly6@gmail.com](mailto:justinly6@gmail.com) (Y. Lu).

<sup>1</sup> Chandra and Long (2013) use another feature of the 2004 VAT reform (i.e., the sharing rule between local and central government in providing export rebates) to identify the effect of the export tax rebate on exporting performance.

exogeneity condition of the instrumental variable. We find that firm investment has a positive and statistically significant effect on the probability of exporting. Specifically, the average exporting propensity of northeastern firms increases by 2.39% due to the increase in fixed investment after the reform, which is large relative to the average exporting propensity of 32.94% for the whole sample. These findings are robust to a battery of sensitivity checks, including using a different standard error estimation, checking a multi-industry issue, using a surviving firms sample, using an alternative measurement of investment incentives, and using different subsamples.

To shed light on the underlying mechanisms through which firm investment increases the probability of exporting, we first show that firm investment significantly improves firm productivity, which in turn significantly increases the probability of exporting. We also find that the effect of firm investment on the probability of exporting is larger in industries facing larger financial constraints, implying that firms are bounded on the supply side of credit and the VAT pilot reform largely increased firm investment by reducing credit constraints. We further find that the effect of firm investment is larger in more competitive industries, suggesting that firms in less competitive industries may partially pass the effect of the VAT pilot reform to their consumers, resulting in a smaller effect.

The remainder of the paper is organized as follows. Section 2 lays out the estimation framework, including a description of the institutional background of the VAT reform in China, a brief discussion of the conceptual framework, data and variables, and the identification strategy. Empirical findings, including main results, robustness checks and mechanisms, are presented in Section 3. The paper concludes with Section 4.

## 2. Empirical strategy

### 2.1. Value-added tax reform in China

The VAT is a widely-used type of tax. For example, more than 130 countries (including both developed and developing countries) have adopted VAT and raised about 20% or more of their tax revenues from it. The advantage of the VAT lies in its simplicity and efficiency due to the low administration cost and less economic distortion.<sup>2</sup> A commonly used type of VAT is the consumption type, that is, the tax is levied based on the difference between firms' total sales of their products and their purchases of all inputs (including fixed assets).

China introduced the VAT nationwide in its 1994 fundamental tax reform. The standard tax rate was 17%, while for some goods, such as agricultural products, the tax rate was 13%. Since its introduction, the VAT has become the major source of tax revenue for the Chinese government. For example, VAT revenue in 2007 accounted for about 31% of total tax revenue.<sup>3</sup>

However, before the reform in 2004, China's VAT was different from the standard consumption type VAT in other countries, as firms' investment in fixed assets was not deductible from the tax base. Therefore, fixed assets were taxed twice: once directly when firms purchased the assets and once indirectly when consumers bought goods produced with these assets. Such double taxation raised the cost of fixed assets and discouraged firms' investment in fixed assets. The adoption of the so-called production type VAT was an outcome of China's economic conditions at the time when the VAT was introduced. In 1994, China's economy was experiencing overheating and the central government faced stringent budget constraints. As a result, the production type VAT was conceived as a way for the central government to raise tax revenue and restrain investment in fixed assets.

A decade after the 1994 reform, the overall economic environment in China had changed significantly. On the one hand, through a series of fiscal centralization policies, the fiscal position of the central government improved substantially: from 1995 to 2004, budgetary revenue increased from 10.8% to around 20% of GDP. On the other hand, the macroeconomic austerity policy since mid-1993 effectively controlled the crisis of overheating and hyper-inflation. The new question faced by the Chinese reformists was how to deepen the economic reform, such as by providing a level playing field and improving the competitiveness of firms.

As a way to stimulate investment and promote an equitable market environment, the central government started to consider reforming its VAT system. On September 12, 2004, the Chinese Ministry of Finance and the State Administration of Taxation officially announced that China would reform its VAT system in six broadly defined industries (i.e., equipment manufacturing, petroleum and chemical manufacturing, metallurgy, ship building, automobile manufacturing, and agricultural product processing industries) in three northeastern (NE) provinces (i.e., Liaoning, Jilin, and Heilongjiang).<sup>4</sup> The new VAT regime was applicable to transactions from July 1, 2004 onward. The crux of this VAT reform was to change the previous production type VAT to the standard consumption type VAT. Under the new VAT system, the purchase of fixed assets could be deducted from the tax base, which would substantially lower the cost of fixed assets (e.g., by 13 to 17%). Three years later, the reform was expanded to include another 26 cities in six central provinces and mining and electricity industries. Finally, the new VAT policy became applicable to all provinces and all industries in January 2009.

Table 1 lists eligible as well as ineligible manufacturing industries in the VAT pilot reform in 2004. The majority of manufacturing industries are eligible and the inclusiveness in classification makes it particularly difficult for firms to switch industries to take advantage of the tax incentive, ensuring that the same firm was either eligible or ineligible before and after the pilot reform. Meanwhile, as shown by Chen et al. (2011), the distribution of eligible and ineligible firms is balanced between NE and non-NE cities and before and after the pilot reform, which makes concerns about the industry selection problem less severe.

### 2.2. Conceptual framework

To illustrate how the VAT reform affects exporting behavior (through investment in technology upgrading), we briefly discuss a conceptual framework that extends the heterogeneous firm framework developed by Melitz (2003) to a two-period one. Specifically, in the first period, upon paying a fixed cost of entry, firms draw their productivity levels, and then decide whether to exit the market immediately or start production. If firms choose to produce, they need to pay a fixed cost of production, and at the same time have two additional options—export to the foreign market (with a fixed cost) and invest in technology upgrading (with a fixed cost). Investment in technology upgrading will increase firm productivity to a given level (which is assumed to be higher than the cutoff productivity level of exporting).<sup>5</sup> In the second period, if a firm invests in technology upgrading in the first period, it will have a new productivity level in the second period and the firm reconsiders its production and exporting behavior based on the new productivity. For firms who do not invest in technology upgrading, their production and exporting behavior in the second period will be the same as in the first period.

The VAT reform in China changes the cost of investment in technology upgrading, as shown in the previous section, in northeastern cities where such investment was absent in firms for years. To fit into this institutional context, we assume that (1) before the reform, the VAT is

<sup>2</sup> Metcalf (1995) discusses the basic concept and administration issues of the VAT. Using data from OECD countries, Dougan and Zhang (2010) show that the VAT is neutral to private saving, whereas income taxation has a substantial negative impact on private saving. See also Auerbach (2009) and references therein.

<sup>3</sup> See <http://finance.people.com.cn/GB/1045/8324441.html> (accessed August 21, 2012).

<sup>4</sup> See "Decisions on the Expansion of Deduction of Value-Added Taxation in the Northeastern Provinces" (<http://www.chinatax.gov.cn/n8136506/n8136563/n8193451/n8193556/n8194481/8249242.html>).

<sup>5</sup> See, for example, Lileeva and Trefler (2010) for the similar assumption.

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