The Impact of Regional and Institutional Factors on Labour productive Performance : Evidence from the Township and Village Enterprise sector in China

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1. INTRODUCTION

The primary objective of economic policy in China over the last three decades has been to raise national prosperity via a series of economic reforms designed to achieve faster industrialisation and increased marketization of the economy (Naughton, 2007; Ward, 2015). Within this overall objective, regional inequality between the three macro-regions (Eastern, Central, and Western) has been regarded as one of the three main problems (along with corruption and pollution) for China's further sustainable growth (Fredrik et al. 2013; Li and Gibson, 2013; Ke, 2015; Chen, 2010). In recent years considerable weight has been placed on the desirability of promoting faster growth within the poorer provinces, particularly in the Central and Western regions, to ensure that increased national prosperity is eventually associated with reduced regional disparities (Chen, 2010; Bao, et al., 2002; Ward, 2015; Zheng, 2011). A key element within this overall strategy has been the development of Township and Village Enterprises (TVEs), which are seen as a driving force for faster growth and especially for reducing inequality between urban and rural sectors across the three macro-regions (Shen and Tsai, 2016). Given the focus on regional concerns in the development of national economic policy, and given the perceived role of TVEs as an important vehicle for raising growth, it is important to understand the factors that determine productivity in the TVEs and how they can play a part in promoting reduced regional inequality.

The rapid growth of the TVE sector has attracted considerable academic attention (Kung and Lin, 2007) and a number of studies have examined TVE productive performance (for example, Ito, 2006; Fu and Balasubramanyam, 2003; Wang and Kalirajan, 2002).

However, many of them have focused on the analysis of total factor productivity (TFP) at the national aggregate level. Less attention has been paid to labour productivity or regional variations in its determinants, and it remains unclear how regional and institutional factors affect labour performance across the three regions in the TVE sector. Our research motivation is, therefore, to investigate regional variations in the determinants of labour productivity in the TVE sector, including the regional impact of national institutional factors. The focus on labour productivity is particularly pertinent given that the vast majority of TVEs are small and medium-sized enterprises (SMEs), and the sector is much more labour intensive in comparison with the state-owned enterprises (SOEs), which are typically larger in size and more capital intensive. Our objective in this paper is to contribute to the literature by providing not only a detailed understanding of the regional determinants of labour productivity but also the sources of regional variations in labour performance. In addition, our paper will reveal the impact of the institutional factor – the Chinese government privatisation reforms on the TVE labour productive performance.

We consider three related issues. First, we identify the factors that influence national and regional TVE labour productivity. Secondly, we investigate whether the identified factors are heterogeneous across the regions and whether this heterogeneity explains regional variations in TVE labour productivity. Thirdly, we examine how the institutional factor of privatisation affected TVE labour productivity over the time period of the study. The findings of the study should provide useful information for policy-makers about how to improve TVE labour efficiency and how to reduce regional inequalities in regional performance. Our hope is that the study also carries policy implications for other developing economies in Africa and Asia, about the ways in which industrialisation and productivity improvements can be promoted, particularly in rural areas. The remainder of the paper is structured as follows. Section 2 examines the nature of regional variations in TVE labour productivity. Section 3

discusses the analytical framework and identifies the specific questions to be examined. Section 4 discusses the statistical methodology, and section 5 presents the empirical results. The final section 6 provides a summary with concluding comments.

2. THE TVE SECTOR AND REGIONAL PRODUCTIVITY VARIATIONS

The TVEs are industrial enterprises operated in rural areas (Putterman 1997; Zhan, 2015). The vast majority of the TVEs are characterised as SMEs in labour-intensive manufacturing industries producing textiles, toys, clothing, and food processing (Fu and Balasubramanyam, 2003; Shen and Tsai, 2016). They are either collectively owned by local township and village governments (also known as commune and brigades enterprises) or privately owned by rural households (Ito, 2006; Putterman 1997; Tong, 1999). However, most of the collectively owned TVEs were privatised during the rural industrial reforms for market liberalisation in 1996-2001 (Dong, et al. 2006; Zhan, 2015). Due to credit and financing constraints, the TVEs have limited access to formal financing sources such as banks or credit cooperatives (Beck, et al. 2015; Fu and Balasubramanyam, 2003). They are more self-financed through informal financing sources, such as their own profits or even individual family members or friends, which is seen as an essential financing channel for privately owned TVEs (Beck, et al. 2015).

The TVE sector experienced a dramatic development following China's economic reforms in 1978 (Tong, 1999). The sector had an even more rapid expansion and became a major driving force for China's remarkable economic growth after 1984 when the Chinese government approved the "Report on creating a new situation in commune and brigade-run enterprises" (Fleisher and Wang, 2003; Tong, 1999). China further launched its deepening economic reforms in the middle of the 1990s, including rural economic reforms for privatising the TVE sector (Shen and Tsai, 2016).

The rapid growth of TVEs in rural areas has been one of the great successes of the economic reforms implemented by China in the 1980s and has played an important role in the transition from central planning to a more market-orientated economy (Huang, 2008; Naughton, 2007; Jefferson, 1998; Kung and Lin, 2007). The development of TVEs has been a key factor in the development of industrialisation and urbanisation in China's rural regions (Ding et al, 2004; Kung and Lin, 2007; Shen and Tsai, 2016). TVEs contribute a third of the country's total GDP and half of its exports (Au and Henderson, 2006; Naughton, 2007; Ding et al, 2004; Liu and Diamond, 2005). Employment within the sector grew from 28 million in 1978 to a peak of 146.8 million in 2006, accounting for 30 percent of the employment of the rural workforce (China TVE Yearbook, 2007). The TVE sector is seen as a more dynamic and efficient alternative to the state-owned enterprise (SOE) sector (Kung and Lin, 2007; Naughton, 2007; Shen and Tsai, 2016). The strong employment performance of the TVE sector has been important in the implementation of China's SOE reforms, providing manufacturing jobs (Zhan, 2015), and absorbing not only surplus labour from rural sector but also the labour released from the SOE sector (Chang, et al. 2003; Dong, 2005; Dong, et al., 2006; Fu and Balasubramanyam, 2003; Li and Rozelle, 2004).

As a result of their collective or private ownership, TVEs generally have higher managerial autonomy and flexibility compared to SOEs (Chang, et al. 2003; Kung and Lin, 2007; Weitzman and Xu, 1994). Partly as a result of this flexibility, and because they typically face tighter budget constraints than the SOEs (Beck, et al. 2015), it is generally recognised that TVEs operate in a more market-orientation manner and respond more effectively to economic incentives. As a consequence of their more outward exporting orientation and greater managerial autonomy, TVEs have also attracted a considerable amount of foreign direct investment (FDI) (Shen and Tsai, 2016), acting as an "efficient conduit" for the transfer of capital, advanced technology, and managerial skills (Fu and

Balasubramanyam, 2003; Buckley, et al, 2007; Au and Henderson, 2006). The result is that TVEs are generally more productively efficient and have achieved higher total factor productivity growth than SOEs (Ito, 2006; Dong, et. al., 2006; Fu and Balasubramanyam, 2003; Jefferson, 1998; Kung and Lin, 2007; Woo, et al, 1994; Weitzman and Xu, 1994).

Despite the overall strong performance of TVEs, there is considerable inequality between the three macro-regions of the country. Dong and Putterman (1997) report significant differences in TVE total productivity across the provinces with an average gap of almost 2:1 between the highest and lowest ranking provinces. Tong (1999) finds similar regional disparities between coastal and non-coastal regions in TVE total productive efficiency. The extent of regional disparities in performance is illustrated by Table 1, showing TVE labour productivity variation between the three macro-regions in 1994 and 2008. In 1994, average labour productivity in the Eastern region at 5.13 was over twice the 2.82 level of the Central region and just under twice the 2.35 level of Western Region. By 2008, labour productivity had increased across all regions, but the 34.15 figure for the Eastern region was still almost twice the 17.80 and 17.20 figures recorded respectively for the Central and Western regions. The implication is that while output and labour productivity were rising across all three regions, there was hardly any change in the overall disparity in regional TVE performance.

Insert Table 1 about here

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3. ANALYTICAL FRAMEWORK AND HYPOTHESES

The traditional approach to the analysis of productivity takes as its starting point a statement of the nature of the production process (see Zhang, 2014). With capital (K) and labour including human capital (L) as the productive inputs, and technology (A) as the factor

determining the productivity of those inputs (equivalent to TFP), the production process can be represented by the general production function:

$$Y = A\, f(K\,, L) \tag{1}$$

In this formulation, changes in output can arise either from changes in the quantities of labour and capital employed or changes in the productivity of those inputs, as described by the behaviour of the technology term:

$$\frac{dY}{dt} = \frac{dA}{dt} + f_K \frac{dK}{dt} + f_L \frac{dL}{dt} \tag{2}$$

The production function can alternatively be written as a relationship between output per person (labour productivity) and the corresponding per capita measures of the inputs (the constant returns to the scale are assumed):

$$\frac{Y}{L} = \frac{A}{L}\ f\left(\frac{K}{L}, \frac{L}{L}\right) \tag{3}$$

Using *y*, *a,* and *k* to represent respectively output, technology and capital, measured per unit of labour, equation (3) can be written more concisely as:

$$y\ = a\, f(k\,, 1\,) \tag{4}$$

And changes in labour productivity over time are then:

$$\frac{dy}{dt} = \frac{da}{dt} + f_K \frac{dk}{dt} \tag{5}$$

Equation (5) indicates that changes in the overall productivity of labour (*dy/dt*) can in principle arise from changes in the productivity of both the labour and capital inputs (summarised in the TFP term, *da/dt*) or changes in the quantity of capital used by each person (*dk/dt*).

Our paper seeks to identify the factors that determine labour productivity in TVEs and assess whether these factors account for regional variations in TVE performance. We assume that labour productivity is determined by a variety of inter-related factors, including labour-related, capital-related, market-related, and institutional-related factors that determine the efficiency with which the inputs are used.

(a) Labour-Related Factors

Human Capital. Numerous authors have suggested that human capital is one of the most important determinants of labour productivity and that labour skills and labour quality can be effectively proxied by educational attainment (Buckley, et al. 2007; Wei and Liu, 2006; Zheng, et al. 2004). In our formulation, educational attainment is measured by the number of employees educated at the higher education (HE) level. The presumption is that *labour productivity is positively associated with human capital.*

Real Wages. The standard analysis of wage determination suggests that real wages should reflect the productivity of labour, with higher productivity suggesting higher real wages. At the same time, efficiency wage theories imply that the direction of causation can also work in the other direction, and that higher wage levels can raise productivity by encouraging increased employee effort and efficiency (Dong and Putterman, 1997; Fleisher and Wang, 2003). We do not attempt to address the issue of causation here and our concern is whether there is in fact a significant relationship between wages and productivity. The presumption is that *there is a positive association between real wages and productivity.*

(b) Capital Intensity-Related Factors

Capital Investment. Investment in capital equipment acts to increase the productivity of labour if it raises the capital-labour ratio. At the same time, because new investment in machinery and equipment (M&E) typically embodies the latest technologies, it can also act to

raise labour productivity via the use of more productive capital. In practice it is difficult to separate these quantity and quality factors and we focus simply on the magnitude of capital investment that the firms undertake, which we use as a proxy for capital intensity. The presumption is that *higher capital intensity is associated with higher labour productivity.*

Firm Size. If firms can achieve economies of scale as they grow larger, it implies that labour and capital can be utilized more efficiently as firm size increases, with a resulting observed increase in labour productivity (Fu and Balasubramanyam 2003; Buckley et al 2007). We include this factor by examining whether productivity is related to the size of the firm. The presumption is that *labour productivity is positively related to TVE firm size.*

Agglomeration Effects. Agglomeration effects arise when business and industrial activities cluster into particular locations, "so as to exploit local scale externalities and market linkages in the production and distribution of goods" (Au and Henderson, 2006, p351). This agglomeration of business activities can help to boost productivity by reducing transactions costs (Porter, 1998) and by stimulating innovation (Zheng, 2011). Although agglomeration effects are related to the scale of production, they arise from the scale of the industry and its geographical concentration rather than firm size as such. We examine whether agglomeration acts a separate factor influencing productivity, independently of firm size, the presumption is that *a higher degree of agglomeration in TVE activities is associated with higher TVE labour productivity*.

(c) Market-Related Factors

Export Intensity. The productivity of labour and capital depends in part on the market environment in which the firm operates and how the firm itself is managed. The literature has identified several managerial and market-related factors that have influenced TVE productivity (see Ito, 2006; Fu and Balasubramanyam, 2003; Wang and Kalirajan, 2002).

Although these factors are difficult to quantify, it has been argued that liberalization in foreign trade helps to increase productivity because exposure to foreign market conditions implies a more competitive environment and a greater outward-orientation, which both encourage greater managerial efficiency and flexibility (Krishna and Mitra, 1998; Ito, 2006; Fu and Balasubramanyam, 2003; Li, 2003; Chen, 2002). The presumption is that *higher export intensity is positively associated with higher labour productivity*.

Foreign Intensity. It has been argued that foreign involvement in domestic production helps to promote increased productivity, partly through the direct effect of increased capital accumulation when foreign direct investment (FDI) occurs, but also because foreign involvement brings indirect (spillover) effects such as demonstration-imitation effects, competition effects, foreign linkage effects and training effects, which raise productivity by promoting a more efficient use of capital and labour (Buckley, et al, 2007; Kinoshita, 1998; Zheng, et al. 2004; Zhang, et al, 2014). However, the literature also points to the possibility that foreign-related effects can be negative as well as positive. Some studies find positive spillover effects, indicating that inward FDI increases the productivity of indigenous firms (for example, Cave, 1974; Blomostrom and Persons, 1983; Kokko, 1994; Kokko, 1996; Wei and Liu, 2006), while others find no effect or even negative effects (for example, Buckley et al, 2007; Globerman, 1979; Haddad and Harrison, 1993; Kholdy, 1995; Cantwell, 1995). The argument here is that indigenous firms may not benefit from association with foreign firms because of a weak ability to absorb the spillovers due to large technology gaps and weak links between the foreign and indigenous firms (Buckley, et al, 2007; Zheng, et al, 2004). More fierce competition may lead indigenous firms eventually to be displaced by foreign firms (Globerman, 1979; Buckley and Casson, 1991; Kholdy, 1995; Cantwell, 1995). Studying the impact of inward FDI on productivity of Chinese indigenous firms, Zhang, et al. (2014) found a positive spillover effect with a diminishing rate over time. Fan (1999) found

FDI has a positive effect on productivity growth for collective-owned enterprises (COEs), but a negative effect on that of SOEs. Overall, the balance of opinion suggests that the impact of foreign involvement is likely to be ambiguous. We include foreign intensity as one of the factors, alongside export intensity, which can affect the business environment and the efficiency with which labour and capital are utilised by the firm. The presumption is that *foreign intensity associated with TVE labour productivity can be either positive or negative.*

(d) Institutional-Related Factors

Institutional factors influencing the business environment can have an important impact on productive efficiency, particularly for firms operating in a transitional economy (Buckley, et al. 2007). As discussed earlier, the major institutional change in the TVE sector is the privatization reform implemented in the mid-1990s, with private-owned TVEs performing much better than the collective-owned TVEs (Chang, et al. 2003). According to Dong, et al. (2006), three quarters of collective-owned TVEs were partially or wholly privatised during the TVE ownership reforms between 1996 and 2001. Noted by Ito (2006), the privatising was a gradual process triggered by dispersed property rights, the tax reform introduced in 1994 by the centre government, and declined firms' profit rates. The privatisation was aimed at generating efficiency gains in the TVE sector under a more liberalized market regime (Kung and Lin, 2007; Ito, 2006).

However, the evidence is mixed about the impact of the privatisation on TVE performance (see Li and Rozelle, 2004; Wang and Kalirajan, 2002; Ito, 2006; Dong, et al, 2006; Dong and Putterman, 1997; Pitt and Putterman, 1998; Svejnar, 1990; Kung and Lin, 2007). Kung and Lin (2007) argue that privatization diminished "the initially leading role of TVEs in economic development". Ito (2006) examined a panel data set, including 100 rural enterprises in Yixing county of Wuxi city in Jiangsu province from 1995 to 2000, and

concluded that privatization had no effect on TVE productivity. Similarly, Dong, et. al., (2006) examined survey data of 168 manufacturing enterprises in Nanjing (capital city of Jiangsu province) in 2002 and found no significant productivity or profitability gap between the reformed and unreformed TVEs. Interestingly, Dong and Putterman (1997), using firm-level data of 200 TVEs located in ten provinces between 1984 and 1989, found that TVEs owned by township and village governments were more efficient than those under private and other forms of ownership. In contrast, Pitt and Putterman (1998) and Svejnar (1990) found no significant difference in TVE productivity between township/village owned and privately owned enterprises. Using firm level data of 88 privatized TVEs in Jiangsu and Zhejiang provinces between 1994 and 1997, Li and Rozelle (2004) reported a significant positive effect of privatization on labour productivity. Our analysis incorporates this factor to examine the privatisation's impact on TVEs' labour efficiency gain, with the presumption that *privatization has either a positive or negative effect on TVE labour productivity*.

4. METHODOLOGY

We employ a balanced panel dataset at the provincial level, covering 29 provinces over the 20 years from 1993 to 2012. The data are collected from the series years of the *China's Township and Village Enterprises Yearbooks* (1994-2013), which provide aggregate data at the TVE sectoral level. Due to data availability, our analysis is focused on regional differences in productivity at the aggregate TVE sectoral level accordingly. We use the three-regional-division (i.e. Eastern, Central, and Western regions) approach to investigate regional variations in TVE labour productivity (Zheng, 2011).

The dependant variable in our study is TVE average labour productivity, measured by the ratio of TVE sector gross outputs to the numbers of employees in the TVE sector. The explanatory variables are measures of the various labour, capital, market-related, and

institutional factors discussed in the last section. Table 2 lists all of the explanatory variables, with their precise definitions and the sign of the expected relationship with labour productivity.

Insert Table 2 about here

We utilize a combination of panel data estimation methods to examine the determinants of TVE labour productivity and whether and how regional characteristics affect the performance across the three macro-regions. We assess the potential impact of the institutional privatization on regional labor productive performance by incorporating three time-dummy variables to capture any initial effect and subsequent 5-year and 10-year impacts. Our panel data analysis poses some econometric issues that can be described in the context of a simple equation:

$$P_{it} = \alpha + \beta' \chi_{it} + \eta_i + \mu_t + \varepsilon_{it} \qquad (6)$$

Where P_{it} are the cross-section time series of the labour productivity measure for each province, χ_{it} represents the explanatory variables for province i and year t, η_i and μ_t denote respectively the province-specific fixed and time effects, and ε_{it} is the error term.

The parameters of equation (6) allow for fixed province effects and year dummy variables. The year dummies control for the effects that are specific for a certain year and have an impact on all TVEs in a given year. The province-specific fixed effects control for unobserved heterogeneity across the regions, capturing effects that do not vary over time, such as geographical and cultural factors inherent to a province.

For the purposes of estimation, we transform our initial static model into a dynamic model in order to control for omitted variable bias and endogeneity (see Caselli et al, 1996; Griliches and Mairesse, 1998). To account for the possible endogeneity bias due to potential interactions between the explanatory variables and the performance indicators, we employ the system GMM-estimator, developed by Blundell and Bond (1998), which deals with these problems by using instrumental variables:

$$P_{it} = \alpha p_{it-1} + \beta' \chi_{it} + \eta_i + \mu_t + \varepsilon_{it} \qquad (7)$$

In this equation, P_{it} is the dependent variable of labour productivity, p_{it-1} is a one year lag of the dependent variable (included to capture the adjustment process of the dependent variable to the desired level), and χ_{it} represents the explanatory variables. The terms η_i and μ_t denote respectively the unobserved common factor affecting all provinces and a province effect capturing unobserved country characteristics. To solve the potential problem of endogeneity of the regressors, suitable instruments are needed (see Griliches and Mairesse, 1998). We rely primarily on internal instruments, along the lines described by Arellano and Bond (1991). The use of instruments is required to deal with the likely endogeneity of the explanatory variables, and the problem of constructing the new error term, which is correlated with the lagged dependent variable. Assuming that the time varying disturbance ε is not serially correlated, and the explanatory variable χ is weakly exogenous (they are uncorrelated with future realization of the time varying error term), and lagged values of the endogenous and exogenous variables provide valid instruments, consistent with Bond et al (2001), the system GMM approach is preferred to the difference estimator (Arellano & Bover, 1995; Blundell & Bond, 1998; Arellano & Bond, 1991). A two-step estimation procedure is adopted instead of a one-step approach because the former is heteroscedastcity consistent. The Arellano-Bond (AB) test for serial correlation in differences and the Sargan-

Hansen test for over-identifying restrictions are employed to assess the absence of serial correlation in the residuals and instruments validity respectively.

5. RESULTS

The empirical results from the dynamic effect model (GMM) in a logarithmic form are reported in Table 3 for the determinants of TVE labour productivity at both the national and regional levels, together with test results for serial correlation and instrument validity. The Arellano-Bond test indicates the absence of any significant second-order serial correlation across the specifications and the Hansen test results suggest that our instruments are valid.

Column (1) for the whole country model shows that all variables are positively signed and statistically significant at high levels of 1% and 5%, except for the agglomeration effect variable. The results indicate that the labour productivity gains are more like to accrue from the labour-related, market-related, as well as capital related factors. Increased human capital, the real wage, foreign intensity, and export intensity will result in a higher labour productivity. However, the three capital-related variables behaved differently. The capital investment and firm size variables are significant, which is in contrast to insignificant agglomeration effect variable. This may suggest that the labour efficiency gains have been generated more from internal rather than external economies of scale. The time dummy variables show the duration and 10 years post-privatization effect are positive and significant. A possibility interpretation here is that the privation effects are positive, but they take time to exert their influence.

Insert Table 3 about here

Column (2), (3), and (4) report the regional results for the Easter, Central, and Western regions, respectively. The general picture that emerges is that the human capital, the real wage, and firm size are the only factors which have a positive and significant impact, while the agglomeration variable has no effect on labour productivity across all regions of the nation, irrespective of regional characteristics. This, again, may indicate that internal factors are more important than external economics of scale in promoting labour productive performance. For all other factors, there is significant regional diversity variation. For example, increased capital investment appears to have had a significant (positive) impact only in the Western region. This may be connected with the fact that this is probably the region in which the capital base is lowest, suggesting that capital investment in that region would be more productive than in the other regions. On the other hand, the foreign intensity variable appears to be positively significant in the Eastern and Central regions, but not in the Western region, which can be explained by the Chinese government preferential policies in attracting FDI into the Eastern and Central regions, generating a positive direct and indirect spillover impact on the labour productivity in the TVE sector. The export variable is significant in the Eastern and Western regions but not in the Central region, which may be connected with the fact that the two regions have been more outward-orientated and dynamic compared with the Central region, for the longest period, allowing time for the usual connection between exports and productivity to be established. Similarly, the results for the three time-dummy variables are significant in the Eastern and Western regions but not in the Central region. This suggests that the privatization reform had a positive and significant effect on TVE labour productivity in the Eastern and Western regions and that the impact was significant in terms of both initial and subsequent effects. In contrast, the impact of privatization for the Central region is positive but not significant. The findings for the Eastern and Western regions is in line with that of Li and Rozelle (2004), who also found that

privatization improved TVEs' productivity performance. According to the magnitude of the coefficients for the three different periods (duration, post 5-year, and post 10-year), the effects have been increasing over time indicating that the TVE privatization reforms have had both a short run and increasingly positive long term impact on the TVE labour productivity for all regions.

Our findings suggest a significant regional variation in the determinants of labour productivity, with only human capital, real wage, and firm size as common factors affecting productive performance. We should note also that another common feature is notice both national and regional, that the lagged variable of labour productivity is positive and statistically significant for both the whole country and the three regions, suggesting a strong self-reinforcing effect with a high degree of persistence in the behavior of labour productivity, and hence slow or negligible convergence in labour productivity between regions.

6. **POLICY IMPLICATIONS**

Our findings for the determinants of labour productivity in TVE firms suggest that labour efficiency gains have been generated more from internal factors such as firm size and human capital rather than external economies of scale, such as agglomeration effects. This suggests that measures to improve labour efficiency should focus more on those internal factors rather than seeking industrial location clusters. With respect to government policy, our results suggest that positive benefits would arise from action by the Chinese government to expand higher education and enlarge or merge TVE activities to increase firm size in all three regions. However the picture is less clear with respect to measures designed to promote FDI (or foreign-firm involvement) or increase capital or export intensity. Our results suggest that these factors exhibit significant regional diversity in their impact and that this should be taken

into account in developing appropriate policy measures. Finally, to reduce regional development inequality, particular attention should be paid to the Western region, the poorest region among the three. Our results suggest that the Chinese government should provide effective preferential policies to attract more FDI into the Western region, and increase government and local investments in human and physical capital to improve TVE labour productivity.

Our results indicate that the institutional factor - government privatization reforms had an important positive impact on labour productivity at the national level and across at least two of the three regions. This finding suggests that institutional privatization can be an effective tool in promoting labour productivity, especially in rural areas. More generally, it implies that further institutional reforms should be seen as important in increasing labour productivity and generating sustainable development. This is a factor that is relevant not just for the process of industrialization in China, but also for other transitional developing countries in Asia and Africa regions.

7. CONCLUSION

In this paper we have examined the impact of regional and institutional factors on labour productivity in the TVE sector in China, which is one of the pillar industrial sectors of the economy. We have identified and compared provincial characteristics and behaviour in determining TVE labour productive performance at both the national and regional levels. Our results for the whole country suggest that human capital, real wage level, capital investment, firm size, foreign intensity, and export intensity are the most important factors determining TVE labour productivity. However, the results for the three macro-regions suggest that this conclusion masks significant regional diversity and that it would be misleading to suppose that the conclusions derived from the analysis of the whole country can be applied to every

region. The regional results suggest that the only common factors affecting labour productivity across all regions are: human capital, the real wage, and firm size factors. For all of the other determining factors, such as capital investment, foreign intensity, and export intensity, it appears that they each exert an impact in only one or two of the three regions, which suggests that the apparent significance of each of the variables at the national level is actually a reflection of only a partial regional significance. The implication is that care needs to be taken in the interpretation of results derived at the national level, and that conclusions derived from the analysis of national data may not always be applicable at the regional level. Having said this, our analysis suggests that most regions would be likely to benefit from institutional reforms designed to improve the efficiency and flexibility of the business environment.

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TABLE 1

China TVE labour productivity variation by region
(Unit: 10,000 yuan)

	1994	**2008**
Eastern	5.13	34.12
Central	2.82	17.80
Western	2.35	17.20
Total	**4.01**	**27.85**

Note: TVE labour productivity is calculated as the ratio of
TVE sector gross output to the number of employees

Source: calculated from China TVE yearbooks (1995 and 2009)

TABLE 2

Variables and Definitions

Variable	**Definition**	**Expected sign**
Labour productivity (Dependent variable)	Ratio of TVE sector gross output to the numbers of TVE employees	
Real wage (Labour-related factor)	Ratio of TVE total real wage to the numbers of TVE employees	+
Human capital (Labour-related factor)	Ratio of the numbers of TVE employees with Higher Education to total the numbers of TVE employees	+
Capital intensity (Capital-related factor)	Ratio of capital investment of TVE sector to TVE sector gross output	+
Firm size (Capital-related factor)	Ratio of TVE sector gross output to number of TVE firms	+
Agglomeration effect (Capital-related factor)	Ratio of number of TVE firms geographically located in the province to the provincial land squares	+
Foreign intensity (Market-related factor)	Ratio of numbers of foreign firms in TVE sector to total numbers of TVE firms	?
Export (Market-related factor)	Ratio of TVE sector export to TVE sector gross output	+
Privatisation (institutional-related factor)	Duration effect, years 1996-2001 = 1, others = 0; Post 5-year effect, years 2002-2006 = 1, others = 0 Post 10-year effect, years 2002-2011 = 1, others = 0	?

Note: All data are collected from the series years of *China Township and Village Enterprises Yearbooks* (1994-2013), except the data of provincial land square, which is collected from the *Chinese Statistical Yearbooks*

TABLE 3
Results from dynamic effect estimation (GMM)

	Whole country (1)	Eastern Region (2)	Central Region (3)	Western Region (4)
lprod-1 (lagged productivity_1)	0.33(0.08)***	0.31(0.11)***	0.39(0.16)**	0.29(0.15)**
lhum (Human capital)	0.05(0.02)**	0.08(0.06)*	0.05(0.02)**	0.16(0.04)***
lwage (Real wage)	0.12(0.02)***	0.16(0.06)**	0.07(0.03)**	0.19(0.06)**
lcap (Capital investment)	0.07 (0.03)**	0.07(0.06)	0.02(0.03)	0.09(0.03)**
lfs (Firm size)	0.15(0.02)***	0.15(0.02)***	0.16(0.08)**	0.14(0.04)***
lagg (Agglomeration effect)	0.01(0.00)	0.11(0.12)	0.05(0.03)	0.11(0.08)
lfdi (foreign intensity)	0.07(0.011)***	0.09(0.04)**	0.13(0.06)*	0.02(0.03)
lexp (Export intensity)	0.08(0.03)**	0.17(0.06)***	0.02(0.02)	0.04(0.02)**
Privatisation dummy	0.11(0.09)	0.10(0.04)**	0.06(0.07)	0.06(0.04)*
5-year post-Priv.	0.14(0.08)*	0.10(0.06)*	0.01(0.04)	0.07(0.03)**
10- year post-Priv.	0.20(0.06)***	0.12(0.03)***	0.01(0.05)	0.13(0.05)**
Constant	-2.9(0.57)	-0.67(1.1)	-3.9(0.53)***	-0.52(0.42)
TN	353	155	116	82
AR (2) test	0.475	0.129	0.615	0.550
Hansen test	0.95	0.94	0.89	0.89