# Contract Enforcement and Vertical Integration: Evidence from China's Manufacturing Firms*

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**Abstract**

It has been taken for granted in the literature on the determinants of vertical integration that the effectiveness of contract enforcement is guaranteed, which is far from true even in some developed countries. In this paper, using a World Bank data set of manufacturing firms in China, we investigate how the variations in the effectiveness of contract enforcement across China's cities affect the degree of vertical integration. We find that weaker contract enforcement causes firms to be more vertically integrated, and that firms with greater reliance on external environment are more vertically integrated in cities with poorer contract enforcement.

**Keywords:** Contract Enforcement, Vertical Integration, Legal Origin, Transaction Cost Economics
**JEL Codes:** L23, D23, P26, K12

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# 1 Introduction

It has been a long-standing important question in economics to understand what determines some transactions to be carried out in the markets but others within firms through vertical integration (Coase, 1937). One of the leading theories of the firm – transaction cost economics – argues that vertical integration is a response to the difficulties of arms-length market transactions (see, e.g., Williamson, 1971, 1985; Klein, Crawford, and Alchian, 1978). Specifically, relationship-specific investments made by the transacting parties create quasi-rents, which are susceptible to ex post opportunistic behavior (such as holdup or renegotiation) in the presence of contractual incompleteness. Vertical integration can mitigate this kind of opportunistic behavior, but at the same time it may suffer from some bureaucratic costs.[1] Vertical integration is chosen when its relative strength vis-à-vis market transactions dominates its relative weakness.

Empirical studies regarding the relevance of transaction cost economics focus on the impacts of specific investments (including physical capital specificity, human capital specificity, site specificity, and dedicated assets) on vertical integration. There are also studies examining factors such as contract complexity and uncertainty that may lead to contractual incompleteness and consequently vertical integration (For a recent review of the empirical studies, please see, for example, Lafontaine and Slade, 2007).[2]

An implicit assumption of the existing empirical studies is that contracts, albeit incomplete, can be well enforced. In reality, however, contract enforcement is far from perfect even in some developed countries. Once contracts cannot be reliably enforced, transacting parties can engage in ex post opportunistic behavior no matter whether the contracts are complete or not. Coupled with specific investments, inefficient contract enforcement leads to severe market transaction costs, and consequently the prevalence of vertical integration. Albeit a convincing argument, very few empirical studies have examined this issue (for two exceptions, see Fan, Huang, Morck, and Yeung, 2007; Acemoglu, Johnson, and Mitton, 2009). In this paper, we investigate

[1] The property-rights theory of the firm argues that there is also opportunistic behavior for transactions within firms, and it proposes a unifying framework for explaining both the costs and benefits of vertical integration (Grossman and Hart, 1986; Hart and Moore, 1990).

[2] There are fewer studies testing the predictions of the property rights theory regarding the vertical boundary of firm (Lafontaine and Slade, 2007). For example, Baker and Hubbard (2003, 2004) examine how improvements in contracting environment affect the relative importance of the transacting parties and hence the choice of organizational form. Feenstra and Hanson (2005) find that outsourcing is more likely when market size is bigger and contracting costs are lower.

the impacts of contract enforcement on vertical integration using a data set of manufacturing firms in China.

Our empirical analysis uses the data of a World Bank survey of 1,566 firms located in 18 cities and 9 manufacturing industries in China. We measure the degree of vertical integration in two ways. One is the ratio of value added to sales, which is the most widely-used measure in the literature (Adelman, 1955; Davies and Morris, 1995; Holmes, 1999). The other is constructed on the basis of the reply to the survey question of how large a proportion of inputs is produced in-house by the firm itself. Meanwhile, there exist substantial variations in the effectiveness of the de facto contract enforcement across regions in China, even though China is a unitary state with uniform legal codes (e.g., Du, Lu and Tao, 2008a; Lu and Tao, 2009). Specifically, we measure the effectiveness of contract enforcement as the perceived likelihood that the legal system would uphold contract and property rights in business disputes (e.g., North, 1991; Johnson, McMillan, and Woodruff, 2002; Acemoglu and Johnson, 2005; Cull and Xu, 2005). Taken together, the case of China provides an ideal setting to investigate how the variations in the effectiveness of contract enforcement affect the vertical boundary of firms.

Our basic Tobit and OLS regression results show that firms facing weaker contract enforcement have greater degrees of vertical integration. These estimation results could be biased due to the possible correlation between the error term and contract enforcement. To alleviate this concern of omitted variables bias, we stepwisely include a list of control variables reflecting the CEO and firm characteristics, and our results remain robust.

To further deal with the possible endogeneity issue, we use two alternative estimation methods. One is to use an instrumental variable for contract enforcement, and the other is to investigate if firms in industries more reliant on external environment are more likely to have vertical integration in regions with poorer contract enforcement, i.e., the difference-in-difference method à la Rajan and Zingales (1998).

Inspired by the recent literature on the importance of legal origins in shaping institutional quality (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998), we use *British Administration* (an indicator of whether a city in China was administered by the Great Britain in the late Qing Dynasty) as an instrumental variable for contract enforcement. The instrumental variable estimation produces statistically significant results showing that weaker contract enforcement causes firms to be more vertically integrated. And our results are robust to various checks on the satisfaction of the relevance condition and the exclusion restriction, two conditions for the validity of the instrumental variable estimation.

The difference-in-difference estimations show that the interaction between

contract enforcement and external reliance has a negative impact on the degree of vertical integration, implying that firms with greater reliance on external environment become more vertically integrated in cities with poorer contract enforcement. These findings reinforce our earlier results obtained using the Tobit, OLS and the instrumental variable estimations.

Finally, for further robustness checks, we repeat the analysis for the subsample of firms with focused businesses, that of private firms, and that of small firms, and again our results are robust. In addition, we find that the impacts of contract enforcement on vertical integration largely come from its impact on the decision to outsource or not, rather than that on the extent of outsourcing.

The paper closest to ours are Fan, Huang, Morck, and Yeung (2007), and Acemoglu, Johnson, and Mitton (2009).[3] Fan, Huang, Morck, and Yeung (2007) uses data of China's publicly-listed firms to study how institutional quality (i.e., contract enforcement, government service, and market development) affects the make-or-buy decision. Acemoglu, Johnson, and Mitton (2009), using cross-country firm-level data, find that better contract enforcement leads to less vertical integration. However, Acemoglu, Johnson, and Mitton (2009)'s result disappears once industry fixed effects are controlled for, while no industry dummies are included in Fan, Huang, Morck, and Yeung (2007). Moreover, these two papers only document the correlation between economic institutions and the make-or-buy decision. Our study contributes to the literature by identifying the causal impacts of contract enforcement on vertical integration. Moreover, our results regarding the impacts of contract enforcement on vertical integration are robust to the control of industry dummies as well as others.

The remainder of the paper is structured as follows. Section 2 introduces the data and variables for the empirical study, while Section 3 presents our main empirical results. The paper concludes with Section 4.

# 2 Data and Variables

The data used in this paper comes from the *Survey of Chinese Enterprises* (SCE), conducted by the World Bank in cooperation with the Enterprise Survey Organization of China in early 2003.[4] For balanced representation, the

[3]There is an emerging literature examining the impacts of economic institutions (including property rights protection and contract enforcement) on corporate decisions (e.g., Laeven and Woodruff, 2007; Du, Lu, and Tao, 2008b; Lu and Tao, 2009).

[4]It is a cross-sectional data set with most of the variables about firm operation and performance in 2002, though it also contains some financial information in the period

SCE covered 18 cities from five geographic areas of China: Northeast – Benxi, Changchun, Dalian, and Harbin; Coastal region – Hangzhou, Jiangmen, Shenzhen, and Wenzhou; Central China – Changsha, Nanchang, Wuhan, and Zhengzhou; Southwest – Chongqing, Guiyang, Kunming, and Nanning; and Northwest – Lanzhou and Xi'an. There are altogether 1,566 firms in nine manufacturing industries: garment & leather products, electronic equipment, electronic parts making, household electronics, automobile & automobile parts, food processing, chemical products & medicine, biotech products & Chinese medicine, and metallurgical products.

The dependent variables in our study are about the degree of vertical integration in a firm. Our first measure is the ratio of value added to sales, which is constructed as the ratio of the difference between sales and purchased raw materials to sales and denoted by *Value Added Ratio*. It is the most commonly used measure of vertical integration (Adelman, 1955; Davies and Morris, 1995), though it has the drawback of being sensitive to the stage of the production process that a firm is specialized in (Holmes, 1999). Table 1 reports summary statistics of the data. Referring to Table 1, we can see that the mean value of *Value Added Ratio* is 0.332 ($\pm$0.197).

Our second measure is the percentage of inputs produced in-house in the total inputs, which is constructed on the basis of the reply to the survey question of how large a proportion of inputs is produced in-house by the firm itself, and denoted by *Self-Made Input Percentage*. The mean value of *Self-Made Input Percentage* is 0.339 ($\pm$0.401). While the survey question is aimed at uncovering the exact degree of vertical integration in a firm, it is arguable that managers at different companies may have different interpretations of what constitute their inputs. This may explain why quite a number of firms report 100% in-house production of their inputs while others have zero production of their inputs, resulting in a greater variation in the variable of *Self-Made Input Percentage* than that of *Value Added Ratio*. Nonetheless, the mean values of these variables are similar, and their correlation is highly significant (see Table 2).

Our key independent variable is *Contract Enforcement*. Here we follow North (1991), Johnson, McMillan, and Woodruff (2002), Acemoglu and Johnson (2005), and Cull and Xu (2005), and measure contract enforcement as the effectiveness of the legal system in dispute resolution. Specifically, in the survey, there is a question asking CEOs: "in your opinion, what's the likelihood that the legal system will uphold your contracts and property rights in business disputes?" The answer ranges from zero to 100 percent. The variable, *Contract Enforcement*, is constructed based on the responses to the

2000-2002.

question, with a higher value indicating better contract enforcement. Since most of business disputes are resolved in local courts in China, this variable reflects the perceived effectiveness of contract enforcement in different cities.

As shown in Table 1, *Contract Enforcement* has a mean value of 0.634 and a standard deviation of 0.389, indicating significant variations across firms. Most of the variations come from the inter-city variation in the effectiveness of contract enforcement. For example, the average effectiveness of contract enforcement ranges from 0.452 in Wenzhou to 0.869 in Chongqing. This is because that though China has a unified legal system, there are substantial variations in the interpretation and enforcement of laws and national ordinances enacted by the central government across China's various regions (see, for example, Clarke, 1996 and Lu and Tao, 2009 for more detailed discussions). Indeed, a survey about "*Doing Business in China*" conducted by the World Bank in 2008 reveals substantial differences in the efficiency of courts to resolve business disputes across China's regions. For example, in coastal cities, it takes an average of 230 days to resolve an uncomplicated commercial dispute, whereas the corresponding number for Northeastern China is 363 days (World Bank, 2008). Meanwhile, there are still some variations across firms within the same cities, which could be due to the underlying firm characteristics and the CEO characteristics such as political connections (Li, Meng, and Zhang, 2006; Li, Meng, Wang, and Zhou, 2008). Firms and entrepreneurs with political connections are presumably able to obtain government protection in various dimensions including the use of legal systems to resolve business disputes.

To deal with the potential endogeneity problems associated with the effectiveness of contract enforcement, we use *British Administration* (a dummy variable indicating whether the respective city was administered by the Great Britain in the late Qing Dynasty) as an instrumental variable. We will discuss this instrumental variable in detail in Section 3.2.

As another check on the endogeneity problems, we investigate if firms more reliant on external environment are more likely to have vertical integration in regions with poorer contract enforcement, i.e., the difference-in-difference method à la Rajan and Zingales (1998). Following Blanchard and Kremer (1997) and Rajan and Subramanian (2007), we measure a firm's reliance on the external environment by the number of external suppliers of the firm (denoted by *External Reliance*).

In the regression analysis, we also control for other variables that may affect vertical integration. Variables related to firm characteristics include: *Percentage of Private Ownership* (measured by the percentage of ownership held by parties other than government agencies), *Firm Size* (measured by the logarithm of employment), *Firm Age* (measured by the logarithm of

years of establishment), *Bank Loans* (a dummy variable indicating whether the firm has any outstanding bank loans), and *Foreign Ownership Share* (measured by the percentage of ownership held by foreign investors in the firm). Following Cull and Xu (2005), we also include the following variables related to CEO characteristics: *Education* (measured by years of schooling), *Tenure* (measured by years of being CEO), *Deputy CEO Before* (a dummy variable indicating whether the CEO used to be a deputy CEO of the firm), and *Government Cadre* (a dummy variable indicating whether the CEO used to be a government official). Finally, we include the *Logarithm of GDP per capita* in a city to proxy for the differences across cities, and industry dummies to account for the differences across industries.

# 3 Empirical Analysis

## 3.1 Benchmark Results

We first conduct regression analysis with the following specification:

$$\begin{aligned} y_{fic} &= \alpha_i + \beta \cdot Contract\ Enforcement_{fic} \\ &\quad + \gamma Logarithm\ of\ GDP\ per\ capita_c + \varepsilon_{fic} \end{aligned}$$

where $y_{fic}$ is the measure of vertical integration (i.e., *Value Added Ratio* and *Self-Made Input Percentage*) for firm $f$ located in city $c$ and industry $i$; $\alpha_i$ is the industry dummy; and $\varepsilon_{fic}$ is the error term.[5] White-robust standard error is used to deal with the heteroskadasticity problem.[6]

Table 3 presents the regression results. The Tobit regression is used as the main estimation method since the dependent variables are two-sided

[5] We here use the logarithm of GDP per capita instead of the city dummy to proxy for the general city characteristics. This is because most of the variations in the key explanatory variable, *Contract Enforcement*, are at the city level, and the inclusion of the city dummy would take away most of the impacts of contract enforcement on vertical integration. Nonetheless, in the difference-in-difference estimation (Section 3.3), we are able to include the city dummy since our focus in that analysis is on the interaction between contract enforcement and firms' reliance on the external environment.

[6] The use of clustered standard errors requires a sufficient number of clusters (specifically, larger than 42); otherwise the results could be misleading (e.g., Wooldridge, 2003, 2006; Angrist and Pischke, 2009). Since the possible clusters in our study would be 9 manufacturing industries or 18 cities, we use the White-robust standard errors instead of the clustered standard errors (White, 1980; Angrist and Lang, 2004). Nonetheless, the results with standard errors clustered at industry * city level are similar and they are available upon request.

truncated (Columns 1-2), while the ordinary-least-squares (OLS) regression is also used as a robustness check (Columns 3-4).

As shown in Column 1, *Contract Enforcement* has a negative and statistically significant impact on *Value Added Ratio*. In terms of magnitude, a one-standard-deviation increase of *Contract Enforcement* leads to a 0.07 standard-deviation decrease of *Value Added Ratio*. Meanwhile, *Contract Enforcement* has a positive albeit statistically insignificant impact on *Self-Made Input Percentage* (Column 2).[7] Similar results are obtained when the OLS method is used to estimate the impacts of contract enforcement on the degree of vertical integration (Columns 3-4). These results suggest that better contract enforcement reduces the degree of vertical integration.

It should be pointed out that our results are in contrast to the findings by Acemoglu, Johnson, and Mitton (2009), in which the impacts of contract enforcement on vertical integration disappear once the industry dummies are included. They explain their results as those regions with poorer contract enforcement completely specialize in vertically-integrated industries. In the case of China, however, there were considerations for regional self-sufficiency in preparation for wars with neighboring countries during the pre-reform cold-war period, resulting in an even distribution of economic activities across China's regions (called *Xiao Er Quan* in Chinese, i.e., each region is small but comprehensive). This trend has continued in the post-reform era due to the local protectionism unleashed by the fiscal decentralization (Young, 2000; Bai, Du, Tao, and Tong, 2004; Lu and Tao, 2009). This lack of regional specialization may explain why our results are still robust to the inclusion of industry dummies.

The above estimation results could be biased due to the possible correlation between the error term and contract enforcement, i.e., $E(Contract\ Enforcement_{fic} \cdot \varepsilon_{fic}) \neq 0$. It is because there could be some omitted variables ($X_{fic}$) affecting both vertical integration and contract enforcement. For example, state-owned enterprises in China are traditionally vertically integrated due to the legacies of the central planning economic system, and they have little need for the use of courts in dealing with business disputes as they have been protected by central and local governments. Meanwhile, firms with political connections can resolve business disputes with government help instead of resorting to courts, and they also can easily obtain government permission to engage in vertically related businesses. Hence, some omitted factors might have driven the association between vertical integration and weak contract enforcement.

[7] The imprecise estimation could be due to the significant variation in the variable of *Self-Made Input Percentage*, which is constructed based on the reply to a survey question.

To deal with the possible omitted variables bias, we include a host of control variables concerning the firm characteristics (*Percentage of Private Ownership*, *Firm Size*, *Firm Age*, *Bank Loans*, and *Foreign Ownership Share*) and CEO characteristics (*Education*, *Tenure*, *Deputy CEO Before*, and *Government Cadre*). We include these firm characteristics variables based on the following considerations. State-owned firms may be more vertically integrated than private firms as a legacy of the central planning system; larger and older firms may naturally exhibit a higher degree of vertical integration; foreign-invested firms may be more susceptible to weak contract enforcement than domestic firms and hence have more vertical integration; and firms with better access to bank loans may rely less on internal capital market and have less vertical integration. The CEO characteristics variables we include mainly capture the managerial experience and political capital that CEOs may possess, which could affect both the tendency toward vertical integration and the perception of contract enforcement effectiveness. The Tobit regression results are shown in Table 4. It is clear that our main results regarding the impact of contract enforcement on vertical integration remain robust to the inclusion of these variables.

Admittedly, we may not be able to exhaust all possible control variables for the firm and CEO characteristics, as some of them may only be observed by the firm but not the econometricians. To further deal with this endogeneity issue, we use two alternative estimation methods. One is to use an instrumental variable for contract enforcement (Section 3.2), and the other is to investigate if firms more reliant on the external environment are more likely to have vertical integration in cities with poorer contract enforcement, i.e., the difference-in-difference method à la Rajan and Zingales (1998) (Section 3.3).

## 3.2 Instrumental Variable Estimation

Motivated by the recent literature (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997 and 1998; Acemoglu, Johnson, and Robinson, 2001, 2002), we look back into the Chinese history for a suitable instrumental variable for the effectiveness of contract enforcement in contemporary China. Specifically, we use a dummy variable, *British Administration*, indicating whether a city was administered by the Great Britain in the late Qing Dynasty, as an instrument for the effectiveness of contract enforcement. We compile historical information on the control of China's regions by foreign powers from relevant texts on the modern history of China, e.g., McAleavy, 1967; Dong, Zhang, and Jiao, 2000.

During the late Qing Dynasty (1840-1911), China was defeated in a series

of wars against foreign powers, including two Opium Wars with the Great Britain, the Sino-Japanese War of 1894-95, and the Boxer Rebellion. In the wake of military defeats, the Qing government was forced to sign unequal treaties including territorial concessions. The wave of territorial partitioning climaxed at the end of the nineteenth century. The Great Britain administered nine regions (Guizhou, Sichuan, Hubei, Hunan, Jiangxi, Anhui, Jiangsu, Henan, and Zhejiang provinces); France controlled Yunnan, Hainan, Guangxi, and the majority of Guangdong province; Germany administered Shandong province; Japan governed Fujian province; and Russia controlled Xinjiang, Mongolia, and the three north-eastern provinces (Qian, 1948). Shanghai and Tianjin, the two leading commercial centers of China at the time, were divided into various foreign concessions.

Three main reasons account for the geographical pattern of territorial partitioning by the foreign powers. First, the geographic proximity between the foreign powers and China's regions is a primary force in shaping the pattern of territorial concessions (Dougherty and Pfaltzgraff, 2000). For example, Russia, located to the north of China, occupied most of China's northern regions such as Xinjiang, Mongolia, and the three northeastern provinces. France, stepping from its colony of Vietnam that lies to the southwest of China, extended its colonial power to the four southwestern provinces in China, i.e., Yunnan, Hainan, Guangxi, and the majority of Guangdong province (Yang, 2006). Japan, defeated by Russia in its aggression in the Northeast China, chose to occupy China's regions such as Taiwan and Fujian that are close to its southern territories. The second reason for the territorial partitioning is for the control of certain products that the foreign powers needed at the time. For example, the Great Britain, which was a big importer of tea and silk from China, chose to occupy those regions in China that produced these two products (Sa and Pan, 1996). Finally, the territorial occupation of Germany, which was late in its occupation of China, was a result of bargaining and negotiation with other foreign powers (China History Society, 1959). Hence, the geographical pattern of territorial concessions had nothing to do with the initial institutional strength and the industrial development capacity of different regions. It can be regarded as an exogenous process. On the contrary, the quasi-colonial experience contributes to the variations in institutional strength across regions in China.

Within their respective domains of control, the foreign powers effectively established their sovereign authorities (McAleavy, 1967). Typically, the foreign powers imposed their own civil and military administration, including legal system, police, and education (Dong, Zhang, and Jiao 2000). In particular, lawsuits taking place in those domains controlled by foreign powers were adjudicated using the legal systems of respective reigning foreign pow-

ers (e.g., Yang and Ye, 1993; Tan, 1996). The foreign powers imposed their own civil and military administration by force and hence, the administrative systems could be considered as being exogenous to the local communities.

Contemporary China is a united sovereign nation with a unified legal system. However, there are substantial variations in the interpretation and enforcement of laws and national ordinances enacted by the central government across China's various regions (e.g., Clarke, 1996). Due to the substantial variations in endowments, technologies and economic development across regions in China, local governments often issue various rules and regulations regarding laws and national ordinances so as to make them more adapted to the local circumstances (e.g., Chen, 2004; Clarke, Murrell, and Whiting, 2008). Furthermore, the enforcement of rules and regulations hinges upon the cooperation of local people as well as local authorities (e.g., Fan, 1985; Lieberthal and Oksenberg, 1988; Zhao, 1989; Li, Zhang, and Wang, 1990; Clarke, 1991), which again varies substantially across China's regions due to the differences in culture, beliefs, and ideologies (e.g., Tai, 1957; Cheng, Liu, and Cheng, 1982; Yearbook of People's Court, 1990; Clarke, 1996).

The imposition of the legal systems by the foreign powers in various parts of China in the late Qing Dynasty is expected to influence not only the legal rules and the legal institutions (including judicial independence and legal procedures) at that time, but also the fundamental legal culture, i.e., human capital and beliefs of the key participants in the legal systems (Zweigert and Kotz, 1998; La Porta, Lopez-de-Silanes, and Shleifer, 2008). Indeed, the foreign powers in China were actively engaged in transplanting and cultivating their beliefs and ideologies to the local people by setting up and operating schools and colleges. Speaking at the Second Protestantism Propagators Congress held in Shanghai in China in 1890, F.L. Hawks Pott, President of Saint John's University, declared that "in our school, we trained China's future teachers and propagators, making them the leaders and comperes in the future and casting the greatest influences on the future China" (Yang and Ye 1993). The legal institutions, human capital and beliefs that were transplanted and cultivated by different foreign powers are expected to persist over time (Zweigert and Kotz, 1998; Balas, La Porta, Lopez-de-Silanes, and Shleifer, 2009). Indeed, there is a growing body of literature on the persistence of culture, beliefs, and ideologies over time (e.g., Bisin and Verdier, 2000; Dohmen, Falk, Huffman, and Sunde, 2006; Tabellini, 2007a, 2007b, 2009). The persistent legal culture shapes the beliefs and behavioral patterns of the current generation. The regional variation in legal culture could determine the variation in the de facto law enforcement across regions. The leeway that each region enjoys in interpreting national laws and ordinances and adapting them to local circumstances serves as a medium through which

the variation in the legal culture could be revealed in the current legal practices, including the effectiveness of contract enforcement.

The foreign powers belong to different legal families. According to La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998), legal origin affects the effectiveness of contract enforcement. Specifically, contract enforcement is more effective under the common law system used by the Great Britain than under the civil law system used by France, Germany, Japan, and Russia (e.g., Acemoglu and Johnson, 2005). Accordingly, we expect that the local legal and business culture in the British-administered regions in China may be more conducive to contract enforcement than those in regions under the administration of other foreign powers. Hence, we take whether a city of China was administered by the Great Britain during the late Qing Dynasty as a reasonable instrument for the effectiveness of contract enforcement in 2002.[8]

Instrumental variable estimation results are summarized in Table 5. The first-stage regressions (reported in Panel B) show that the instrumental variable (*British Administration*) is positively and statistically significantly correlated with the effectiveness of contract enforcement, which is consistent with our above argument on the relevance of the instrumental variable. Columns 1-2 in Panel A report the second-stage estimation results of the instrumented Tobit estimation when *Value Added Ratio* and *Self-Made Input Percentage* are the dependent variable respectively. Consistent with the regression results in Tables 3-4, the effectiveness of contract enforcement has statistically significant negative effects on the degree of vertical integration. In terms of magnitude, a one-standard-deviation increase in the effectiveness of contract enforcement leads to a 0.50 standard-deviation decrease of *Value Added Ratio* and a 1.68 standard-deviations decrease of *Self-Made Input Percentage*. Compared to the Tobit and OLS regression results in Table 3, there are significant increases in the estimated impacts of contract enforcement on vertical integration. One possible reason is that the omitted variables are positively correlated with the error term, which leads to the underestimation of the Tobit/OLS estimates. The other possible explanation is due to the measurement error associated with the explanatory variable (contract enforcement), which drives the Tobit/OLS estimates toward zero.

The validity of our instrumental variable estimation hinges upon the satisfaction of the relevance condition and the exclusion restriction. The relevance condition is confirmed by the highly significant correlation between the in-

[8] Nine out of the eighteen cities (Changsha, Chongqing, Guiyang, Hangzhou, Nanchang, Shenzhen, Wenzhou, Wuhan, and Zhengzhou) in our sample were administered by the Great Britain, and the rest of the sample was occupied by France or Russia.

strumental variable and the effectiveness of contract enforcement (Panel B of Table 5), and the result of the Anderson canonical correlation likelihood ratio statistic (Panel C of Table 5).[9] Meanwhile, the concern for weak instrument is ruled out by the results of the Shea Partial R-squared and the Cragg-Donald F-statistic (Panel C of Table 5).[10]

One may be concerned that the instrumental variable estimation could be biased as the instrument may affect the degree of vertical integration through channels other than contract enforcement (the possible violation of the exclusion restriction). For example, legal origins have been shown to play an instrumental role in enhancing the development of financial intermediaries, and common law countries have more developed financial intermediaries (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998; Beck, Levine, and Loayza, 2000; Levine, Loayza, and Beck, 2000). Credit market imperfections in turn necessitate the use of collateral in order to obtain bank loans (e.g., Banerjee and Newman, 1993; Diamond and Rajan, 2005), which limits market entry and consequently leads to larger and more vertically integrated firms (Rajan and Zingales, 1998). Hence, it may be argued that cities from British-administered regions in China could have more developed financial intermediaries, under which there is less need for vertical integration. Meanwhile, it is found that countries under the common law system enjoy faster economic development than do those countries under the civil law system (Acemoglu and Johnson, 2005). Similarly, it could be argued that China's cities administrated by the Great Britain in the late Qing Dynasty may enjoy faster economic development, which in turn leads to lower degrees of vertical integration (Stigler, 1951). To ensure that the exclusion restriction is satisfied, we stepwisely include a list of the CEO and firm characteristics in the analysis. These characteristics arguably capture the potential alternative channels of the influence of legal origins on vertical integration. For instance, the access to bank loans reflects the financial intermediary development in different cities, and the GDP per capita gauges economic development in various cities. As shown in Columns 3-6, our main results remain robust to these controls.

One may still be concerned that our results could be driven by some outlying observations, in particular the firms located in a few better-performing

[9]The test results of relevance condition and weak instrument are obtained from the the two-stage least squares estimations as they are not reported in instrumented Tobit estimation in STATA. Meanwhile, the main results regarding the impacts of contract enforcement on vertical integration obtained from the two-stage least squares estimations are similar to those obtained from instrumented Tobit estimations.

[10]The Cragg-Donald F-statistic values for our regressions are significantly above the value of 10, which is considered as the critical value by Staiger and Stock (1997).

British-administered cities, or those located in a few under-performing non-British-administered cities. To rule out this concern, we conduct robustness checks using two subsamples: a subsample excluding firms located in coastal British-administered cities (Hangzhou and Wenzhou) and a subsample excluding firms located in inland non-British-administered cities (Lanzhou and Xi'an). As shown in Table 6, our main results on the negative causal impacts of contract enforcement on vertical integration remain robust in these two subsamples.

To further illustrate the validity of our instrumental variable, we compare the degree of vertical integration in the British-administered cities with that in the non-British-administered cities for the automobile and automobile parts industry (a typical industry with a low ratio of value added to gross output in the United States).[11] The degrees of vertical integration in the British-administered cities is 0.397, which is indeed significantly lower than that in the non-British-administered cities, 0.535.[12] Presumably, in cities with poorer contract enforcement, there is a greater need for vertical integration, which is consistent with our general finding on the negative and causal impacts of contract enforcement on vertical integration.

## 3.3 Difference-in-difference Estimations

Despite the efforts we have made in establishing the validity of our instrumental variable for contract enforcement, there could still be concerns regarding the satisfaction of the exclusion restriction for the instrumental variable estimation. In particular, as our instrumental variable is at the city-level, we cannot include city dummies in our analysis, implying that there could be some city characteristics correlating with both our instrumental variable and vertical integration.

In this subsection, we use an alternative approach, i.e., the difference-in-difference method à la Rajan and Zingales (1998), which allows us to include the city dummies as well as the industry dummies used in the Tobit/OLS and the instrumental variable estimations. Specifically, we investigate if firms more reliant on the external environment are more likely to have vertical integration in regions with poorer contract enforcement. Following Blanchard and Kremer (1997) and Rajan and Subramanian (2007), we measure a firm's reliance on the external environment by the number of external suppliers the

[11] According to the OECD STAN Structural Analysis Database, the ratio of value added to sales in motor vehicles, trailers and semi-trailers industry in the U.S. in 2002 is 0.262, which is far below the national average across industries (0.525).

[12] The t-statistic for the difference between these two levels of vertical integration is 3.18, which is significant at 1% level.

firm has (denoted by *External Reliance*).[13] This measure is based on the premise that the number of external suppliers is primarily determined by the requirement of production technology that a firm in a specific industry adopts, i.e., the demand for different varieties of raw materials and intermediate goods provided by different specialized suppliers. Clearly, a larger number of external suppliers a firm relies on indicates a larger degree of external reliance stipulated by the firm's production technology. Accordingly, we estimate the following specification:

$$\begin{aligned} y_{fic} &= \alpha_i + \beta \cdot Contract\ Enforcement_{fic} + \delta \cdot External\ \text{Reliance}_{fic} \\ &\quad + \eta \cdot Contract\ Enforcement_{fic} \cdot External\ \text{Reliance}_{fic} + \gamma_c + \varepsilon_{fic} \end{aligned}$$

where $\gamma_c$ is a set of city dummies. Conceptually, firms with more reliance on the external environment are more sensitive to the quality of contract enforcement. Hence the impacts of contract enforcement on vertical integration for these firms are expected to be greater, or in other words we expect to observe a negative estimated coefficient for the interaction term between contract enforcement and the external reliance.

The Tobit estimation results are reported in Table 7. As shown in Columns 1-2, the interaction between contract enforcement and external reliance has a negative impact on the degree of vertical integration, implying that firms with greater reliance on external environment become more vertically integrated in cities with poorer contract enforcement. In Columns 3-4, we include the CEO and firm characteristics as used in Tables 4-5, and our results are robust to these controls.[14] These results are consistent with the theoretical prediction, and reinforce our earlier findings of the negative and causal impacts of contract enforcement on vertical integration.

[13] Blanchard and Kremer (1997) and Rajan and Subramanian (2007) propose to use firm-level measures of reliance. However, owing to data limitations, they can only use industry-level measures of reliance instead. By contrast, we are able to use firm-level measure of the reliance on the external environment.

[14] We also experiment with an alternative estimation specification in which the average degree of vertical integration in a U.S. industry in 2002 is used as a proxy for the degree of external reliance in that industry in our data set. The results are similar albeit less statistically significant (the $p$-value for the interaction term between the degree of vertical integration and contract enforcement is 0.12). Presumably the imprecise estimation is due to the poor matching between the industry classification in our data set and that in the U.S., as the former is not a standard classification and different from both the Chinese Standard Industrial Classification and the U.S. Standard Industrial Classification. Under this circumstance, it is not that ideal to adopt the U.S. industry characteristics in vertical integration as a benchmark for our analysis of Chinese industries.

## 3.4 Robustness Checks

We conduct robustness checks using three subsamples of our data set. For firms with many businesses, the degree of vertical integration could vary from one business to another. Thus our measure of vertical integration may reflect the average degree of vertical integration across various businesses, which may bias our estimations of the impacts of contract enforcement on vertical integration. To alleviate this concern, we focus on the sub-sample of firms with focused business (defined as firms whose main business contributes at least 90% to their total sales). The results shown in Columns 1-2 of Table 8 suggest that our main findings remain robust to this sub-sample.[15]

Second, China's state-owned firms were the main players under the central planning system. Even during China's economic transition, state-owned firms are favored by the government, thus enjoying better de facto contract enforcement. At the same time, influenced by the principle of self-sufficiency under the central planning system, state-owned firms have continued to be vertically integrated. To make sure that our results are not biased due to the inclusion of these state-owned firms, we focus on the sub-sample of private firms (defined as firms with private ownership accounting for at least 90% shares). As shown in Columns 3-4 of Table 8, our main findings remain robust to this sub-sample.

Third, one may suspect that our results could be driven by larger firms that are more likely to vertically integrate and thus less prone to the ineffective contract enforcement. To deal with this concern, we focus on the subsample of smaller firms (excluding the top 10% firms in terms of employment).[16] As shown in Columns 5-6 of Table 8, the impacts of contract enforcement on vertical integration remain negative and significant.

Finally, it is interesting to investigate if the effectiveness of contract enforcement has differential effects on the decision to outsource or not (extensive margin) and the decision on the extent of outsourcing (intensive margin). A dummy variable is constructed with value one if a firm has *Self-Made Input Percentage* less than 100%, and zero otherwise, and denoted by *Outsourcing*. In Column 1 of Table 9, we regress *Outsourcing* on *Contract Enforcement*, whereas in Columns 2 and 3 of Table 9, we focus on the subsample of firms with some outsourcing and regress *Value Added Ratio* and *Self-Made Input Percentage* on *Contract Enforcement*, respectively. It is found that the effectiveness of contract enforcement has positive impacts on both the likelihood

[15] We only report the instrumental estimation results in Table 8 to save space. Results using the Tobit/OLS estimation and the difference-in-difference estimation are similar and available upon request.

[16] Results are similar when the top 25% or top 50% firms are excluded from the sample.

and the extent of outsourcing, though the latter effect is not always statistically significant. In terms of magnitude, a one-standard-deviation increase in the effectiveness of contract enforcement leads to a 2.5 standard-deviation increase in the likelihood of outsourcing, but an approximately 0.5 standard-deviation increase in the extent of outsourcing. These results imply that the impacts of contract enforcement on vertical integration largely come from its impact on the decision on outsourcing or not rather than that on the extent of outsourcing. One possible explanation is that a firm considering adopting outsourcing needs to pay some fixed costs for enforcing contracts through the legal system; however, once the fixed costs are paid, the marginal cost of adopting more outsourcing is fairly small. Better contract enforcement environment promotes outsourcing mainly by lowering the fixed costs and reducing the barriers to embark on outsourcing for firms.

# 4 Conclusion

The make-or-buy decision is an important one for business strategy, and a long-standing research topic in economics. In explaining the determinants of vertical integration, the existing literature mainly focuses on contractual incompleteness and asset specificity by taking for granted that the effectiveness of contract enforcement is guaranteed. Given that contract enforcement is imperfect even in some developed economies, the investigation of the impacts of contract enforcement on vertical integration is highly needed. However, empirical evidence along this line remains limited and highly inconclusive.

In this paper, using a data set of manufacturing firms in China, we investigate how the variations in the effectiveness of contract enforcement across China's cities affect the degree of vertical integration. We find that contract enforcement has a negative and causal impact on vertical integration. The results are robust to the instrumental variable estimation, the difference-in-difference estimation, and the use of various subsamples. Our findings highlight the importance of economic institutions on firm organizational choice.

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Table 1, Summary statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Value Added Ratio | 1,350 | 0.332 | 0.197 | 0.001 | 1.000 |
| Self-Made Input Percentage | 1,459 | 0.339 | 0.401 | 0.000 | 1.000 |
| Contract Enforcement | 1,361 | 0.634 | 0.389 | 0.000 | 1.000 |
| External Reliance | 1,509 | 0.042 | 0.199 | 0.000 | 7.100 |
| Contract Enforcement * External Reliance | 1,316 | 0.027 | 0.069 | 0.000 | 1.000 |
| Percentage of Private Ownership | 1,566 | 0.813 | 0.376 | 0.000 | 1.000 |
| Firm Size | 1,565 | 5.091 | 1.373 | 0.000 | 9.649 |
| Firm Age | 1,566 | 2.494 | 0.777 | 1.099 | 3.970 |
| Bank Loans | 1,540 | 0.273 | 0.446 | 0.000 | 1.000 |
| Foreign Ownership Share | 1,566 | 0.107 | 0.265 | 0.000 | 1.000 |
| Education | 1,553 | 14.359 | 2.511 | 0.000 | 19.000 |
| Tenure | 1,548 | 6.240 | 4.580 | 1.000 | 33.000 |
| Deputy CEO Before | 1,548 | 0.280 | 0.449 | 0.000 | 1.000 |
| Government Cadre | 1,548 | 0.035 | 0.185 | 0.000 | 1.000 |
| Outsourcing | 1,459 | 0.873 | 0.334 | 0.000 | 1.000 |

Table 2, Correlations among key variables

| | Value Added Ratio | Self-Made Input Percentage | Contract Enforcement | British Administration |
|---|---|---|---|---|
| Value Added Ratio | 1.000 | | | |
| Self-Made Input Percentage | 0.1055 | 1.0000 | | |
| Contract Enforcement | -0.0779 | -0.0369 | 1.0000 | |
| British Administration | -0.1173 | -0.1305 | 0.1357 | 1.0000 |

Table 3, Tobit and OLS estimates

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Estimation Methodology | Tobit | | OLS | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | -0.033** | -0.068 | -0.033** | -0.024 |
| | (0.015) | (0.059) | (0.015) | (0.028) |
| **Controls** | | | | |
| Logarithm of GDP per capita | -0.031*** | -0.005 | -0.031*** | -0.015 |
| | (0.010) | (0.041) | (0.010) | (0.020) |
| Industry Dummy | Yes | Yes | Yes | Yes |
| Number of Observations | 1,181 | 1,290 | 1,181 | 1,290 |
| *p*-value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4, Tobit estimates, with more controls

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Estimation Methodology | Tobit | | | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | -0.035** | -0.077 | -0.027* | -0.087 |
| | (0.014) | (0.059) | (0.015) | (0.060) |
| **CEO Characteristics** | | | | |
| Education | 0.004* | 0.022** | 0.006** | 0.017 |
| | (0.002) | (0.010) | (0.002) | (0.011) |
| Tenure | 0.001 | 0.011** | 0.000 | 0.008* |
| | (0.001) | (0.005) | (0.001) | (0.005) |
| Deputy CEO Before | 0.008 | 0.081 | 0.002 | 0.056 |
| | (0.012) | (0.049) | (0.012) | (0.051) |
| Government Cadre | -0.015 | -0.294** | -0.011 | -0.284** |
| | (0.029) | (0.131) | (0.031) | (0.132) |
| **Firm Characteristics** | | | | |
| Percentage of Private Ownership | | | -0.014 | 0.093 |
| | | | (0.017) | (0.066) |
| Firm Size | | | -0.015*** | 0.032 |
| | | | (0.005) | (0.020) |
| Firm Age | | | 0.026*** | 0.049 |
| | | | (0.009) | (0.033) |
| Bank Loans | | | -0.029** | 0.034 |
| | | | (0.011) | (0.052) |
| Foreign Ownership Share | | | -0.004 | 0.004 |
| | | | (0.023) | (0.093) |
| **Others** | | | | |
| Logarithm of GDP per capita | -0.032*** | -0.022 | -0.024** | -0.031 |
| | (0.010) | (0.041) | (0.010) | (0.042) |
| Industry Dummy | Yes | Yes | Yes | Yes |
| Number of Observations | 1,158 | 1,266 | 1,143 | 1,248 |
| *p*-value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5, IV estimates

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Estimation Methodology | Tobit+IV | | | | | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| | Panel A, Second Stage | | | | | |
| Contract Enforcement | -0.252** | -1.732*** | -0.251** | -1.487*** | -0.190* | -1.644** |
| | (0.106) | (0.676) | (0.104) | (0.603) | (0.112) | (0.678) |
| **CEO Characteristics** | | | | | | |
| Education | | | 0.005* | 0.029** | 0.006** | 0.014 |
| | | | (0.003) | (0.013) | (0.003) | (0.013) |
| Tenure | | | 0.001 | 0.010 | 0.001 | 0.011 |
| | | | (0.001) | (0.006) | (0.001) | (0.007) |
| Deputy CEO Before | | | 0.002 | 0.050 | -0.002 | 0.019 |
| | | | (0.013) | (0.064) | (0.013) | (0.069) |
| Government Cadre | | | -0.023 | -0.358** | -0.017 | -0.357** |
| | | | (0.031) | (0.156) | (0.031) | (0.163) |
| **Firm Characteristics** | | | | | | |
| Percentage of Private Ownership | | | | | -0.023 | 0.011 |
| | | | | | (0.019) | (0.092) |
| Firm Size | | | | | -0.010 | 0.085*** |
| | | | | | (0.006) | (0.032) |
| Firm Age | | | | | 0.018* | -0.007 |
| | | | | | (0.011) | (0.047) |
| Bank Loans | | | | | -0.018 | 0.099 |
| | | | | | (0.014) | (0.072) |
| Foreign Ownership Share | | | | | -0.002 | -0.018 |
| | | | | | (0.024) | (0.113) |
| **Others** | | | | | | |
| Logarithm of GDP per capita | -0.033*** | 0.016 | -0.035*** | -0.010 | -0.029*** | -0.039 |
| | (0.011) | (0.055) | (0.011) | (0.052) | (0.011) | (0.054) |
| Industry Dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| | Panel B, First Stage: Dependent Variable is Contract Enforcement | | | | | |
| British Administration | 0.120*** | 0.092*** | 0.122*** | 0.098*** | 0.110*** | 0.091*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.025) | (0.024) | (0.025) | (0.024) | (0.025) | (0.024) |
| **CEO Characteristics** | | | | | | |
| Education | | | 0.004 | 0.006 | -0.002 | -0.000 |
| | | | (0.005) | (0.005) | (0.005) | (0.005) |
| Tenure | | | -0.001 | -0.001 | 0.001 | 0.001 |
| | | | (0.003) | (0.003) | (0.003) | (0.003) |
| Deputy CEO Before | | | -0.026 | -0.022 | -0.023 | -0.023 |
| | | | (0.026) | (0.025) | (0.027) | (0.025) |
| Government Cadre | | | -0.036 | -0.044 | -0.035 | -0.043 |
| | | | (0.058) | (0.058) | (0.058) | (0.058) |
| **Firm Characteristics** | | | | | | |
| Percentage of Private Ownership | | | | | -0.054 | -0.055* |
| | | | | | (0.034) | (0.032) |
| Firm Size | | | | | 0.026*** | 0.030*** |
| | | | | | (0.010) | (0.009) |
| Firm Age | | | | | -0.047*** | -0.034** |
| | | | | | (0.017) | (0.016) |
| Bank Loans | | | | | 0.061*** | 0.035 |
| | | | | | (0.025) | (0.025) |
| Foreign Ownership Share | | | | | 0.027 | -0.002 |
| | | | | | (0.045) | (0.044) |
| **Others** | | | | | | |
| Logarithm of GDP per capita | -0.009 | 0.011 | -0.012 | 0.006 | -0.027 | -0.007 |
| | (0.020) | (0.018) | (0.020) | (0.018) | (0.020) | (0.019) |
| Industry Dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Panel C, Various Tests for the Instrumental Variable | | | | | | |
| Anderson Canonical Correlation LR Statistic | [25.09]*** | [15.78]*** | [25.06]*** | [17.47]*** | [20.15]*** | [14.84]*** |
| Shea Partial R-squared | 0.0210 | 0.0122 | 0.0214 | 0.0137 | 0.0175 | 0.0118 |
| Cragg-Donald F-statistic | 25.12 | 15.74 | 25.00 | 17.39 | 19.98 | 14.69 |
| Number of Observations | 1,181 | 1,290 | 1,158 | 1,266 | 1,143 | 1,248 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6, IV estimates, subsamples

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Estimation Methodology | Tobit+IV | | | |
| Sub-sample | Without Coastal British Administrated Cities | | Without Inland Non-British Administrated Cities | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | -0.188* | -2.072*** | -0.296* | -2.842* |
| | (0.108) | (0.744) | (0.175) | (1.468) |
| **Controls** | | | | |
| Logarithm of GDP per capita | -0.043** | -0.239** | -0.038*** | -0.012 |
| | (0.022) | (0.126) | (0.013) | (0.070) |
| Industry Dummy | Yes | Yes | Yes | Yes |
| Number of Observations | 1,037 | 1,128 | 1,022 | 1,108 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively. In all columns, only the second stage results of the Tobit+IV regression are reported whereas the first stage results are available upon request.

Table 7, Difference-in-difference estimates

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Estimation Methodology | Tobit | | | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | -0.013 | -0.063 | -0.011 | -0.064 |
| | (0.016) | (0.066) | (0.017) | (0.066) |
| Contract Enforcement * External Reliance | -0.240*** | -0.115 | -0.189*** | -0.217 |
| | (0.059) | (0.317) | (0.065) | (0.319) |
| External Reliance | 0.029*** | -0.216** | 0.032*** | -0.223** |
| | (0.004) | (0.096) | (0.004) | (0.089) |
| **Controls** | | | | |
| City Dummy | Yes | Yes | Yes | Yes |
| Industry Dummy | Yes | Yes | Yes | Yes |
| CEO Characteristics | | | Yes | Yes |
| Firm Characteristics | | | Yes | Yes |
| Number of Observations | 1,158 | 1,255 | 1,124 | 1,218 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively. CEO characteristics include *Education*, *Tenure*, *Deputy CEO Before*, and *Government Cadre*, while firm characteristics include *Percentage of Private Ownership*, *Firm Size*, *Firm Age*, *Bank Loans*, and *Foreign Ownership Share*.

Table 8, Sub-samples

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Estimation Methodology | Tobit+IV | | | | | |
| Sub-sample | Firms with Focused Business | | Private Firms | | Small Firms | |
| Dependent Variable | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | -0.202* | -1.603** | -0.245** | -1.829*** | -0.246** | -1.729** |
| | (0.105) | (0.639) | (0.107) | (0.683) | (0.111) | (0.700) |
| **Controls** | | | | | | |
| Logarithm of GDP per capita | -0.024** | 0.046 | -0.032*** | 0.011 | -0.026** | 0.039 |
| | (0.012) | (0.066) | (0.012) | (0.060) | (0.012) | (0.066) |
| Industry Dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 754 | 818 | 931 | 1,009 | 1,057 | 1,157 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively. In all columns, only the second stage results of the Tobit+IV regression are reported whereas the first stage results are available upon request.

Table 9, Extensive versus intensive margin

| | 1 | 2 | 3 |
|---|---|---|---|
| Estimation Methodology | Probit+IV | Tobit+IV | Tobit+IV |
| Sub-sample | Whole Sample | Outsourcing Firm | Outsourcing Firm |
| Dependent Variable | Outsourcing | Value Added Ratio | Self-Made Input Percentage |
| Contract Enforcement | 2.174*** | -0.279** | -0.531 |
| | (0.283) | (0.120) | (0.375) |
| **Controls** | | | |
| Logarithm of GDP per capita | -0.043 | -0.037*** | -0.010 |
| | (0.075) | (0.012) | (0.034) |
| Industry Dummy | Yes | Yes | Yes |
| Number of Observations | 1,290 | 991 | 1,136 |

White-robust standard errors are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively. In all columns, only the second stage results of the Tobit+IV regression are reported whereas the first stage results are available upon request.