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Does Quality Certification or Product Diversification Improve the Performance of Small and Medium Enterprises?

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Abstract: This study utilizes a Cobb–Douglas production function and an instrumental variables regression approach to analyze the impact of quality certification and product diversification on asset productivity at the firm level. Analyzing a panel dataset of approximately 2500 firms from 2011, 2013, and 2015 showed that regional norms significantly influence adoption behaviors, which vary across industries and business types. The study reveals that firms employing computers and those with a larger scale are more inclined to adopt these strategies. The results showed that quality certification enhances asset productivity by approximately 26%, highlighting its positive role. In contrast, firms with diversified products exhibit about 18% lower asset productivity than mono-product firms, suggesting a trade-off inherent in diversification. The study concludes with policy recommendations emphasizing the promotion of quality certification while carefully considering the complexities and potential inefficiencies arising from product diversification strategies.

Keywords: SMEs; quality certification; product diversification; firm performance; asset productivity; Vietnam

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1. Introduction

The role of small and medium-sized enterprises (SMEs) in driving economic growth, and innovation has been increasingly recognized. These entities, often characterized by their agility and adaptability, have become critical players in the global economy, especially in developing countries [1,2]. For SMEs, maintaining competitiveness and improving performance, such as asset turnover or asset productivity [3] and profit, are their ultimate goals. Various strategies have been explored in this context, for instance quality-certification [4–6] and product-diversification [7,8] schemes. According to some prior studies, certification and diversification are crucial for enhancing the performance of SMEs [9–12]. However, the implementation expenses and administrative constraints associated with certifications such as ISO 9001 (for quality management) may be prohibitive for SMEs. The effectiveness of these strategies is mixed, or the effect of being certified or diversified on firm performance is nonlinear [13,14].

Despite the importance of SMEs and their performance, challenges exist for SMEs in adopting new measures due to high levels of competition and limited resources. Unlike large firms, SMEs are more resource-constrained and vulnerable to market competition, impacting their ability to compete effectively, especially in international markets [15,16]. In addition, SMEs often lack a detailed understanding of market and policy framework changes and find it challenging to plan effective strategies due to resource limitations [1].

In this study, we first explored the factors influencing the adoption of quality certification (mainly certification of quality management systems such as ISO 9001 or HACCP) and diversification strategies by SMEs. We, in particular, focused on how firms located in close proximity or sharing similar environmental characteristics may influence each other in adopting new practices, such as quality certification or product diversification. This

phenomenon can be understood through the lens of social norms and policy frameworks, commonly referred to as production technology, as outlined in the works of [17,18]. Second, we evaluated the impact of these strategies on the firm performance, measured as asset productivity [3].

Our study adds to the existing literature in several dimensions. A frequent econometric challenge in studies examining the adoption of new strategies by firms or individuals is endogeneity, as demonstrated in previous studies, i.e., [19,20]. This issue is particularly pertinent in cases of certification schemes or product diversification, where the adoption of such strategies is contingent on pre-existing conditions or criteria, such as production scale or financial capacity. To address this, we used an instrumental variable approach, employing the percentage of firms adopting similar strategies in the same district, which significantly and positively influence a firm's adoption behavior. Moreover, quality certification not only beneficially impacts labor productivity [21], but also improves the asset productivity of SMEs. Additionally, while diversification might mitigate risks [22], diversifying to several different product types could present a trade-off, potentially challenging rather than enhancing economies of scope.

This paper is structured as follows. Section 2 reviews the relationship between certification, diversification, and firm asset productivity. Data and empirical models are presented in Section 3. In Section 4, we discuss the determinants of the adoption of certification and diversification and evaluate the impact of these measures on asset productivity. Section 5 summarizes the key findings and policy options and suggests future research directions.

2. Literature Review

Extensive knowledge and discourse have surrounded the performance of SMEs. An abundance of research, including empirical studies and various points of view, has been devoted to examining the effect of certification and diversification on the performance of SMEs. While several previous studies indicated that certification of quality systems would not significantly affect SMEs, others highlight potential benefits such as the ability to satisfy consumer demands or acquire a competitive edge in the market [23]. Similarly, the relationship between geographical diversification and corporate performance has been explored, revealing varying outcomes for SMEs. Additionally, the role of managerial characteristics, internationalization, and the development of SMEs in diversifying economies have all been found to be interconnected and impactful factors [23–25].

The expansion of a business's operations into new product lines or markets is referred to as diversification. The empirical research findings demonstrate that diversification is an essential factor influencing the performance of SMEs. Additionally, SMEs can mitigate the risks associated with over-reliance on a single product or market sector by diversifying their operations to explore new market opportunities [23,26]. Another empirical study found that, while product diversification did not directly correlate with overall performance, investment levels in rent-generating, proprietary assets were linked to the extent of product diversification [27]. This suggests that diversification, when coupled with strategic investment, can potentially impact the performance of SMEs positively [26,28].

On the other hand, Ref. [29] conducted a study on Japanese SMEs, which showed a U-shaped relationship between geographical diversification and corporate performance. They found that most SMEs faced higher learning costs at the initial stages of expansion due to a lack of relevant experience. Nevertheless, the research conducted by [30] suggests that financial performance can lead to internationalization for SMEs. They observed a material relationship between managerial characteristics and geographical diversification strategies. Specifically, they found that specific organizational attributes were correlated with profitability according to the level of international diversification. Overall, the research indicates that diversification strategies, whether through product or geographical expansion, can have both positive and negative effects on the performance of SMEs. These findings highlight the need for SMEs to carefully consider their diversification strategies and align them with their specific resources, market conditions, and managerial capabilities [26,31–33].

An analysis of how companies execute certification reveals a complex interplay of components. The certification procedures businesses adopt are determined by their organizational routines, absorptive ability, and discussions with certifying authorities [34,35]. The rationales behind quality certification encompass market competitiveness and strategic positioning [36]. Conversely, the acceptance of sustainability certifications is propelled by ethical, environmental, and economic motivations [36,37]. Businesses respond to environmental certification with strategic measures, including product bunching and pricing surcharges. Implementing ethical standards for international suppliers is subject to the influence of intricate interconnections with pre-existing circumstances. Environmental certification safeguards against the potential hazards linked to novelty and insignificance, augmenting operational effectiveness and financial profits [38–40]. Some previous works found that certification can significantly improve the performance of SMEs. It can function as a tool to exhibit the quality and standards of the SMEs' products and services, thereby fostering customer trust and confidence. In addition, the accreditation of quality systems can confer a competitive advantage and grant access to untapped market sectors where strict adherence to criteria is essential. For instance, the acquisition of ISO certification for quality management systems can bolster the reputation of SMEs and facilitate opportunities for entry into more-extensive markets and prospective alliances with international firms [23].

In conclusion, extensive research has been conducted on the performance of SMEs, particularly regarding the impact of certification and diversification. The findings suggest that certification and diversification strategies can significantly affect SMEs' performance, with potential benefits such as meeting consumer demands and gaining a competitive edge. However, the outcomes can vary depending on managerial characteristics, internationalization, and market conditions. Therefore, SMEs should carefully consider their certification and diversification strategies in alignment with their available resources and capabilities. This practice will enable them to navigate the market complexities effectively and enhance their overall performance.

This analysis commences with an examination of the factors that influence the acceptance of quality certification and diversification programs by SMEs in Vietnam. Additionally, we assessed the effects of various strategies on asset productivity, a metric that functions as a gauge of the firms' overall performance.

3. Data and Empirical Models

3.1. Data and Variables

Our study utilizes an unbalanced panel dataset of small and medium enterprises (SMEs) in Vietnam, collected in the years 2011, 2013, and 2015. The dataset consists of surveys from approximately 2500 enterprises across 10 provinces in Vietnam, each employing fewer than 300 employees. The context of the surveyed population, sampling methodology, and key characteristics of this dataset have been extensively detailed in previous studies (see, for example, [1,21]). The variables of interest are defined in Table 1 and descriptively summarized in Table 2.

The outcome variable in our study is asset productivity, defined as the ratio of revenues to total asset value, indicating the efficiency of investment in assets [3]. The mean asset productivity (AP) of the firms over the three years was 1.865, implying that, for every dollar of asset, the firms could generate USD 1.865 in revenue. In our estimation models, this dependent variable is transformed into its natural logarithms form, and the Kernel density of this variable is detailed in the Appendix A. The following variables, Lk and Mk, represent the ratios of labor hours and other production costs to the asset value, respectively. They function as primary production inputs and are expressed in their natural logarithmic forms used in the Cobb–Douglas production function.

Table 1. Variable definitions and measurements.

Variable Label	Variable Definition and Measurement
AP (lnAP)	Asset productivity measured by total sales divided by total asset value.
Lk (lnLk)	Total working hours divided by total asset value measured in million VND.
Mk (lnMk)	Total immediate, indirect, and material costs divided by total asset value.
cert	Equals 1 if the firm has both nationally and internationally recognized quality certification, and 0 otherwise.
cert_percent	The percentage of certified firms in the district.
diver	Equals 1 if the firm has more than one different goods/services (different 4-digit VSIC), and 0 otherwise.
diver_percent	The percentage of diversified firms in the district.
FB_sector	Equals 1 if the firm is a food and beverage producer, and 0 otherwise.
mar_power	Measured in the number of times that the firm changed the output price of the main product.
business_type	Equals 1 for a household business, and 0 otherwise.
network	Number of business contacts within the same sector.
computer	Equals 1 if the firm uses at least one computer, and 0 otherwise.
firm_age	Measured in years of establishment until the surveyed time.
gender	Gender of the respondent: equals 1 for male, and 0 otherwise.

Table 2. Summary statistics by year and aggregate.

	Y2011	Y2013	Y2015	All Three Years			
	Mean	Mean	Mean	Mean	SD	Min	Max
AP	1.631	1.653	2.291	1.865	10.124	0.000	693.730
Lk	0.022	0.022	0.023	0.022	0.058	0.000	3.600
Mk	1.194	1.140	1.668	1.339	9.473	0.001	674.811
cert	0.087	0.091	0.150	0.110	0.313	0.000	1.000
diver	0.114	0.112	0.118	0.115	0.318	0.000	1.000
cert_percent	8.678	9.182	14.972	11.006	10.380	0.000	100.000
diver_percent	11.404	11.227	11.663	11.434	8.589	0.000	100.000
FB_sector	0.299	0.307	0.318	0.308	0.462	0.000	1.000
mar_power	0.850	0.574	0.402	0.605	0.489	0.000	1.000
business_type	0.637	0.626	0.623	0.628	0.483	0.000	1.000
network	32.923	32.801	32.952	32.893	51.055	6.000	1387.000
computer	0.412	0.413	0.481	0.436	0.496	0.000	1.000
firm_age	13.419	15.605	16.492	15.199	9.973	2.000	76.000
No. of Obs.	2428	2481	2565	7474			

The quality certification variable, cert, takes a value of 1 if the firm has adopted either national or international standards (i.e., [21]). Table 2 shows that about 9% of SMEs adopted at least one quality certification scheme in 2011 and 2013, and this figure jumped to 15% in 2015. One of the key determinants of the certification adoption behavior is the percentage of certified firms in the district in the surveyed year. We noted that the sample mean value of this variable was very close to the mean value of the certification variable by definition. However, the standard deviation of the percentage of certified firms in a district was much lower than that of the certification variable, 10.4% compared with 31.3%. We also observed a similar pattern for product diversification and the percentage of diversified firms. We were also interested in other control variables, as summarized in Table 2.

3.2. Empirical Model

We depart from a standard Cobb–Douglas production function as specified in Equation (1) below:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} e^{\epsilon_{it} + \gamma T_{it} + \boldsymbol{\eta} \boldsymbol{X_{it}}} \quad (1)$$

where Y denotes the production output measured in asset productivity and A refers to the technology level or total factor productivity. K and L represent the production inputs, with K being the ratio of the costs to the total asset value and L being the ratio of labor hours to the total asset value. T refers to the adoption behavior, and $\boldsymbol{X}$ is a vector of control variables. α, β, γ, and $\boldsymbol{\eta}$ are parameters to be estimated. ϵ is known as the error term, and the prefixes it indicate firm and year identifications. Taking the natural logarithms of Equation (1), we obtain the following equation:

$$\ln Y_{it} = a + \alpha \ln K_{it} + \beta \ln L_{it} + \gamma T_{it} + \boldsymbol{\eta} \boldsymbol{X_{it}} + \tau_t + \epsilon_{it} \quad (2)$$

Apart from the production function, we are interested in the effect of the quality certification and diversification strategies, denoted as variable T controlling for a set of variables, $\boldsymbol{X}$, such as a sector, market power measured by the ability to change the price, business types, the network, the use of computers, and firm age. However, when assessing the adoption behavior and the impact of the adopted strategies on asset productivity, the adoption behavior is endogenous [17,19]. In such cases, the availability of valid instruments is crucial. Those firms, within the adjunct distance or located in the same district, may learn from each other, which can be interpreted as a spillover effect or the effect of social norms or pressures [41,42]. Moreover, firms located in the same district are under similar institutions. That is, to construct the instrument, we calculated the percentage of adopted firms in the same district. This allowed us to employ instrumental variable (IV) models, which could mitigate the bias due to unobserved features affecting the adoption behavior. The IV approach requires the following assumptions. First, the percentage of adopted firms located in the same district is correlated with the adoption behavior of the firms. Second, there is no significant correlation between the percentage of adopted firms in the same districts and the error term estimated from the asset productivity model (see, for example, [43]). Given that the first stage regression model is a logit model predicting adoption behavior, in which the percentage of adopted firms located in the same district is the instrument, the first-stage regression model is specified as follows:

$$adopt_{it} = b + \beta Percent\_adoption_{it} + \boldsymbol{\eta} \boldsymbol{X_{it}} + \zeta_t + \delta_{it} \quad (3)$$

The second-stage model reads as:

$$\ln Y_{it} = a + \alpha \ln K_{it} + \beta \ln L_{it} + \gamma \widehat{adopt} + \boldsymbol{\eta} \boldsymbol{X_{it}} + \tau_t + \epsilon_{it}. \quad (4)$$

4. Results and Discussion

Prior to discussing the primary results displayed in Tables 3 and 4, it is essential to evaluate the validity of the instruments to ensure the enhanced consistency of the instrumental variable estimation. First, the random effects logit regression models presented in Table 3 suggest that the proportion of certified firms within the same district has a statistically significant impact on a firm's likelihood of adopting certification. Similarly, the proportion of diversified firms within the same district significantly affects a firm's propensity to adopt diversification strategies. Second, we also performed the correlation test between the instrument and the residual of the corresponding main equation, ϵ_{it}, in Equation (2). The correlation between the percentage of certified firms in a district and ϵ_{it} was relatively weak, with a correlation coefficient of 0.082, and this figure for the correlation relationship between the percentage of diversified firms in a district and ϵ_{it} was -0.062. This indicates the validity of the instruments for the IV regressions.

Table 3. Random effects logit regression results.

	Dependent Variable:			
	Cert		**Diver**	
	(1)	**(2)**	**(3)**	**(4)**
cert_percent	0.009 ***	0.008 ***		
	(0.0004)	(0.0003)		
diver_percent			0.009 ***	0.010 ***
			(0.0005)	(0.0004)
FB_sector	0.110 ***	0.110 ***	−0.045 ***	−0.043 ***
	(0.009)	(0.008)	(0.009)	(0.009)
mar_power	−0.004	−0.004	0.002	0.003
	(0.006)	(0.006)	(0.007)	(0.007)
business_type	−0.122 ***	−0.118 ***	−0.052 ***	−0.044 ***
	(0.010)	(0.010)	(0.011)	(0.011)
network	0.00003	0.00001	0.00002	0.00000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
computer	0.070 ***	0.062 ***	0.041 ***	0.032 ***
	(0.010)	(0.009)	(0.010)	(0.010)
firm_age	0.002 ***	0.002 ***	0.0001	0.0003
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
prov_control	*Yes*	*No*	*Yes*	*No*
Constant	−0.017	0.007	0.012	0.022
	(0.017)	(0.013)	(0.019)	(0.014)
Observations	7695	7695	7695	7695
R^2	0.161	0.159	0.084	0.081
Adjusted R^2	0.160	0.158	0.082	0.080
F Statistic	1473.231 ***	1446.662 ***	686.632 ***	661.681 ***

Note: *** $p < 0.01$.

Table 4. IV regression results.

	Coef.	**Robust Std.**	**Coef.**	**Robust Std.**	**Coef.**	**Robust Std.**
(Intercept)	1.268	0.027 ***	1.241	0.027 ***	1.273	0.027 ***
lnLk	0.193	0.006 ***	0.194	0.006 ***	0.189	0.006 ***
lnMk	0.767	0.007 ***	0.765	0.007 ***	0.772	0.007 ***
cert	0.255	0.043 ***	0.273	0.042 ***		
diver	−0.196	0.032 ***			−0.176	0.031 ***
FB_sector	−0.091	0.008 ***	−0.084	0.007 ***	−0.061	0.006 ***
mar_power	−0.044	0.006 ***	−0.045	0.006 ***	−0.049	0.006 ***
business_type	−0.043	0.010 ***	−0.030	0.010 ***	−0.075	0.009 ***
network	0.000	0.000	0.000	0.000	0.000	0.000 *
computer	0.048	0.009 ***	0.045	0.009 ***	0.070	0.008 ***
firm_age	−0.001	0.000 ***	−0.001	0.000 ***	−0.001	0.000 ***
realph_asset	0.000	0.000	0.000	0.000	0.000	0.000 *
Observation	7602		7602		7602	
R-squared	0.955		0.957		0.954	
Adjusted R-squared	0.955		0.957		0.954	

Note: * $p < 0.1$; *** $p < 0.01$.

4.1. Certification and Diversification Adoption

Table 3 reports the random effects logit regression results of factors influencing the likelihood of adopting the quality certification ('cert') and product diversification ('diver') behavior by firms. The analysis is presented in four models, each corresponding to different combinations of dependent variables and control inclusions. The findings reveal intricate

dynamics between firm characteristics and their strategic outcomes, providing nuanced insights into the factors driving certification attainment and diversification within firms.

The positive relationship between 'cert' and 'cert_percent' suggests a mimicry effect, where firms are likely to adopt certifications if they operate in areas with a higher prevalence of certified firms. This finding aligns with institutional theory, which posits that firms often conform to prevailing norms and practices in their institutional environment to gain legitimacy [44]. The significant and positive impact of 'FB_sector' on 'cert' may be explained through the lens of food safety concerns in Vietnam [45,46]. This suggests that food and beverage firms are more likely to seek certifications to signal quality and gain competitive advantage [47]. In contrast, household businesses ('business_type') are less likely to seek certifications, possibly due to resource constraints or a lack of institutional pressure, highlighting the importance of organizational capacity in adopting complex practices [48]. The role of technology ('computer') and firm age ('firm_age') in positively influencing certification adoption further supports the notion that resource availability and firm maturity are crucial in meeting the demands of the certification processes.

The observed positive correlation between 'diver' and 'diver_percent' indicates that firms are more inclined to diversify in regions with diverse product types. This could be attributed to competitive isomorphism or organization–environment relations, where firms mimic the successful strategies of their peers to remain competitive [49]. The negative association of the 'FB_sector' with 'diver' might reflect the specialized nature of the food and beverage industry, where diversification could dilute brand identity or clash with regulatory constraints. The negative effect of 'business_type' suggests that smaller, resource-constrained firms may face higher barriers to diversification. The positive influence of 'computer' underscores the role of technology in enabling firms to explore and enhance a firm's adaptive capacity [50].

In summary, the study sheds light on the various factors influencing firms' strategic outcomes in certification attainment and diversification. The significant predictors, such as the percentage of certification or diversification, sectoral affiliation, business type, technological resources, and firm age, provide a different angle of the driving forces behind firm strategies. However, the relatively modest R^2 values suggest that other unobserved factors may also play a significant role.

4.2. The Impact of Certification and Diversification on Productivity

The IV regression results, presented in Table 4, provide insights into the sizable effects of quality certification ('cert') and product diversification ('diver') on asset productivity ('lnAP'), accounting for potential endogeneity issues. Endogeneity in this context might arise from omitted variable bias, measurement error, or reverse causality, where the level of asset productivity could influence a firm's decision to obtain certifications or diversify its products. By using the IV approach, the model aims to offer a more-accurate estimation of the causal impact of quality certification and product diversification on asset productivity.

The coefficient for 'cert' is positive and significant across the models where it is included, indicating that obtaining quality certifications is associated with an increase in asset productivity. Specifically, the coefficients range from 0.255 to 0.273, implying a substantial and positive effect on the asset productivity. This means that, all else being equal, obtaining quality certification is associated with an approximately 25.5% to 27.3% increase in the sales generated per unit of asset.

This significant positive effect can be attributed to several mechanisms. First, certifications often require firms to adhere to standardized processes that enhance operational efficiency and reduce waste [51]. Second, by streamlining operations, firms can generate more output from the same level of assets. Quality certifications can also enhance a firm's reputation and provide access to new markets, particularly where certifications are a prerequisite for entry [52]. This can lead to increased sales without a corresponding increase in asset base, thereby improving the sales-to-asset ratio. Third, the process of obtaining and

maintaining certification may foster a culture of continuous improvement and innovation within the firm, leading to better use of assets and improved productivity over time [53].

Conversely, the coefficient for 'diver' is negative and significant in the models where it is included, indicating that diversification is associated with a decrease in asset productivity. The coefficients are −0.196 and −0.176, suggesting that diversifying product lines is associated with an approximately 17.6% to 19.6% decrease in the sales generated per unit of asset.

This negative impact may be due to several factors. First, diversification can increase the complexity of operations, leading to inefficiencies and a dilution of focus. Managing a wider array of products or services may require more-diverse assets, not all of which are utilized efficiently [54,55]. Second, diversifying into areas outside of a firm's core competencies can lead to a misallocation of resources, where assets are not used in the most-productive manner [53].

The IV regression models indicate that, while quality certification significantly enhances asset productivity, product diversification appears to diminish it. These findings underscore the importance of strategic alignment and careful consideration of the broader market and operational context when pursuing quality certification and diversification strategies. Firms must weigh the potential efficiency gains from certification against the possible complexity and resource misallocation associated with diversification.

5. Conclusions, Policy Options, and Limitations

This study primarily utilizes a Cobb–Douglas production function framework through instrumental variables regression to elucidate the impacts of quality certification and product diversification on firm-level asset productivity. Quality certification was found to significantly enhance asset productivity, with certified firms showing an increase in sales per unit of asset. This suggests that certifications improve operational efficiency, enhance reputation, and facilitate market access. In contrast, product diversification is associated with a decrease in asset productivity, indicating the potential complexities and inefficiencies that can arise from managing a broader range of products or services.

The implications for policymakers and industry stakeholders are profound. Encouraging quality certifications through supportive policies can elevate industry standards and competitiveness, while a strategic approach to diversification is necessary to ensure that expansion does not compromise asset productivity. Additionally, fostering technological advancement and providing targeted support to small and household businesses can further enhance productivity and operational efficiency.

However, the study has limitations that call on further research. The use of asset productivity as the sole measure may not capture the full spectrum of firm performance. Future studies could incorporate additional productivity metrics or explore industry-specific effects to provide a more-nuanced understanding. Moreover, the nature of the data limits the ability to fully account for all factors influencing certification and diversification decisions. Understanding these aspects is vital for developing more-targeted and -effective policies and strategies for enhancing firm productivity and competitiveness.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

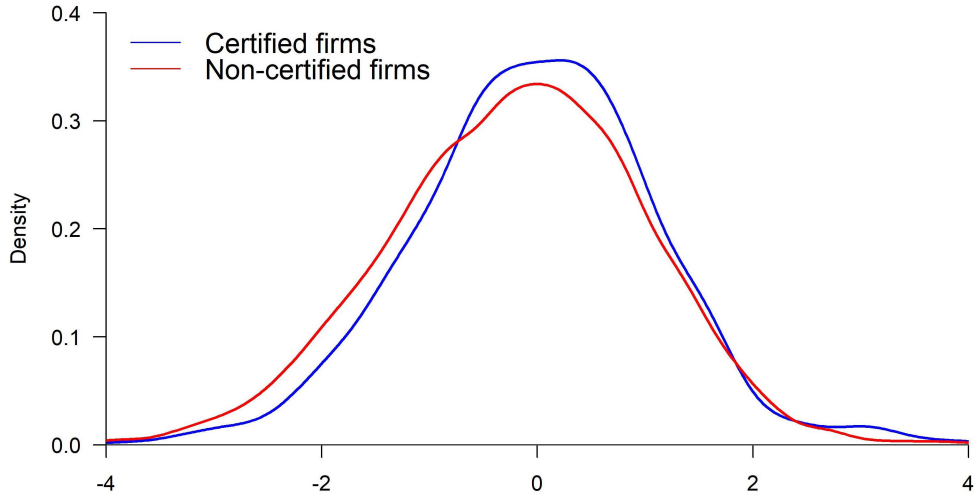

Figure A1. Density of log of asset productivity: certified vs. non-certified firms.

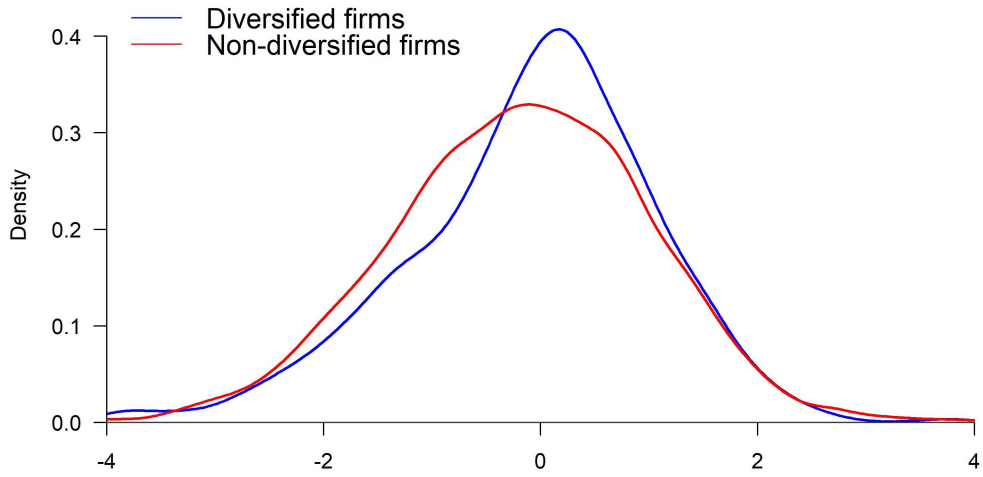

Figure A2. Density of log of asset productivity: diversified vs. non-diversified firms.

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