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Imports and finance: first empirical evidence for Indian manufacturing firms

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Abstract

Purpose – This study aims to investigate the impact of importing on firm profitability in India, an emerging economy, from 2002 to 2019 while also examining how liquidity and debt levels influence this relationship.
Design/methodology/approach – A two-step methodology that combines propensity score matching (PSM) with fixed-effects models is applied to address selection bias and unobserved heterogeneity. Additionally, a system generalized method of moments estimator is employed to ensure the robustness of the results.
Findings – The results indicate that imports significantly improve firm profitability across multiple measures, including earnings before interest, taxes, depreciation, and amortization (EBITDA), profit after tax (PAT) and cash profits. Firms with lower liquidity benefit the most from importing. While the impact on EBITDA is consistent across debt levels, high-debt firms experience stronger improvements in PAT and low-debt firms see greater gains in cash profits.
Practical implications – The findings not only expand our understanding of the financial benefits of importing but also provide practical insights for firms in emerging markets seeking to enhance profitability through international trade.
Originality/value – This study contributes to the literature by examining the link between importing and firm financial performance, emphasizing profitability. This is a valuable addition, as most prior studies have primarily focused on productivity metrics, often overlooking financial indicators. Additionally, it explores how importing affects profitability across firms with varying liquidity and debt levels, a largely unexplored issue. Advanced empirical techniques ensure precise estimation of the import effect.

Keywords Imports, Learning by importing, Profitability, Financial performance, India
Paper type Research paper

1. Introduction

Endogenous growth theories have long recognized the crucial role of imports in driving economic growth and efficiency gains (Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1993; Aghion and Howitt, 1998). Imports provide firms with access to a diverse range of resources (Ethier, 1982; Markusen, 1989; Halpern *et al.*, 2015) and cutting-edge technologies (Keller, 2002; Acharya and Keller, 2009). However, the benefits of importing extend beyond mere access to resources. The well-established "learning from importing" hypothesis, central to heterogeneous firms' literature, emphasizes the productivity benefits firms gain through importing. Empirical studies using micro-level data from various countries have consistently supported this view, demonstrating the positive impact of imports on firm productivity [1] (Amiti and Konings, 2007; Kasahara and Rodrigue, 2008; Topalova and Khandelwal, 2011; Kasahara and Lapham, 2013; Sharma, 2014; Sharma and Mishra, 2015;

JEL Classification — F14, F65, L60

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Halpern *et al*., 2015; Elliott *et al*., 2016; Abreha, 2019; Camino-Mogro and Carrillo-Maldonado, 2023).

Despite these productivity gains, importing is not without its costs. Firms incur substantial fixed expenses related to supplier identification, contractual negotiations, quality inspections, regulatory compliance, and the integration of foreign inputs into existing production frameworks (Dalgic *et al*., 2015; Nucci *et al*., 2021). Additionally, international trade exposes firms to financial risks, such as exchange rate volatility and fluctuating tariffs. These inherent informational asymmetries within global supply chains necessitate a thorough understanding of the financial aspects of importing.

Much of the existing literature has focused on how financial factors, particularly credit constraints, influence firms' importing behavior. Studies have established that credit constraints significantly impede firms' ability to import, affecting both the decision to import (extensive margin) and the volume of imports (intensive margin) (Bas and Berthou, 2012; Aristei and Franco, 2014; Fauceglia, 2015; Muûls, 2015; Wagner, 2015; Nucci *et al*., 2021). Nevertheless, a critical gap persists: the literature has largely overlooked the reciprocal impact, specifically, how imports affect firms' financial performance, particularly their profitability. This oversight is particularly surprising, given that profit maximization, rather than mere productivity improvements, is the ultimate objective of firms. Furthermore, since a positive relationship between productivity and profitability is often assumed (Wagner, 2012a, 2014), it is expected that a productivity premium would also translate into a profitability premium.

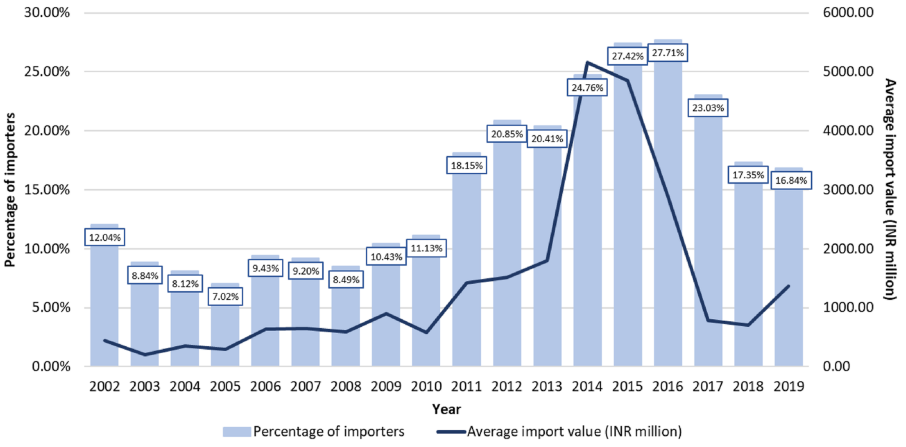
From a theoretical perspective, profitability is a direct measure of a firm's success, as its survival depends on maintaining sustained profits (Wagner, 2012b). Financial analysts rely heavily on profitability indicators within financial statements to assess firm performance, which in turn influences investor confidence and access to capital (Robinson *et al*., 2012). Moreover, studies have found that firms with low profitability are more likely to exit the market (Ilmakunnasand Topi, 1999; Bottazzi *et al*., 2011). Given these considerations, an empirical investigation into the relationship between imports and firm profitability is not only theoretically significant but also holds practical implications. Despite its relevance, only a handful of studies have explored this relationship empirically. Wagner (2012a) was the first to examine the impact of import status on profitability, finding no significant effect in German manufacturing firms. In a follow-up study, Wagner (2014) shifted focus to the extensive margins of imports (variety of goods imported and the number of source countries) but found no evidence that greater import activity increased profits in the German manufacturing sector. van den Berg *et al*. (2018) also found that internationalization tended to lower profit margins in firms from Finland and the Netherlands. In contrast, Srithanpong (2014) identified a positive relationship between importing and profitability in Thai manufacturing firms. Fu *et al*. (2021) further explored this link in Chinese manufacturing through the lens of trade liberalization. They argued that access to low-cost imported inputs reduced firms' reliance on inventories, lowered inventory costs, and ultimately improved profitability.

Principally, imports influence firms' profitability in two opposing ways. First, imports can exert *pro-competition effects* by intensifying competition within the domestic market. The influx of foreign goods can pressure domestic firms to lower prices, potentially reducing markups and profitability. Secondly, imports can enhance profitability through *pro-competitive effects*. Access to cheaper imported inputs and competitively priced final goods can improve profit margins through reduced production costs and price arbitrage. Furthermore, if import penetration incentivizes firms to improve product quality, they may benefit from an "importer premium", gaining a competitive advantage through superior offerings.

Building on these perspectives, the present study examines the impact of imports on firm profitability within the context of an emerging economy, India. Imports have played a significant and evolving role in India's economic landscape over the last 2 decades. The percentage of importing firms has steadily increased, particularly after 2010, peaking at

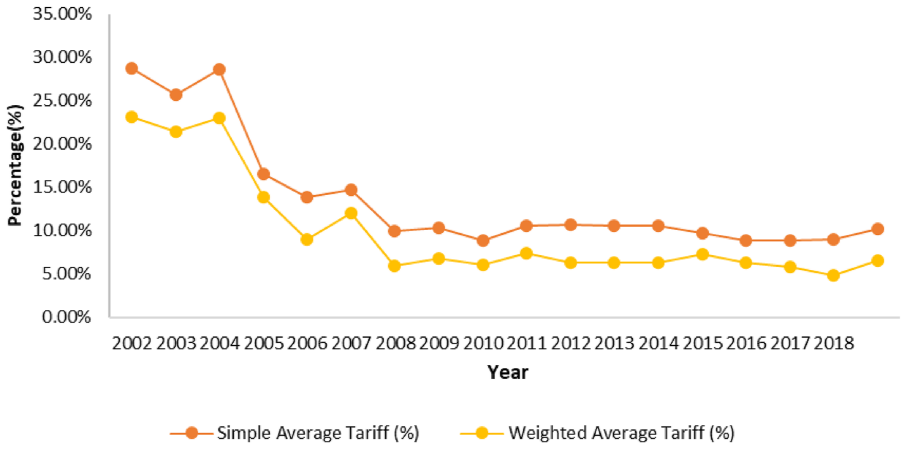
around 28% in 2016 (see Figure 1). Concurrently, average import values have shown substantial growth, with notable peaks and troughs. A significant surge in both the percentage of importing firms and import values occurred between 2011 and 2015, with import values reaching their highest at INR 5,154.72 million in 2014. This trend reflects India's increasing integration into global supply chains, driven by the need for advanced technologies, raw materials, and competitive goods. However, the fluctuations in later years, particularly the decline after 2016, can be partly attributed to the "Make in India" initiative [2] and a general slowdown in the global economy [3]. A key factor shaping this trend has been the gradual reduction in import tariffs (see Figure 2). In the early 2000s, tariffs were relatively high, with the simple average tariff at 29% and the weighted average exceeding 20%. However, by the mid-2000s, tariff rates had been significantly reduced to more moderate levels. By 2010, the simple average tariff had declined to 9%, while the weighted average stood at 6%, where it largely remained throughout the decade. These lower tariffs facilitated greater trade openness, increased import participation, and enhanced industrial competitiveness.

Our study makes several significant contributions to the existing literature on imports and firm performance. First, we examine the relationship between importing and firm financial performance, focusing specifically on profitability as a key measure. This adds valuable insights to the field, which has predominantly examined the impact of imports on productivity growth (Kasahara and Rodrigue, 2008; Halpern *et al*., 2015; Elliott *et al*., 2016; Camino-Mogro *et al*., 2021), domestic product growth (Colantone and Crinò, 2014; Goldberg *et al*., 2010), and exports growth (Bas and Strauss-Kahn, 2014; Feng *et al*., 2016; Sharma, 2016; Pane and Patunru, 2023). Notably, financial indicators have been largely overlooked in prior assessments of import-driven firm-level outcomes. Furthermore, we explore how the effect of importing on profitability varies based on firms' liquidity and debt status, an issue largely unexplored in the existing literature. Second, we employ a robust methodological approach that combines propensity score matching (PSM) with panel data models, ensuring a more precise estimation of the impact of imports. Additionally, we utilize the system generalized method of moments (GMM) to address potential econometric challenges, further strengthening the reliability of our findings. Finally, our focus on firm-level imports in a developing economy is particularly important. While existing research has examined the relationship between imports and firm performance, there is a notable gap in studies exploring



Source(s): Authors' calculations based on the CMIE Prowess database

Figure 1. Yearly trends in the share of importers and average import value (2002–2019)



Source(s): Authors' calculations based on the World Integrated Trade Solution (WITS) database

Figure 2. India's effectively applied simple average tariff and weighted average tariff on world imports (2009–2019)

this dynamic in developing countries, where factors such as resource constraints and market conditions differ significantly from those in developed economies. Our study provides new insights into how imports affect firms in emerging markets, which could inform policymakers and managers in similar contexts.

The paper is structured as follows: Section 2 describes the data, empirical methodology, and summary statistics. Section 3 presents the findings, while Section 4 conducts the robustness check. Section 5 includes subgroup analysis, and Section 6 offers concluding remarks.

2. Data and empirical strategy

2.1 Data

Our research focuses on Indian manufacturing firms, utilizing data from the Prowess database managed by the Center for Monitoring Indian Economy (CMIE). This extensive database collects firm-level information in India, compiling data from publicly available income statements and balance sheets. Importantly, the firms listed in the Prowess database represent over 70% of the economic activity in India's organized industrial sector. They account for roughly 75% of all corporate taxes and more than 95% of the excise duties collected by the Government of India. A key feature of this database is its detailed breakdown of sample firms' imports, including raw materials, finished goods, and capital goods. Given its comprehensive coverage, the Prowess database has been widely used in firm-level studies on import behavior (Goldberg *et al*., 2010; Bas and Berthou, 2012; Sharma, 2014, 2016; Khanna and Sharma, 2025). For our analysis, we begin with an unbalanced panel dataset covering the years 2002–2019 [4]. After the data-cleaning process [5], our final dataset comprises 16,983 firm-year observations from 3,167 firms across 22 industries at the two-digit NIC level. Among these 3,167 firms, 272 are import starters, 538 are continuous importers, 265 are sporadic importers, and 2,092 are non-importers.

2.2 Empirical strategy

Our objective is to accurately assess the impact of imports on firm profitability. However, we must address the issue of selection bias in this investigation. Firms that choose to import may

already differ from non-importers in ways that also influence profitability. As a result, any observed differences in profitability between these groups might result from pre-existing firm characteristics rather than the act of importing itself. To address this challenge, we employ a two-step estimation strategy. First, we use propensity score matching to account for selection bias. Second, we apply a fixed-effects model to the matched sample to control for firm-specific unobservable factors that may influence profitability.

A key challenge in this analysis is the unobservable counterfactual –what would have been the profitability of importing firms if they had not imported? Since this scenario cannot be directly observed, the most effective way to measure the impact of imports on firm profitability is to compare two firms with identical characteristics, where one imports and the other does not. However, identifying such comparable firms is difficult because importing firms tend to differ significantly from non-importers across several dimensions. Previous research on importing behavior suggests that importers share similar characteristics with exporters. Importers are larger, more productive, pay higher wages, and are more skill- and capital-intensive than non-importers (Kugler and Verhoogen, 2009; Bernard *et al*., 2012; Kasahara and Lapham, 2013; Halpern *et al*., 2015). These differences complicate the creation of a valid control group of non-importers that accurately represents the counterfactual scenario for importing firms.

To address this issue, we use the propensity score matching method developed by Rosenbaum and Rubin (1983). PSM helps create a comparable control group by matching importing firms with "twin" non-importing firms based on observable characteristics. This technique reduces selection bias by ensuring that both groups share similar pre-import attributes. By comparing the actual outcomes of importers with the estimated counterfactual outcomes of non-importers, we can more accurately determine the true effect of importing on firm profitability.

PSM mitigates two key sources of bias in observational data: bias due to lack of distribution overlap and bias caused by variations in density weighting (Heckman *et al*., 1998). The methodology constructs the counterfactual group using propensity scores, which represent the probability of a firm choosing to import based on its observable characteristics [6]. These propensity scores are estimated using a probit model:

$$\Pr(IMPSTART_{izt} = 1) = \phi(X_{i,z,t-1},\ \delta_t,\ \delta_z) \tag{1}$$

Equation (1) outlines the probit model for estimating propensity scores. The dependent variable, $IMPSTART_{izt}$, is a binary variable that equals one if firm i in industry z starts importing in year t, and zero otherwise. ϕ represents the cumulative distribution function of the standard normal distribution. $X_{i,z,t-1}$ is a vector of firm-specific characteristics from the year before importing, while δ_t and δ_z capture time and industry-specific effects, respectively.

The firm-level characteristics included in $X_{i,z,t-1}$ are productivity, profitability, liquidity, leverage, labor cost, tangibility, age, and foreign ownership structure (see Table 1 for variables description). These factors are selected based on theoretical insights and empirical evidence from previous studies. *Productivity*, a key determinant of firm efficiency, is included in our analysis, as past studies consistently link productivity to a firm's likelihood of importing (Bernard *et al*., 2007; Kasahara and Rodrigue, 2008; Muûls and Pisu, 2009; Vogel and Wagner, 2010; Dalgic *et al*., 2015; Sharma and Mishra, 2015; Elliott *et al*., 2016). To estimate productivity [7], we use the ACF-corrected Levinsohn-Petrin (LP) procedure (Levinsohn and Petrin, 2003; Ackerberg *et al*., 2015). *Financial characteristics* such as profitability, liquidity, debt level, and labor costs are also crucial in determining a firm's capacity to finance the initial costs of importing. Firms with strong financial resources are better equipped to cover the upfront costs of importing (Gibson and Graciano, 2011; Dalgic *et al*., 2015), making these factors important for our analysis. We also include *tangibility*, measured as the ratio of net fixed assets to total assets, which indicates a firm's reliance on capital-intensive production processes. This variable helps us understand how capital intensity influences the likelihood of

Table 1. Variables description

Variable	Description
Profitability1	Logarithm of earnings before interest, taxes, depreciation and amortization (EBITDA)
Profitability2	Logarithm of profit after tax (PAT)
Profitability3	Logarithm of cash profits
Imports	Logarithm of total imports
Productivity	Logarithm of total factor productivity (TFP) estimated using ACF-corrected LP specification
Liquidity	Ratio of current assets to total liabilities
Debt level	Logarithm of total borrowings
Labor cost	Ratio of salaries to sales
Tangibility	Ratio of net fixed assets to total assets
Age	Logarithm of the difference between the reporting year and the incorporation year
Foreign ownership	Binary variable: 1 if the foreign promoters' ownership share is 10% or greater; 0 otherwise

Source(s): Authors' own work

importing. Additionally, *firm age*, measured as the logarithm of age, captures the impact of experience and maturity on a firm's importing decisions, as more established firms may have better access to international markets. Lastly, a dummy variable for *foreign ownership* accounts for the potential impact of ownership structure on import behavior. Foreign-owned firms often have stronger global connections and may, therefore, be more likely to engage in importing.

We implement one-to-one nearest neighbor (NN) matching procedure to pair each importing firm with a non-importing firm based on their propensity scores. The NN matching algorithm selects the non-importing firm with the closest propensity score for each importing firm, ensuring that both firms are as similar as possible in terms of observable characteristics (Caliendo and Kopeinig, 2008). To further refine the control group and enhance the comparability of the matched pairs, we restrict the matching to firms within the same year (t) and industry (z). This approach minimizes potential biases arising from temporal or sectoral differences.

Following the matching process, we estimate the following fixed-effects model on the matched sample to analyze the relationship between imports and firm profitability:

$$Profitability_{izt} = \beta_0 + \beta_1 Imports_{izt} + X_{izt} + \delta_t + \delta_z + \mu_{izt} \quad (2)$$

Equation (2) specifies the fixed-effects model, where the dependent variable is firm profitability. Our analysis considers three distinct profitability measures: Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA), Profit After Tax (PAT), and Cash Profits. Each metric captures a different aspect of profitability. EBITDA (*Profitability1*) reflects a firm's operating profitability, focusing on earnings from core business activities without the influence of capital structure, taxes, or depreciation/amortization. PAT (*Profitability2*) measures net profitability after accounting for all expenses, including interest, taxes, and depreciation. It indicates the firm's bottom-line performance and the earnings available to shareholders. Cash profits (*Profitability3*) assess the actual cash generated by a firm after adjusting for non-cash expenses, emphasizing liquidity and short-term financial health. Moreover, the high correlations among these three profitability measures suggest that they are interrelated and collectively provide a well-rounded assessment of firm performance (Table A1 in the Appendix). The key independent variable in the model is imports, measured by the volume of imports. Additionally, the vector X_{izt} includes firm-specific control variables such as productivity, profitability, liquidity, leverage, labor costs, asset tangibility, firm age, and foreign ownership. These variables account for factors that may

influence profitability independently of imports. The model also incorporates year [8] (δ_t) and industry (δ_z) fixed effects. Finally, μ_{izt} is the error term.

By combining propensity score matching with the fixed-effects model, we account for both observable firm characteristics (through matching) and unobservable, time-invariant firm-specific factors (through fixed effects). This two-step approach provides a robust estimate of the causal relationship between imports and firm profitability, ensuring that the results are not driven by selection bias or omitted variable bias.

Table 2 provides a summary of the variables examined in this study, comparing all firms and different types of importers: import starters, continuous importers, sporadic importers, and non-importers. The profitability measures (Profitability 1, Profitability 2, and Profitability 3) show moderate average values, indicating that firms generally maintain stable financial health. Productivity levels remain relatively stable across all firm categories, with only minor variations. Continuous importers exhibit the highest liquidity, while import starters have the lowest, suggesting that firms engaged in consistent importing are better at managing short-term financial obligations. Non-importers show slightly higher average debt levels and labor costs, which may indicate potential financial strain. Tangibility, representing the proportion of fixed assets, is slightly higher among import starters compared to other groups, suggesting greater investment in physical assets to support import activities. Firm age is fairly consistent across categories, though continuous importers are slightly younger on average, while non-importers tend to be the oldest. Lastly, foreign ownership is more prevalent among import starters, indicating stronger foreign investor involvement in these firms.

3. Results

3.1 PSM results

We implement the 1:1 nearest neighbor matching method to pair each importer firm (starter) with a similar non-importer within the same year and industry based on the probability of initiating imports. Table 3 presents the matching balance results, showing that before matching, significant differences exist between importer and non-importer firms in profitability, debt levels, labor costs, tangibility, and age. However, after matching, the *t*-test fails to reject the null hypothesis, indicating no significant differences in the means of key firm characteristics between the two groups. This confirms that the matching process successfully balances the samples. Figure 3 visually supports these findings by presenting kernel density distributions of propensity scores before and after PSM. The kernel density plots reveal substantial differences between importer and non-importer firms in the unmatched sample, while the matched sample for all profitability measures shows a much closer alignment between the propensity scores of both groups.

3.2 PSM-fixed effects results

Following the successful matching of importer and non-importer firms, we employ fixed-effects regressions on the matched sample to analyze the relationship between imports and firm profitability. The results in Table 4 reveal that the impact of imports is consistently positive and statistically significant across all three profitability measures – EBITDA (Profitability 1), PAT (Profitability 2), and cash profits (Profitability 3). Firms engaged in imports demonstrate higher profitability, with imports contributing to approximately a 6% increase in operational profitability (EBITDA), around a 15% rise in net profitability (PAT), and about an 11% improvement in cash-based profits.

The observed differences in the magnitude of the impact of imports on various profitability measures can be attributed to the inherent nature of each metric and how imports influence different stages of the firm's financial performance. The relatively modest increase in operational profitability (EBITDA) of 6% suggests that while imports may lower input costs and improve efficiency, firms still face other operational expenses, such as labor costs and

Table 2. Summary statistics

	All firms (N = 16,983; n = 3,167)				Import starters (N = 2,339; n = 272)		Continuous importers (N = 2,618; n = 538)		Sporadic importers (N = 1,101; n = 265)		Non-importers (N = 10,925; n = 2,092)	
Variable	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Profitability1	6.27	1.88	−2.30	13.79	6.06	1.62	5.83	1.54	5.91	1.70	6.46	1.99
Profitability2	5.26	2.10	−2.30	12.89	4.95	1.81	4.78	1.79	4.84	1.94	5.48	2.20
Profitability3	5.77	1.93	−2.30	13.43	5.56	1.62	5.31	1.62	5.41	1.73	5.96	2.05
Imports	4.83	2.39	−2.30	13.49	5.00	2.57	4.79	2.25	4.48	2.63	0.00	0.00
Productivity	−3.59	0.93	−12.04	1.90	−3.65	0.89	−3.63	0.93	−3.59	1.00	−3.57	0.93
Liquidity	0.45	0.19	0.00	0.99	0.43	0.18	0.47	0.19	0.44	0.20	0.44	0.20
Debt level	6.98	2.13	−2.30	14.94	6.92	1.95	6.49	1.95	6.67	2.03	7.14	2.20
Labor cost	0.10	1.05	0.00	132.00	0.08	0.16	0.09	0.10	0.10	0.36	0.11	1.30
Tangibility	0.34	0.17	0.00	0.98	0.36	0.17	0.32	0.16	0.34	0.17	0.33	0.17
Age	3.33	0.65	0.00	5.05	3.33	0.59	3.24	0.59	3.32	0.65	3.35	0.67
Foreign ownership	0.07	0.26	0.00	1.00	0.09	0.28	0.04	0.20	0.07	0.25	0.08	0.27

Note(s): Import starters are those that began importing during this sample period and continued for at least two consecutive years. Continuous importers are firms that consistently import goods throughout the entire time frame between 2002 and 2019. Sporadic importers exhibit inconsistent import patterns, while non-importers are firms that do not engage in any imports during this period. "*N*" represents the total number of firm-year observations and "*n*" indicates the number of firms in the sample. Values are reported as averages, and the negative values of productivity result from the log transformation of TFP

Source(s): Authors' own work

Table 3. Propensity score matching and balancing results

Variable	Unmatched sample: Treated group ($N = 272$) Mean	Std. Dev	Control group ($N = 10{,}925$) Mean	Std. Dev	*t*-test on mean difference *t*-stat [*p*-value]
Profitability1$_{t-1}$	5.78	1.48	6.57	1.96	7.75 [0.000]
Profitability2$_{t-1}$	4.62	1.68	5.58	2.19	7.55 [0.000]
Profitability3$_{t-1}$	5.23	1.47	6.06	2.04	7.93 [0.000]
Productivity$_{t-1}$	−3.56	0.97	−3.51	0.89	0.81 [0.418]
Liquidity$_{t-1}$	0.46	0.18	0.44	0.19	−1.68 [0.095]
Debt level$_{t-1}$	6.68	1.92	7.25	2.18	4.42 [0.000]
Labor cost$_{t-1}$	0.07	0.07	0.10	0.29	4.04 [0.000]
Tangibility$_{t-1}$	0.36	0.16	0.34	0.17	−1.90 [0.059]
Age$_{t-1}$	3.23	0.62	3.36	0.67	3.13 [0.002]
Foreign ownership$_{t-1}$	0.08	0.28	0.09	0.28	0.02 [0.875]

Variable	Matched sample (outcome variable: Profitability1) Treated group ($N = 201$) Mean	Std. Dev	Control group ($N = 201$) Mean	Std. Dev	*t*-test on mean difference t-stat [*p*-value]
Profitability1$_{t-1}$	5.86	1.40	6.02	1.56	1.09 [0.275]
Productivity$_{t-1}$	−3.49	0.94	−3.45	0.80	0.44 [0.663]
Liquidity$_{t-1}$	0.47	0.18	0.47	0.17	0.12 [0.902]
Debt level$_{t-1}$	6.59	1.93	6.65	2.03	0.27 [0.784]
Labor cost$_{t-1}$	0.07	0.06	0.07	0.05	−0.37 [0.710]
Tangibility$_{t-1}$	0.35	0.16	0.35	0.16	−0.12 [0.908]
Age$_{t-1}$	3.22	0.62	3.23	0.59	0.22 [0.824]
Foreign ownership$_{t-1}$	0.07	0.26	0.09	0.29	0.51 [0.473]

Variable	Matched sample (outcome variable: Profitability2) Treated group ($N = 173$) Mean	Std. Dev	Control group ($N = 173$) Mean	Std. Dev	*t*-test on mean difference t-stat [*p*-value]
Profitability2$_{t-1}$	4.71	1.67	4.80	1.73	0.48 [0.633]
Productivity$_{t-1}$	−3.37	0.78	−3.41	0.73	−0.49 [0.623]
Liquidity$_{t-1}$	0.48	0.18	0.47	0.17	−0.49 [0.624]
Debt level$_{t-1}$	6.53	1.97	6.62	2.01	0.42 [0.673]
Labor cost$_{t-1}$	0.07	0.06	0.07	0.05	0.60 [0.546]
Tangibility$_{t-1}$	0.34	0.16	0.35	0.16	0.54 [0.593]
Age$_{t-1}$	3.20	0.59	3.24	0.58	0.68 [0.500]
Foreign ownership$_{t-1}$	0.05	0.22	0.10	0.30	2.66 [0.103]

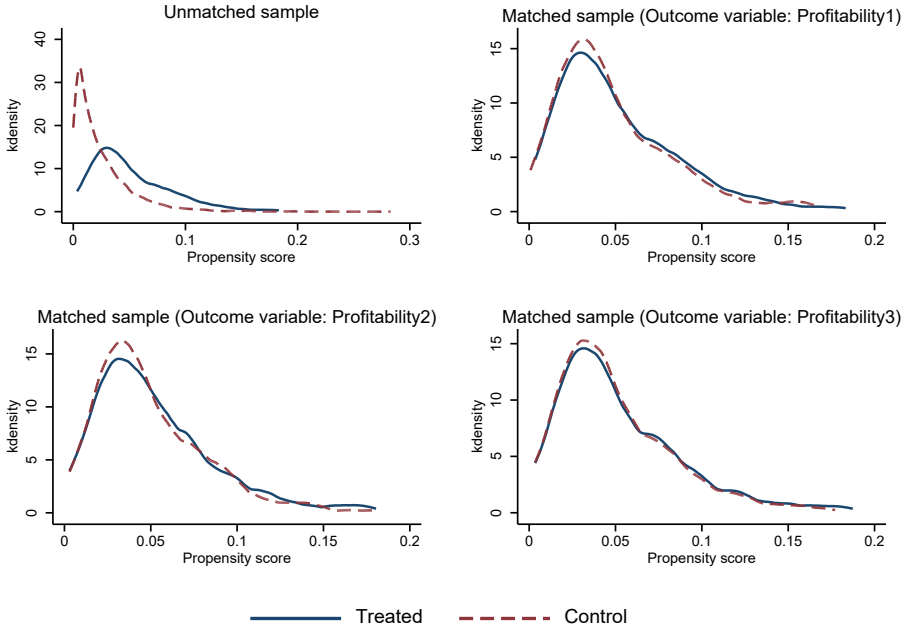
Variable	Matched sample (outcome variable: Profitability3) Treated group ($N = 187$) Mean	Std. Dev	Control group ($N = 187$) Mean	Std. Dev	*t*-test on mean difference t-stat [*p*-value]
Profitability3$_{t-1}$	5.28	1.48	5.43	1.59	0.96 [0.338]

(*continued*)

Table 3. Continued

Variable	Matched sample (outcome variable: Profitability3) Treated group (N = 187) Mean	Std. Dev	Control group (N = 187) Mean	Std. Dev	t-test on mean difference t-stat [p-value]
Productivity$_{t-1}$	−3.41	0.81	−3.43	0.76	−0.26 [0.798]
Liquidity$_{t-1}$	0.48	0.18	0.47	0.17	−0.09 [0.927]
Debt level$_{t-1}$	6.54	1.95	6.67	2.06	0.63 [0.526]
Labor cost$_{t-1}$	0.07	0.07	0.07	0.05	−0.24 [0.812]
Tangibility$_{t-1}$	0.35	0.16	0.35	0.16	0.15 [0.883]
Age$_{t-1}$	3.20	0.59	3.22	0.60	0.27 [0.788]
Foreign ownership$_{t-1}$	0.07	0.26	0.10	0.30	0.88 [0.348]

Note(s): The Pearson χ^2 test is utilized instead of the traditional t-test for the foreign ownership dummy variable
Source(s): Authors' own work



Source(s): Authors' calculations

Figure 3. Kernel density distribution of propensity scores before and after propensity score matching

overheads, that limit the overall gains. In contrast, the higher impact on net profitability (PAT), at around 15%, indicates that importing firms may benefit not only from cost reductions but also from enhanced pricing power and tax benefits. Imports can improve the quality of the final product (Camino-Mogro and López, 2021) [9], allowing firms to charge a price premium and generate higher revenue. Additionally, importers may reduce taxable income through duty drawbacks or tax incentives, or they may lower financing costs by improving creditworthiness. These factors amplify the impact on net profitability compared to operational profitability. Meanwhile, the 11% rise in cash-based profits reflects the improved liquidity position of

Table 4. Impact of imports on profitability: PSM-fixed effect estimation results

	(1) Profitability1	(2) Profitability1	(3) Profitability1	(4) Profitability2	(5) Profitability2	(6) Profitability2	(7) Profitability3	(8) Profitability3	(9) Profitability3
Imports	0.063***	0.063***	0.064***	0.146***	0.147***	0.148***	0.110***	0.111***	0.113***
	(0.024)	(0.024)	(0.024)	(0.035)	(0.034)	(0.036)	(0.023)	(0.024)	(0.024)
Productivity	0.281***	0.298***	0.310***	0.199*	0.233**	0.232**	0.128*	0.141**	0.147**
	(0.069)	(0.071)	(0.073)	(0.105)	(0.105)	(0.108)	(0.069)	(0.070)	(0.073)
Liquidity	−0.869**	−0.908**	−0.875**	−0.948	−1.252*	−1.123*	−0.961**	−1.008**	−1.058**
	(0.376)	(0.395)	(0.406)	(0.670)	(0.664)	(0.680)	(0.409)	(0.419)	(0.426)
Debt level	−0.012	−0.023	−0.033	−0.264***	−0.236***	−0.260***	−0.078	−0.059	−0.072
	(0.050)	(0.051)	(0.053)	(0.088)	(0.088)	(0.095)	(0.050)	(0.051)	(0.054)
Labor cost	−3.863***	−3.731***	−3.875***	−4.852**	−5.734**	−6.177**	−2.744**	−2.924**	−3.343**
	(1.150)	(1.205)	(1.222)	(2.361)	(2.338)	(2.390)	(1.389)	(1.413)	(1.434)
Tangibility	−1.213***	−1.167***	−1.114***	−1.282**	−0.885	−0.892	−0.810**	−0.682*	−0.708*
	(0.381)	(0.398)	(0.410)	(0.607)	(0.611)	(0.633)	(0.394)	(0.410)	(0.422)
Age	1.526***	1.249**	1.361**	1.003**	−1.430	−1.636	1.580***	0.434	0.784
	(0.285)	(0.636)	(0.662)	(0.443)	(1.110)	(1.184)	(0.286)	(0.747)	(0.789)
Foreign ownership	0.211	0.174	0.168	0.149	0.273	0.269	0.678**	0.670**	0.672**
	(0.248)	(0.252)	(0.254)	(0.552)	(0.535)	(0.540)	(0.269)	(0.274)	(0.275)
Constant	2.781***	3.740*	3.871*	4.542***	11.937***	12.683***	1.601*	5.337**	4.953**
	(0.960)	(1.964)	(2.052)	(1.445)	(3.388)	(3.631)	(0.951)	(2.309)	(2.415)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	708	708	708	523	523	523	606	606	606
R-squared	0.075	0.090	0.033	0.021	0.009	0.002	0.064	0.208	0.026

Note(s): Columns (1), (4) and (8) control for firm fixed effects. Columns (2), (5) and (7) include both firm and year fixed effects. Columns (3), (6) and (9) incorporate fixed effects for firm, year and industry. Standard errors are reported in parentheses. ***, ** and * indicate significance at the 1, 5 and 10% levels, respectively
Source(s): Authors' own work

importing firms, but it is slightly lower than the PAT impact, possibly due to working capital requirements and timing differences between revenue recognition and cash collection.

Among the control variables, we see that productivity has a positive and significant effect on all profitability measures. Higher productivity is associated with greater operational efficiency, net profitability, and cash flow, which aligns with expectations. Increased productivity often leads to cost efficiencies, higher output, and improved profit margins. Liquidity, on the other hand, shows a negative relationship with profitability. While liquidity is generally considered a financial buffer, excessive cash holdings may indicate inefficiencies in capital allocation. Firms that do not reinvest their liquid assets into growth opportunities may experience lower returns. This finding suggests that simply accumulating cash does not necessarily translate into higher profitability. While debt has no significant impact on operational profitability (EBITDA) and cash profits, it significantly reduces net profitability (PAT). This suggests that while firms can sustain their core operations and cash flow despite financial leverage, the burden of interest payments and debt servicing costs reduces overall net earnings. Labor costs consistently show a negative effect on all profitability measures, suggesting that rising labor expenses erode operational, net, and cash profitability. Tangibility, which reflects the proportion of fixed assets in a firm's structure, is negatively associated with profitability. This could be due to higher maintenance costs, depreciation, or inefficiencies in utilizing these assets to generate profits, particularly compared to firms with a more asset-light structure. Regarding firm age, older firms tend to have higher profits, likely due to their accumulated experience and established market positions. Finally, foreign ownership appears to positively influence cash-based profits, implying that firms with foreign investors may benefit from external capital infusion.

4. Robustness check: system GMM approach

While the PSM-fixed effects model controls for time-invariant unobserved heterogeneity, it may still struggle with endogeneity arising from dynamic relationships or reverse causality. To strengthen the reliability of our findings, we employ the two-step System GMM method (Blundell and Bond, 1998) as a robustness check. System GMM is particularly valuable because it addresses potential reverse causation between imports and profitability. In this context, while imports may influence profitability, more profitable firms may also be more inclined to engage in imports, creating a feedback loop. Additionally, this model accounts for dynamic panel bias (Roodman, 2009). The general GMM specification is as follows:

$$Profitability_{izt} = \beta_0 + \beta_1 Imports_{izt} + \beta_2 Profitability_{i,z,t-1} + X_{izt} + \delta_t + \delta_z + \mu_{izt} \quad (3)$$

Equation (3) includes a lagged profitability term to capture persistence and uses internal instruments from both lagged levels and lagged differences of the endogenous variables to correct for endogeneity (Singh and Sharma, 2020). Table 5 shows that imports contribute positively to firm profitability, leading to estimated increases of approximately 6% in EBITDA, 9% in PAT, and 10% in cash profits. These results are in line with the fixed-effects estimates, which also indicate a significant positive association between imports and profitability.

All control variables exhibit consistent signs in both models, except for debt level. The PSM-fixed effects model indicates a negative relationship between debt and net profitability (PAT), whereas the System GMM model reveals a positive association. This discrepancy stems from the distinct methodological approaches of the two models. The System GMM model estimates a dynamic relationship, while the fixed-effects model provides estimates for a static model. Although the PSM-fixed effects model controls for time-invariant factors, it may still be susceptible to bias from unobserved time-varying factors (such as a firm's risk appetite), which could negatively influence the debt-profitability relationship. In contrast, the System GMM model, through its use of lagged and instrumental variables, is better equipped to address the impact of these unobserved factors. This adjustment results in a positive

Table 5. Robustness check: system GMM estimation results

	(1) Profitability1	(2) Profitability1	(3) Profitability1	(4) Profitability2	(5) Profitability2	(6) Profitability2	(7) Profitability3	(8) Profitability3	(9) Profitability3
$Profitability1_{t-1}$	0.463***	0.453***	0.476***						
	(0.053)	(0.061)	(0.056)						
$Profitability2_{t-1}$				0.311***	0.378***	0.337***			
				(0.064)	(0.085)	(0.073)			
$Profitability3_{t-1}$							0.380***	0.365***	0.401***
							(0.095)	(0.108)	(0.097)
Imports	0.074***	0.063**	0.061***	0.114***	0.099***	0.074**	0.112***	0.103***	0.095***
	(0.022)	(0.025)	(0.023)	(0.038)	(0.034)	(0.037)	(0.034)	(0.029)	(0.035)
Productivity	0.098*	0.159**	0.145*	0.131	0.210**	0.184*	0.131*	0.161**	0.134*
	(0.054)	(0.067)	(0.074)	(0.086)	(0.105)	(0.098)	(0.072)	(0.070)	(0.069)
Liquidity	−0.686***	−0.777***	−0.729***	−1.626***	−1.471***	−1.590***	−1.331***	−1.315***	−1.270***
	(0.205)	(0.238)	(0.235)	(0.316)	(0.289)	(0.324)	(0.277)	(0.300)	(0.314)
Debt level	0.187***	0.195***	0.197***	0.184***	0.157***	0.188***	0.191***	0.198***	0.181***
	(0.038)	(0.039)	(0.038)	(0.052)	(0.055)	(0.058)	(0.043)	(0.053)	(0.047)
Labor cost	−3.684**	−3.957**	−4.434**	−3.537	−4.559*	−4.767*	−3.477*	−3.629**	−5.116***
	(1.760)	(1.831)	(1.909)	(2.338)	(2.439)	(2.527)	(1.906)	(1.776)	(1.885)
Tangibility	−0.142	−0.106	−0.077	−1.038***	−0.676**	−0.871***	−0.201	0.104	0.204
	(0.226)	(0.244)	(0.256)	(0.324)	(0.272)	(0.332)	(0.239)	(0.279)	(0.269)
Age	0.053	0.049	0.074	0.068	0.080	0.076	0.101*	0.067	0.121*
	(0.045)	(0.056)	(0.063)	(0.082)	(0.083)	(0.094)	(0.060)	(0.070)	(0.071)
Foreign ownership	0.166	0.279*	0.291**	0.491**	0.554*	0.736***	0.230	0.360**	0.353**
	(0.126)	(0.167)	(0.148)	(0.232)	(0.283)	(0.220)	(0.152)	(0.180)	(0.170)
Constant	2.389***	2.810***	2.475***	3.186***	3.312***	3.352***	2.622***	2.907***	2.472***
	(0.301)	(0.388)	(0.415)	(0.489)	(0.609)	(0.569)	(0.451)	(0.465)	(0.550)
Year dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Industry dummies	No	No	Yes	No	No	Yes	No	No	Yes
Observations	2,100	2,100	2,100	1,658	1,658	1,658	1,880	1,880	1,880

(*continued*)

Table 5. Continued

	(1) Profitability1	(2) Profitability1	(3) Profitability1	(4) Profitability2	(5) Profitability2	(6) Profitability2	(7) Profitability3	(8) Profitability3	(9) Profitability3
Number of groups	832	832	832	716	716	716	772	772	772
Number of instruments	196	212	233	196	168	233	196	212	233
Wald $\chi^2[\rho > \chi^2]$	71,078.539 [0.000]	83,928.885 [0.000]	101,830.935 [0.000]	15,780.179 [0.000]	18,401.831 [0.000]	21,398.691 [0.000]	39,827.547 [0.000]	43,818.969 [0.000]	57,214.602 [0.000]
*AR*2 ρ-value	0.072	0.070	0.070	0.107	0.121	0.124	0.183	0.194	0.162
Hansen ρ-value	0.201	0.312	0.341	0.546	0.267	0.330	0.372	0.515	0.634

Note(s): The table presents the results of the two-step system GMM regression. Columns (1), (4), and (8) do not include dummies; Columns (2), (5), and (7) include year dummies; and Columns (3), (6) and (9) incorporate both year and industry dummies. Standard errors are reported in parentheses. ***, ** and * indicate significance at the 1, 5 and 10% levels, respectively

Source(s): Authors' own work

Table 6. Profitability effects of imports across liquidity and debt categories: system GMM estimates

	(1) Profitability1 Highly liquid firms	(2) Less liquid firms	(3) Profitability2 Highly liquid firms	(4) Less liquid firms	(5) Profitability3 Highly liquid firms	(6) Less liquid firms	(7) Profitability1 High-debt firms	(8) Low-debt firms	(9) Profitability2 High-debt firms	(10) Low-debt firms	(11) Profitability3 High-debt firms	(12) Low-debt firms
$Profitability1_{t-1}$	0.556**	0.364***					0.439***	0.371***				
	(0.274)	(0.106)					(0.100)	(0.066)				
$Profitability2_{t-1}$			0.319***	0.372***					0.438***	0.279***		
			(0.091)	(0.099)					(0.069)	(0.078)		
$Profitability3_{t-1}$					0.459***	0.324**					0.520***	0.258**
					(0.062)	(0.145)					(0.091)	(0.113)
Imports	0.044	0.082***	0.037	0.104***	0.038	0.136***	0.063*	0.060*	0.074**	0.077	0.054	0.104**
	(0.212)	(0.029)	(0.055)	(0.039)	(0.038)	(0.034)	(0.034)	(0.033)	(0.036)	(0.058)	(0.041)	(0.045)
Productivity	0.036	0.369***	0.164	0.228	0.076	0.340**	0.138**	0.267***	0.125	0.277*	0.130	0.202
	(0.356)	(0.121)	(0.122)	(0.165)	(0.070)	(0.151)	(0.068)	(0.101)	(0.080)	(0.149)	(0.079)	(0.144)
Liquidity	−0.152	−0.768*	−1.012	−1.390**	−0.987*	−1.237**	0.341	−0.874***	−0.094	−1.733***	−0.110	−1.489***
	(3.241)	(0.419)	(0.687)	(0.573)	(0.558)	(0.543)	(0.383)	(0.281)	(0.453)	(0.466)	(0.241)	(0.389)
Debt level	0.164	0.246***	0.239***	0.170***	0.177***	0.201***	0.345***	0.126***	0.298***	0.098**	0.325***	0.090**
	(0.171)	(0.065)	(0.082)	(0.056)	(0.050)	(0.070)	(0.086)	(0.044)	(0.071)	(0.050)	(0.113)	(0.042)
Labor cost	−5.067	−2.018	−3.190	−1.778	−6.045**	−1.853	−1.039	−2.603	−3.214	−1.524	−0.424	−4.449
	(6.779)	(2.292)	(2.281)	(2.686)	(2.376)	(1.947)	(1.815)	(2.035)	(2.569)	(2.508)	(2.228)	(2.793)
Tangibility	−0.108	0.307	−1.163	−0.500	−0.153	0.176	0.814*	−0.177	0.483	−1.081**	0.774***	−0.033
	(1.761)	(0.322)	(0.789)	(0.453)	(0.567)	(0.341)	(0.422)	(0.405)	(0.520)	(0.546)	(0.235)	(0.411)
Age	0.057	0.107	−0.028	0.129	0.100	0.062	0.013	0.035	0.201*	0.027	0.005	0.120
	(0.335)	(0.091)	(0.106)	(0.155)	(0.074)	(0.075)	(0.060)	(0.066)	(0.104)	(0.128)	(0.083)	(0.090)
Foreign ownership	0.108	0.356*	0.752**	0.613**	0.287	0.407**	−0.007	0.379**	0.082	0.936***	0.028	0.516**
	(0.868)	(0.186)	(0.361)	(0.278)	(0.237)	(0.206)	(0.103)	(0.166)	(0.192)	(0.241)	(0.118)	(0.212)
Constant	1.611	3.043***	3.265***	2.631***	2.267***	3.410***	0.590	4.003***	−0.030	4.576***	0.181	3.998***
	(3.157)	(0.695)	(0.784)	(0.900)	(0.629)	(0.917)	(0.569)	(0.634)	(0.682)	(0.912)	(0.425)	(0.848)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,197	903	996	662	1,099	781	795	1,305	590	1,068	686	1,194
Number of groups	471	361	419	297	444	328	295	537	244	472	264	508
Number of instruments	232	218	227	206	231	208	230	225	221	216	223	221
Wald $\chi^2[\rho > \chi^2]$	128,447.847	60,655.032	15,228.907	21,353.636	35,014.690	39,265.044	166,320.314	48,357.255	33,905.182	11,548.334	107,144.097	38,886.691
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AR2 ρ-value	0.028	0.313	0.192	0.392	0.040	0.664	0.328	0.184	0.448	0.204	0.307	0.497
Hansen ρ-value	0.997	0.983	0.873	0.941	0.992	0.870	0.993	0.921	0.997	0.738	0.999	0.951

Note(s): The table presents the results of the two-step system GMM regression. Each model includes year and industry dummies. Standard errors are reported in parentheses. ***, ** and * indicate significance at the 1, 5 and 10% levels, respectively

Source(s): Authors' own work

relationship, suggesting that firms may utilize debt to finance productive investments and achieve profitability.

5. Subgroup analysis

This section examines the impact of imports on firm profitability across different financial subgroups, segmented by liquidity and debt levels. As shown in Table 6, the effect of imports is most pronounced and statistically significant for firms with lower liquidity. Firms with limited liquidity are often compelled to adopt cost-saving measures and tend to be more cautious in their spending. Consequently, they prioritize sourcing lower-cost resources or essential goods, which helps improve their profitability. In contrast, highly liquid firms with ample cash reserves have greater financial flexibility and face less pressure to cut costs. While they engage in importing, they focus on acquiring higher-quality inputs, advanced technology, or resources that support long-term growth rather than immediate cost reduction. As a result, although these firms benefit from imports, the effects are not statistically significant.

Regarding debt levels, the impact of imports on profitability varies by profitability measure. For EBITDA (Profitability1), the coefficients for imports are nearly identical for both high- and low-debt firms, but the relationship is weakly significant. Since EBITDA excludes interest expenses, both groups experience similar benefits. However, at the PAT (Profitability2) level, the relationship is significant only for high-debt firms. This suggests that high-debt firms, with greater access to financing, can import more, leading to higher profitability. In contrast, low-debt firms with limited financial resources import less, resulting in an insignificant impact on PAT. This pattern implies that imports are financed through debt, allowing highly leveraged firms to expand profitability despite interest costs. For cash profits (Profitability3), the effect of imports is significant for low-debt firms but not for high-debt firms. While imports boost PAT for high-debt firms, much of their cash flow is absorbed by interest payments and debt servicing, reducing free cash. Additionally, high-debt firms typically have higher depreciation and amortization expenses, reflecting capital-intensive operations, which further dampens the impact of imports on cash profits. In contrast, low-debt firms, with lower financial burdens, retain more profits as cash, making the impact of imports on cash profits significant.

6. Conclusion

The cross-border flow of goods not only expands trade opportunities but also reshapes firm profitability in an increasingly interconnected world. Our study provides compelling evidence that imports positively impact firm profitability within an emerging economy, India. Using the Propensity Score Matching (PSM) estimator, we address endogeneity concerns arising from firm selection in importing activities. We further apply panel data fixed-effects models to establish a positive association between imports and firm profitability. Additionally, the system GMM estimator ensures the robustness of our findings.

Across various profitability measures (EBITDA, PAT, and cash profits), imports significantly improve firm performance, leading to gains in operational, net, and cash-based profitability. Additionally, the impact of imports varies based on financial characteristics like liquidity and debt. Firms with lower liquidity benefit the most due to their focus on cost-saving strategies, whereas highly liquid firms, prioritizing long-term growth over immediate cost reductions, show insignificant effects. Regarding debt, imports improve operational profitability (EBITDA) similarly for high- and low-debt firms. However, net profitability (PAT) rises only for high-debt firms, suggesting imports are largely debt-financed. In contrast, low-debt firms experience stronger gains in cash-based profits, as high-debt firms allocate more cash flow to interest payments and debt servicing, limiting their benefits. Overall, imports drive profitability, particularly for firms with lower liquidity and higher debt.

Our study contributes to the limited body of research on international trade and firm profitability (Wagner, 2012a, 2014; Srithanpong, 2014; van den Berg *et al*., 2018; Fu *et al*.,

2021). Prior studies, such as Srithanpong (2014), used regression models to identify profitability premiums but did not establish causality or account for self-selection into importing. Similarly, Fu *et al*. (2021) assessed the impact of imports indirectly through input tariff reductions rather than directly linking imports to profitability. Unlike these studies, our research directly measures the effect of imports on profitability and employs advanced techniques such as PSM and dynamic panel data analysis to establish a robust causal link. While imports may put pressure on a nation's current account, their role in improving firm profitability, along with productivity, cannot be overlooked. Based on our findings, we recommend policies that help firms maximize import benefits. Improving access to finance, streamlining import procedures, and fostering a trade-friendly environment can enable firms in developing economies to integrate more effectively into global supply chains.

Notes

1. For a survey see Wagner (2012b).
2. The "Make in India" initiative aimed to boost domestic manufacturing, potentially reducing reliance on imports in certain sectors.
3. Global merchandise imports volumes grew only 1.7% in 2015, compared to 3% in 2014 (World Bank, 2016).
4. The analysis is limited to data up until 2019 to mitigate the influence of the COVID-19 pandemic.
5. We excluded firms with missing or zero values for critical variables such as sales, salaries, assets, and liabilities.
6. We focus on firms that initiate imports during the sample period (starters) to leverage their pre-import period as a baseline for estimating the probability of import initiation (propensity score). This allows us to match them with comparable non-importers and create a valid counterfactual. Applying this approach to continuous importers would be challenging, as they lack a pre-import period for comparison.
7. Productivity is estimated following the semi-parametric approach of Ackerberg *et al*. (2015) using a value-added Cobb-Douglas production function with labor and capital as inputs. Value added is deflated using industry-specific Wholesale Price Indices (WPIs), and capital using a gross fixed capital deflator (2011–12 base year). Due to space constraints, results are not presented.
8. Time-fixed effects help control for unobserved, year-specific factors that may have influenced imports across all firms. These effects account for external events, such as policy changes or global market conditions, that could have contributed to the post-2016 import decline. By incorporating these controls, we ensure that our estimates of the relationship between imports and firm profitability are not driven by broader temporal trends.
9. Also see Arneja and Sharma (2024).

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Appendix

Table A1. Correlation matrix of profitability measures.

	Profitability1	Profitability2	Profitability3
Profitability1	1.000		
Profitability2	0.9252*	1.000	
Profitability3	0.9683*	0.9479*	1.000

Source(s): Authors' calculations

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