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The Effects of the Temporary Protection on Firm Performances: Evidence from the Steel Industry in Viet Nam

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Abstract: *Trade protection may have significant impacts on sectors other than those targeted by protection policies, especially when the target sector produces goods that are essential inputs to downstream sectors. Using panel Vietnamese enterprise surveys from 2010 to 2017, this paper examines whether temporary trade protection has a significant impact on the steel sector and downstream users of steel. We find that, during the trade protection period for the steel sector, this policy increased sales of protected firms but hurt downstream firms. In particular, trade protection has significant impacts on the sales, profit, and productivity of downstream firms in sectors that use steel intensively as their inputs. Additionally, these adverse effects of protection are more severe for small downstream firms.*

Keywords: trade protection, steel production, downstream sectors
JEL Classification: F13, F14, H25

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1. Introduction

There are many reasons motivating countries to implement a protection policy to nurture an industry. The first is the desire to support an infant industry in which the country has a potential comparative advantage, especially for industries in which economies of scale and/or learning-by-doing effects are essential. Second, aid is vital to an industry considered a gateway, in that its development brings fundamental knowledge and technologies, provides easier entry into the production of more complex and skill-intensive manufactured goods and, hence, accelerates economic growth. Finally, domestic industries must be protected from import competition to enable those industries to provide specialised products and services to local downstream sectors more effectively than imported sources. However, industrial protection policies to encourage domestic production often involve practices such as protection from imports (antidumping or safeguard tariffs) that can substantially raise the domestic price of that industry's goods. This price increase pushes up input costs for downstream sectors and, therefore, may hinder the development of these sectors, thus hurting economic growth (Blonigen, 2016).

Most existing studies focus on examining the impact of trade liberalisation on firm performance, measured by such factors as productivity. These studies generally find that trade liberalisation can drive productivity gains for downstream firms through lower tariff rates. For example, using Indonesian data, Amiti and Konings (2007) show that lowering input tariffs (and hence reducing input costs) raises productivity for firms that import their inputs, and that the productivity gains from input liberalisation are higher than that from output liberalisation. Topalova and Khandelwal (2011) found similar results by using Indian data. Likewise, Goldberg et al. (2010) show that lower input tariffs lead to the introduction of new input varieties, which are proved to be an important source of downstream productivity gains in the sample of Indian plants. Other reasons explaining the productivity gains from trade liberalisation can be found in specific industries. For instance, when examining the impact of input tariff liberalisation on downstream exporting firm behaviour using firm-level data of French food processing firms, Chavassus-Lozza et al. (2013) find that input liberalisation leads to a significant exit of exporters with the lowest productivity.

Regarding the industrial protection policy, very few empirical works measuring the effects of protection policy on domestic producers are explored. A natural question related to the industrial policy is whether protection is the cause of more inefficient domestic firms, or whether these firms will take advantage of the protection time as an adjustment period to restructure and become more productive by the time the safeguard protection expires.

Current studies give mixed results on the impact of the industrial protection policy on firm productivity. On the one hand, they conclude that trade protection tends to improve firms' profit and market power. For example, Nieberding (1999) finds that United States (US) firms that receive protection enhanced their domestic market power, while those whose petition was rejected experienced a decrease in their market power. Similarly, the results of the study by Konings and Vandenbussche (2005) indicate that protection has significant positive effects on domestic markups. Another study by these authors in 2004 also shows that antidumping protection can induce technological catching-up by the domestic firms affected by import protection.

On the other hand, the impact of the trade protection policy is proved to depend on firms' initial productivity, and adverse spill-over effects of the protection policy are also observed in the literature. Konings and Vandenbussche (2008), for instance, find that domestic firms with relatively low initial productivity had productivity gains during the protection period, while those with high initial productivity levels experienced losses in productivity during this period. Vandenbussche and Viegelahn (2015) show that firms whose inputs are subject to import protection tend to use other inputs as a replacement to lower their costs. Similarly, using a database of the steel sector in major steel-producing countries, Blonigen (2016) concludes that an increase in steel protection leads to a decline in export competitiveness for the downstream manufacturing sector, and an even greater decline for downstream sectors that use steel intensively.

This paper adds to the existing literature by estimating the impact of trade protection policy on Viet Nam's steel sector. As in many other countries, Viet Nam's steel industry plays an important role in the country's economy. Steel products are a significant input to many sectors of the economy, particularly the manufacturing and

construction sectors, and are particularly important in the production of investment goods and infrastructure. Thus, the availability and quality of steel products can play a major role in the productivity and growth of a country. Therefore, although Viet Nam has participated in many bilateral and multilateral trade agreements, steel is one of the few sectors that has received high trade protection. In the early 2000s, Viet Nam adopted a protection policy through levying, for example, tariff rates of 40% on bar and wire rod products and 30% on surface-treated sheets. In 2015, however, due to the World Trade Organization (WTO) accession, the most favoured nation tariff rates decreased to 4–12%. In 2016, to reduce imports of steel, Viet Nam has imposed additional tariffs on imported steel products as an official safeguard measure against cheap imports that threaten domestic steel producers. The additional tariff is imposed on billet and long steel as well as on pre-painted galvanised iron.[1] As a result, it is expected that protected steel producers will be better off compared to other firms in the same sector.

Using the safeguard measures implemented in 2016 as a natural experiment, this paper attempts to evaluate the impact of safeguard measures on the performance of firms in the steel sector, as well as that of other firms in downstream sectors. Using the Vietnamese enterprise surveys from 2010 to 2017 and employing the difference-in-difference method, we find that trade protection benefits protected steel firms, and the trade policy that has been in place since 2016 has increased the protected firms' sales by 50%. However, there is strong evidence that steel-sector protection has a significant negative impact on the performance of downstream industries. We find that, during the protection period for the steel sector, higher steel input share has resulted in lower sales and higher domestic prices for downstream industrial sectors. The effect can be as high as a 15.9% decline in sales and a 14.3% increase in price for firms in the sectors that use steel inputs most intensively. We also find that these protection policies have the most harmful effects on small downstream firms.

Our study offers two main contributions to the literature. First, it complements other studies by investigating the effects of trade protection on firm performances in developing countries (e.g. Amiti and Konings, 2007; Topalova and Khandelwal,

[1]In 2014, Viet Nam also imposed an antidumping tariff on cold-rolled stainless steel. However, imported cold-rolled stainless steel only accounts for 6.3% of domestic production.

2011). Second, our analysis extends the literature on the impact of trade protection of upstream firms on downstream sectors.

2. Background

2.1. The Evolution of Viet Nam's Steel Industry

Viet Nam's steel industry was established in the early 1960s with the appearance of the Thai Nguyen Iron and Steel Complex, the first factory in Viet Nam with a production line from iron ore mining. Its first product was cast iron, and the factory launched its first rolled steel product in 1975. However, most of Viet Nam's rolled steel products were imported from the Soviet Union and China. During 1976–1982, the steel industry did not see any significant improvements despite being prioritised; the supply of steel products was very low and did not satisfy the domestic demand. Meanwhile, steel imports were severely affected by the economic crisis and political situation in the Soviet Union and other Eastern European countries. However, through the implementation of reasonable incentive policies, the steel industry has strengthened its production capacity and surpassed 100,000 tonnes of steel products for the first time in 1990 (Nguyen and Nguyen, 2017).

During 1990–1999, Viet Nam implemented several changes to its institutions and policies. Thanks to *Doi Moi* (Renovation), numerous private steel enterprises were established. The Law on Foreign Investment (1987) and the Law on Companies (1990) built a legal framework to attract investment in the steel industry, from not only private domestic but also foreign companies. In 1995, the Vietnam Steel Corporation was established. During this year, the country's steel output amounted to 470,000 tonnes, 4.5 times the amount in 1990, and the same amount of steel imported from the Soviet Union. Of the total steel production, 85% came from the state sector, 13% from foreign firms, and the remaining 2% from domestic private firms. By 2000, the supply of rolled steel product was 3.5 times higher than the supply in 1995. Of this, the state sector's share dropped to 36%, while that of the foreign sector increased to 53%; the remaining 11% belonged to the private sector.

During 2000–2006, steel enterprises began to develop rapidly. Viet Nam's openness and integration policies have contributed to attract foreign investors to the country's steel industry. Although its capacity has continuously improved, it is still

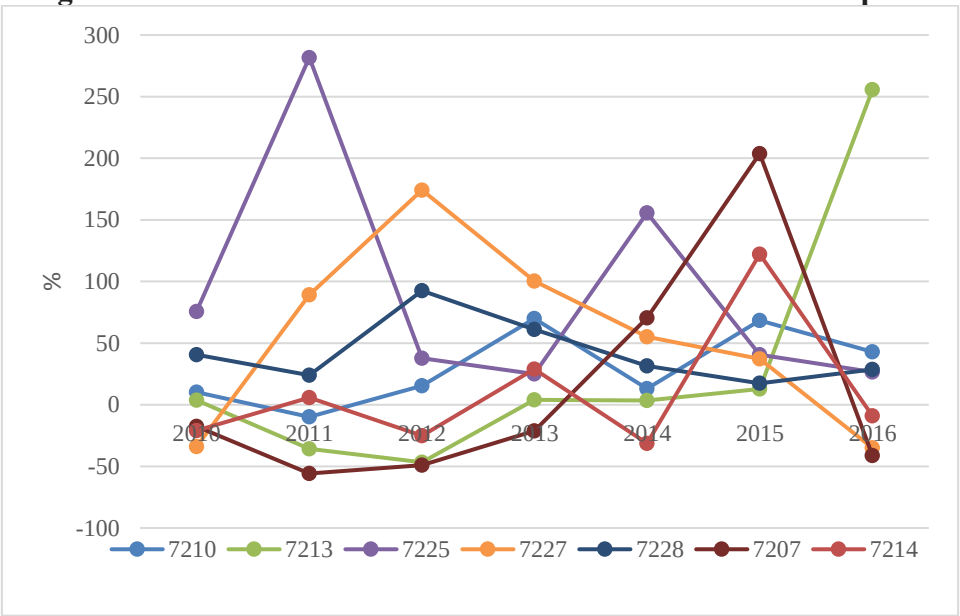
small, with an average rolling capacity of about 100,000 tonnes per year as of 2007, much lower than the approximately 500,000 tonnes per year produced by plants in other countries in the region. After Viet Nam's accession to the WTO in 2007, domestic private steel makers experienced a great leap forward when their total rolled steel output surpassed that of the other sectors, reaching over 1.2 million tonnes, accounting for 41% of the total market while the state sector accounted for only 31% and the share from the foreign sector decreased to 28%.

According to the World Steel Association, in 2015, the gross output of steel products in Viet Nam was about 15 million tonnes, and that of crude steel was 6.1 million tonnes, equivalent to about 0.4% of crude steel production worldwide. In terms of import and export, Viet Nam imported 16.3 million tonnes of steel (the seventh highest volume in the world) and exported 1.4 million tonnes of steel in 2015. Regarding the amount of net imported steel (imports minus exports), Viet Nam ranks second in the world, behind only the US (Nguyen and Nguyen, 2017).

Domestic steel companies have met the domestic demand for construction steel and cold-rolled steel, and even exports many steel products such as galvanised steel, steel pipes, and cold-rolled steel. However, Viet Nam's steel industry is still developing and has to import a large amount of raw materials as well as semi-finished products to serve the domestic production. From 2007 to 2016, crude steel output growth (15.9% per year) was higher than that of steel products (13.1% per year) but this only satisfied half of the industry demand. In fact, most domestic crude steel is long steel, while flat steel is produced from imported billet.

Viet Nam must import many other kinds of steel in large quantities such as hot-rolled steel, fabricated steel, and alloy steel. In 2016, Viet Nam imported more than 1.1 million tonnes of billets, about 1.8 million tonnes of galvanised steel, and more than 8.1 million tonnes of alloy steel (Nguyen and Nguyen, 2017). All imported products increased significantly compared to those in 2015, except for billets, of which imports decreased sharply (by about 40% compared to the previous year) due to antidumping duty. Figure 1 shows the evolution of selected billet products in 2010–2016. The figures indicate that the volumes of most protected steel products declined sharply in 2016 after the protected tariff rates were applied.

Figure 1: Growth Rate of Selected Iron and Steel Product Imports

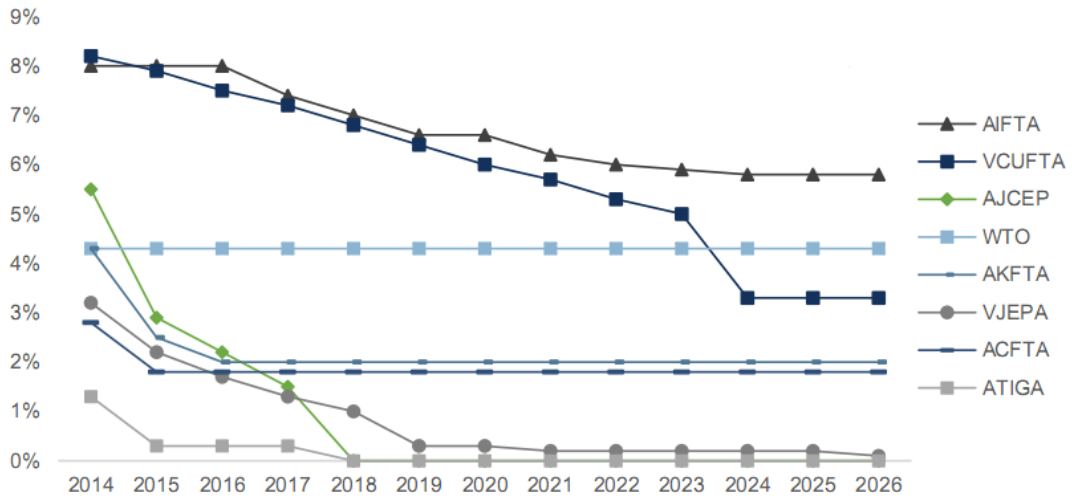


Note: 7207 = Semi-finished products of iron or non-alloy steel; 7210 = flat-rolled products of iron or non-alloy steel, 600 millimetres wide or more, clad, plated, or coated; 7213 = bars and rods, hot-rolled, in irregularly wound coils, of iron or non-alloy steel; 7214 = other bars and rods of iron or non-alloy steel, not further worked than forged, hot-rolled, hot-drawn, or hot-extruded, but including those twisted after rolling; 7225 = flat-rolled products of other alloy steel, 600 millimetres wide or more; 7227 = bars and rods, hot-rolled, in irregularly wound coils, of other alloy steels; 7228 = other bars and rods of other alloy steel, angles, shapes and sections of other alloy steel, and hollow drill bars and rods of alloy or non-alloy steel.
Source: United Nations International Trade Statistics Database. https://comtrade.un.org/ (accessed 15 August 2018).

2.2. Supporting Policies for the Steel Industry

In the process of negotiating free-trade agreements (FTAs), Viet Nam has tried to maintain tariff reductions for steel products to allow domestic steel companies enough time to develop. Figure 2 shows that the government continues to proceed with caution in levying tariffs on major importers such as India and the Russian Federation in the Association of Southeast Asian Nations–India Free Trade Area and the Vietnam Eurasian Economic Union Free Trade Agreement. So far, Viet Nam has signed 12 bilateral and multilateral FTAs, is negotiating four FTAs, and is considering another FTA. As committed in the FTAs, import taxes for steel and its products will be cut on schedule, with the average rate fluctuating between 0.69% and 7.55% during 2015–2018 and continuing to decline in the next phase (see Figure 2). The most strongly protected products are construction steel and billets.

Figure 2. Committed Tariff Rates for Steel Imports in Free-Trade Agreements

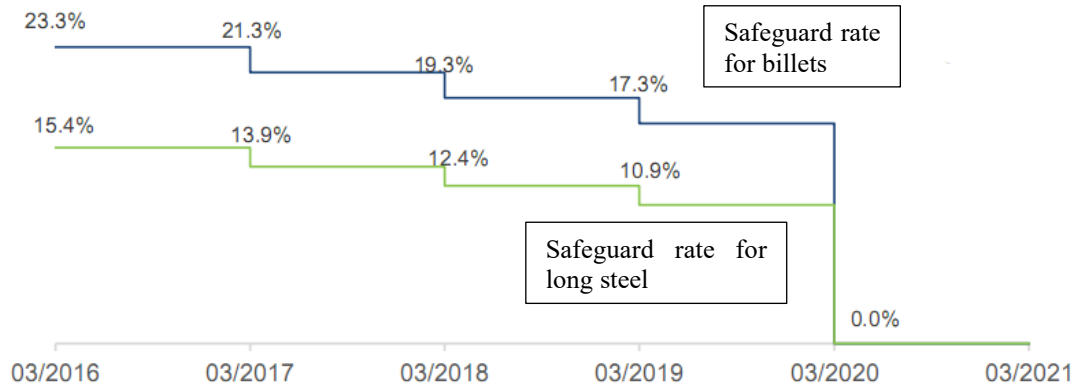


ACFTA = Vietnam–China Free Trade Area, AIFTA = Association of Southeast Asian Nations (ASEAN)–India Free Trade Area, AJCEP = ASEAN–Japan Comprehensive Economic Partnership, AKFTA = ASEAN–Korean Free Trade Area, ATIGA = ASEAN Trade in Goods Agreement, VCUFTA = Vietnam–Eurasian Economic Union Free Trade Area, VJEPA = Vietnam–Japan Economic Partnership Agreement, WTO = World Trade Organization.
Source: Nguyen, H. and H. Nguyen (2017), *Steel Sector Report*. FPT Security Research.

The amount of imported steel billets rose from more than 466,000 tonnes in 2012 to 1.5 million tonnes in 2015. The amount of imported long steel products also rose from more than 387,000 tonnes in 2012 to 1.2 million tonnes in 2015. In the face of massive steel imports, the Ministry of Industry and Trade (MOIT) has decided to impose temporary safeguard duties of 23.3% on steel billets and of 14.2% on long steel products for a maximum of 200 days. They have also applied official safeguard duties of 21.3% on billets and 13.9% on long steel in 2016 (Figure 3), and 3.17–38.4% on galvanised steel and 20.48–29.17% on H-shaped steel in 2017.[2] Protection tariffs will last for at least 5 years, allowing businesses enough time to consolidate their production capacity. The detailed codes of protected products are reported in Table 1.

[2]Any dumping complaint must be supported by steel firms with a combined production representing at least 50% of total steel production. During the investigation period, the MOIT imposes a temporary measure resulting in temporary import relief. After the investigation period, if the complaint was justified, the MOIT will impose a final measure, usually an import tariff, which will be kept unchanged for 5 years.

Figure 3: Safeguard Tariff for Billet and Long Steel Products



Source: Nguyen, H. and H. Nguyen (2017), *Steel Sector Report*. FPT Security Research.

3. Empirical Methodology

3.1. Data Description

The primary dataset used in this paper is drawn from the Vietnam Enterprise Census Survey (VES), which has been conducted annually since 2000 by the Vietnam General Statistical Office. These surveys cover all enterprises, regardless of size, and all sectors (mining, manufacturing, services, and agriculture).[3] The firms can be tracked over time via a unique firm identifier. This means that we can follow each firm over time to observe whether they grow, stagnate, or exit. The VES provides comprehensive information about firms and their activities, including information on firm demographics, ownership, business activities, employment, wages, assets, capital, business performance, revenue, and profit. The VES also includes information on the volume and value of sales of main industrial products for each firm, making it possible to calculate the price of each product.

To estimate the impact on firm performances of the trade protection policy introduced at the beginning in 2016, we study the period 2010–2017 to mitigate the impact of Viet Nam's accession to the WTO in 2007 as well as that of the 2009 demand stimulus policy, both of which may contaminate the results. Because the firm

[3]As the number of small, private enterprises has grown exponentially in recent years, the General Statistical Office has implemented two versions of the questionnaire. The long version of the questionnaire is for all state, foreign, and large private enterprises as well as a random subsample of small, private enterprises. All small, private enterprises not randomly selected for the long questionnaire were given a shorter questionnaire that only asked a small subset of questions from the long questionnaire.

products are coded with an eight-digit number, we can match these with the five-digit Harmonized System for products on which Viet Nam imposes antidumping and safeguard tariffs. To identify precisely which firms benefit from trade protection, we examine their main products in the domestic market. At the same time, to minimise the effects of other factors in 2016–2017 that could contaminate our results, we restrict the sample to manufacturing sectors directly affected by the steel sector.[4]

Table 1 reports the temporary protection rates for selective steel production. The government has applied different rates for imported steel products, depending on the market.

Table 1: Safeguard and Antidumping Cases

Product	HS Code	Initiation	Temporary Decision	Final Decision
Billet and long steel	7210.7010 7210.7090 7212.4010 7212.4020 7212.4090 7225.9990 7226.9919 7226.9999 7207.11.00 7207.19.00 7207.20.29 7207.20.99 7224.90.00 7213.10.00 7213.91.20 7214.20.31 7214.20.41 7227.90.00 7228.30.10 9811.00.00	7 March 2016	23.3% to billet and 14.2% to long steel Up to 200 days since 22 March 2016	23.3% to billet and 15.4% to long steel 5 years since 2 August 2016
H-shaped steel	7216.33.00 7228.70.10 7228.70.90	5 October 2016	21.18%–36.33% Up to 120 days since 5 April 2017	20.48%–29.17% 5 years since 5 September 2017
Galvanised steel	7210.41.11 7210.41.12 7210.41.19 7210.49.11 7210.49.12 7210.49.13 7210.49.19 7210.50.00 7210.61.11 7210.61.12 7210.61.19 7210.69.11 7210.69.12 7210.69.19 7210.90.10 7210.90.90 7212.30.10 7212.30.20 7212.30.91 7212.30.99 7212.50.11 7212.50.12 7212.50.19 7212.50.21 7212.50.22 7212.50.29 7212.50.91 7212.50.92	3 March 2016	China: 4.02%–38.4% Republic of Korea: 12.4%–19% 120 days since 1 September 2016	China: 3.17%–38.4% Republic of Korea: 7.02%–19% 5 years since 15 April 2017

[4] Viet Nam Standard Industrial Classification codes are from 24100 to 30990.

7212.50.99	7212.60.10
7212.60.20	7212.60.90
7225.92.90	7225.99.90
7226.99.11	7226.99.19
7226.99.91	7226.99.99
7216.33.00	7228.70.10
	7228.70.90

Sources: Ministry of Industry and Commerce (2016a), 'Decision 862/QD-BCT on Application of Temporary Safeguard Measures'. https://thuvienphapluat.vn (accessed 15 August 2018); (2016b), 'Decision 2968/QD-BCT on Application of Safeguard Measures'. https://thuvienphapluat.vn (accessed 15 August 2018); (2016c), 'Decision 3584/QD-BCT on Application of Temporary Safeguard Measures'. https://thuvienphapluat.vn (accessed 15 August 2018); (2017a), 'Decision 1105/QD-BCT on Implementation of Official Anti-Dumping Measures Against Imported Plated Steel Products'. https://thuvienphapluat.vn (accessed 15 August 2018); (2017b), 'Decision 957/QD-BCT on Imposition of Provisional Anti-Dumping Measures on H-Shaped Steel Products Imported from the People's Republic of China (including Hong Kong)'. https://thuvienphapluat.vn (accessed 15 August 2018); (2017c), 'Decision 3283/QD-BCT on Imposition of Official Anti-Dumping Measures on H-Shaped Steel Products Imported from the People's Republic of China (including Hong Kong)'. https://thuvienphapluat.vn (accessed 15 August 2018).

Table 2 provides descriptive statistics for the main variables. In this study, to measure firm productivity, we focus on both labour productivity and total factor productivity (TFP). Particularly, we compute labour productivity as the ratio between value added and employment. In addition, we use the Olley–Pakes methodology to compute TFP as it controls for both the sample selection bias and the simultaneity bias (Olley and Pakes, 1996).

Table 2: Summary Statistics for Main Variables

	Obs	Mean	Standard deviation	Minimum	Maximum
Ln (1+ sales)	46,267	6.35	2.90	0.10	20.86
Ln (price)	46,266	2.64	2.24	0.0001	15.05
Ln (1+ profit)	46,298	3.14	2.98	0.06	15.74
Ln (labour productivity)	46,298	3.28	1.94	-8.51	12.03
Ln (TFP)	45,542	0.16	2.40	-15.82	9.20
Steel input share	46,298	0.32	0.14	0.04	0.60
Steel input share × I(Year ≥ 2016)	46,298	0.07	0.15	0.00	0.60

Ln = natural logarithm, Obs = observations, TFP = total factor productivity.
Source: Authors' calculations from the Enterprise Censuses in 2010–2017.

Data on the input share of steel in a given sector comes from Viet Nam's input–output table in 2012. We apply the steel share of input usage for each sector taken from the input–output table in 2012 to all of the years, making the common assumption that these input–output ratios are fixed during the period. To minimise the potential effects of imported steel dependency from sectors other than the domestic steel sector, we use

a non-competitive input–output table that separates the input from other sectors and import.

The figure in Table 2 shows the statistic summary of the main dependent variables. Since several observations show zeros for each of these variables, we add the value of '1' to each variable before taking natural logs. The input share of steel in a sector ranges from 0.00 to 0.6, with a mean of 0.32 and a standard deviation of 0.14. We create the main independent variable by multiplying the indicator of protection policy with the input share of steel ($Share_j \times I(Year \geq 2016)$). We expect that greater protection in steel may diminish the performances of downstream firms, especially for sectors that use steel more intensively.

Table 3: Summary Statistics on Protected Firms and Non-Protected Firms in the Steel Sector

	Protected firms (1)	Non-protected firms (2)	T-test for difference in means of (1) and (2) (3)
Ln (1+ sales)	8.68 (0.43)	8.21 (0.16)	1.15
Ln (1+ profit)	4.15 (0.60)	3.57 (0.26)	0.94
Ln (Labour productivity)	3.14 (0.43)	2.38 (0.24)	1.38
Ln (TFP)	0.59 (0.53)	1.37 (0.31)	1.12

Ln = natural logarithm, TFP = total factor productivity.
Notes:
1. The comparison is carried out in the year before the additional protection tariff was imposed.
2. Standard errors are in parentheses.
3. Protected firms represent 18% of firm-level observations (50 firms) and non-protected firms represent the remaining 82% (225 firms).
4. Profit and productivity variables are deflated using annual gross domestic product deflators.
Source: Authors' calculations from the 2015 Enterprise Census.

Table 3 displays the characteristics of some main dependent variables of the protected steel and non-protected steel firms in the year before the additional protection tariff was imposed. As indicated in the table, the two groups are similar in almost all indicators. They show an initial indication that there is no difference in outcome variables between the control and treatment groups before the trade protection was applied.

3.2. Empirical Model

Impact on Firm Performances

We begin the analysis of the impact of trade protection on steel firms by estimating the following equation:

$$(1) \quad y_{it} = \alpha + \beta_1 TP_i + \beta_2\{I(Year \geq 2016) \times TP_i\} + \gamma x_{it} + \eta_i + \varphi_t + \epsilon_{it}$$

where y_{it} is the log of outcome variables of steel firm i during year t (sales, price, profit, and productivity), and TP_i is a dummy variable equal to 1 if steel firm *i* receives trade protection and 0 for other steel firms. $I(Year \geq 2016)$ is the time dummy variable equal to 1 for the years since 2016 and 0 otherwise. x_{it} are firm characteristics. η_i and φ_t are firm and year fixed effects, respectively. The control group consists of steel sector firms[5] who are not main suppliers of billets and long steel and are protected by the safeguard tariff. The parameter β_2 is the reduced-form estimate of the effects of trade protection. We expect that trade protection will have positive impacts on the outcomes of firms that produce protected products compared to non-protected firms; therefore, β_2 is expected to be positive.

The empirical relationship between trade protection and the outcome variables is prone to potential biases due to omitted variables. There is a possibility that the decision to apply trade protection may be influenced by some incumbent firms with market power. In fact, this is the case in Viet Nam's steel market where the domestic market is dominated by a group of large steel firms who require the government to investigate and apply safeguard measures to protect the domestic market. Therefore, firm characteristics may simultaneously correlate with trade protection decisions and firms' outputs (such as output, price, profit, and productivity). To check the severity of these biases, we conduct a sensitivity analysis by adding several firm characteristic variables. If the results are biased because of confounding factors, we would expect the estimates to be sensitive to the addition of these variables. Another way to determine if trade protection is contaminated by other policies is to implement a placebo test for the period prior to the year in which the trade protection

[5] Its Viet Nam Standard Industrial Classification code is 24100.

has been applied. We expect that there is no significant difference between steel firms whose products have been protected and those firms whose products have not been protected.

Impact on Downstream Firm Performances

To identify the effects of trade protection for the steel sector on downstream firm performance, we use a specification analogous to that used by Blonigen (2016). In his settings, he uses heterogeneity in sectors' steel input requirements to examine the impact of national-level industrial policies on downstream export competitiveness. Here, we estimate the impact of trade protection on downstream firm performance with the following empirical specification:

$$(2)\quad df_{f\neq i,jt} = \pi + \delta_1 Share_j + \delta_2 (Share_j \times I(Year \geq 2016)) + \theta x_{ft} + \mu_f + \rho_t + \varepsilon_{fjt}$$

where $df_{f\neq ijt}$ is the downstream firm *f* in sector *j* outcomes in year *t*. $Share_j$ is the share of steel in other sector *j*'s output in time *t*, which is taken from the Viet Nam Input–Output Table in 2012, measuring the dependency of downstream *f*'s sector on the steel sector *j*. μ_f and ρ_t are firm and time-fixed terms. δ_1 captures the effect of the steel sector to downstream sectors without trade protection, and $I(Year \geq 2016) = 0$. $\delta_1 + \delta_2$ captures the effect of the steel sector to downstream sectors with trade protection, $I(Year \geq 2016) = 1$. Our focus is on the sign and significance of δ_2, with a positive sign indicating that industry protection helps other industries and a negative sign suggesting that trade protections to the steel sector have a harmful effect on downstream firms.

Endogeneity in Equation (2) is not the main concern with this specification. The steel share is an input–output relationship related to the technological requirements of production. The decision on trade protection in the steel sector is also likely reasonably exogenous to production in other sectors. If trade protection in the steel sector leads policy makers to consider effects on the sectors that use steel most intensively and possibly to employ some support for these downstream sectors to mitigate the effects of trade protection on the steel sector, this would make it less likely that we would find any effects of steel protection on downstream sectors.

4. Empirical Results

4.1. The Trade Protection Policy Impact on the Performance of Steel Firms

In this section, we estimate the impact of temporary trade protection policy on the performance of steel firms. To implement the log-linear version of Equation (1) without dropping observations with zero-values on the dependent variables, we add '1' to the dependent variables before taking the natural log of dependent variables. The values of dependent variables are inflation-adjusted to reflect changes in prices over time. Standard errors are clustered at firm levels. Time fixed effects are also included to take into account changes in the economic environment over time. The control variables are not presented for ease of exposition.

Estimation results of Equation (1) are reported in Tables 4 and 5. The first specification, reported in Table 4, includes firm and time fixed effects, without additional controls, except for a dummy on protected steel firms and the interaction of this variable with a dummy on the period from 2016. In Table 5, we further control for firm characteristics. The results in Table 4 show that temporary trade protection has profound effects on firms' sales. However, it does not have significant effects on firms' profit, labour productivity, or TFP, as shown in Columns 3–5.

Table 4: Effects of Safeguard and Antidumping Tariffs on Protected Steel Firms

	(1)	(2)	(3)	(4)
VARIABLES	Ln (1+sales)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for protected steel firms × Dummy for year since 2016	0.50***	-0.097	-0.034	-0.017
	(0.188)	(0.457)	(0.366)	(0.464)
Other variables	No	No	No	No
Observations	3,242	3,214	3,214	3,183
R-squared	0.021	0.076	0.078	0.074
Number of firms	1,013	1,012	1,012	1,002
Firm fixed effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.

Notes: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include an indicator for protected firms. Profit and productivity variables are deflated using annual gross domestic product deflators.

Source: Authors' calculations from Enterprise Censuses in 2010–2017.

To examine whether or not the decision to protect the steel sector is affected by a group of specific firms, we conduct a sensitivity analysis by adding firm characteristic variables into the model. If the results are biased because of confounding factors, we would expect the estimates to be sensitive to the addition of these variables. Table 5 reports similar regressions as in Table 4, but adds firm characteristic variables, including the log of employment, the log of asset, dummies on industrial zone, and ownership. The results in Table 5 indicate that trade protection has a significant impact on firms' sales, which is consistent with the findings in other studies (e.g. Nieberding, 1999; Konings and Vandenbussche, 2005). Thus, the protected policy introduced in 2016 has increased firm sales by 40% compared to non-protected steel firms.

Table 5: Effects of Safeguard and Antidumping Tariffs on Protected Steel Firms (Controlling for Firm Characteristics)

	(1)	(2)	(3)	(4)
VARIABLES	Ln (1+sales)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for protected steel firms × Dummy for year since 2016	0.40**	-0.16	-0.02	0.01
	(0.18)	(0.51)	(0.38)	(0.48)
Other variables	Yes	Yes	Yes	Yes
Observations	3,179	2,850	2,850	2,850
R-squared	0.119	0.106	0.103	0.094
Number of firms	1,001	939	939	939
Firm fixed effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.
Note: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include an indicator for protected firms, log of employment, log of asset, industrial zone indicator, and ownership dummies. Profit and productivity variables are deflated using annual gross domestic product deflators.
Source: Authors' calculations from the Enterprise Censuses in 2010–2017.

Another concern is pre-existing trends in the outcomes under study that may be spuriously correlated with trade policy changes. To check the validity of our assumption, we use a falsification test for the period prior to the year in which trade protection was applied. We expect that there is no significant difference between steel firms whose products have been protected and other steel firms whose products have not been protected. We take three consecutive years before 2016 and assume that protection rates have been applied in each year to examine this impact. The

estimates are reported in Table 6. The coefficient estimates for our main variable in all three specifications are insignificant. We find no evidence of a differential relationship between trade protection and firms' performances in these early pre-adoption periods.

Table 6: Falsification Test

	(1)	(2)	(3)	(4)
VARIABLES	Ln (1+sales)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for protected firms × year 2013	-0.137	0.518	0.057	0.045
	(0.162)	(0.338)	(0.382)	(0.488)
Dummy for protected firms × year 2014	-0.179	-0.556	-0.231	-0.287
	(0.158)	(0.385)	(0.341)	(0.429)
Dummy for protected firms × year 2015	-0.079	0.111	0.273	0.287
	(0.315)	(0.572)	(0.509)	(0.644)
Other variables	Yes	Yes	Yes	Yes
Observations	3,179	3,183	3,183	3,183
Number of firms	1,001	1,002	1,002	1,002
Firm fixed effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.
Note: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include year dummies, an indicator for protected firms, log of employment, log of asset, industrial zone indicator, and ownership dummies. Profit and productivity variables are deflated using annual gross domestic product deflators.
Source: Authors' calculations from the Enterprise Censuses in 2010–2017.

4.2. Trade Protection Policy Impact on Downstream Firms' Performances

Table 7 provides the estimation results of Equation (2) using the full sample of manufacturing sectors from 2010 to 2017. In Columns 1–3, our interested variable, the interaction of trade protection dummy with the input share of steel in the sector, has statistically significant effects on the domestic sales, prices, profits, labour productivity, and TFP of downstream firms. The results in Columns 1 and 2 indicate that a one standard deviation increase in steel input share (0.14) makes downstream firm's production sales decrease by 7.84%[6] and domestic prices rise by 7.08% since the government applied additional tariff rates. The results in Column 3 also show that a one standard deviation increase in steel input share results in the profits of downstream firms decreasing by 8.83% in the years in which a further trade protection policy was applied. This outcome is consistent with the hypothesis that

[6] This has been calculated as 0.56 * 0.14 * 100 = 7.84%.

trade protection raises costs for downstream industries and harms their performances. The temporary protection policy for the steel industry also lowers downstream industries' labour productivity by 6.15% and TFP by 8.03%, with a one standard deviation increase in steel input share.

Table 7: Effects on Downstream Firms

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln (1+sales)	Ln (Price)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for steel sector since 2016 × Steel input share	-0.565***	0.506***	-0.631***	-0.439***	-0.574***
	(0.217)	(0.179)	(0.250)	(0.193)	(0.247)
Steel input share	2.781***	-2.654***	-0.799***	0.159	0.211
	(0.393)	(0.345)	(0.304)	(0.216)	(0.277)
Other variables	Yes	Yes	Yes	Yes	Yes
Observations	42,621	42,620	42,646	42,646	42,611
R-squared	0.062	0.026	0.052	0.038	0.025
Number of firms	14,610	14,610	14,610	14,610	14,598
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.
Note: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include log of employment, log of asset, industrial zone indicator, and dummy variables for ownership. Profit and productivity variables are deflated using annual gross domestic product deflators.
Source: Authors' calculations from the Enterprise Censuses in 2010–2017.

4.3. Robustness Checks

To examine the robustness of our results, we undertake a number of checks. First, we test on a variety of firm sizes. Firms of different sizes may have different competitive capacities. Firms with less advanced technologies or those that are small in size may find it harder to manage under the pressure of increasing input prices and an input supply shortage. Larger domestic firms may suffer less from negative impacts resulting from upstream sectors and smaller firms may suffer more. As expected, the estimates presented in Table 8 show that small manufacturing firms tend to suffer more from trade protection than other downstream firms.[7]

[7]Micro firms are those with fewer than 10 employees. Small firms are those with more than 10 and fewer than 200 employees.

Table 8: Effects on Downstream Firms by Firm Size

	Micro firm sample					Small firm sample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Ln (1+sales)	Ln (price)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)	Ln (1+sales)	Ln (price)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for steel sector since 2016 × Steel input share	-0.227	0.235	0.174	-0.460	-0.680	-0.853**	0.703**	0.054	-0.229	−0.288
	(0.532)	(0.425)	(0.402)	(0.386)	(0.530)	(0.354)	(0.292)	(0.401)	(0.291)	(0.369)
Steel input share	4.824***	-4.621***	-0.097	0.607	0.560	2.069***	-2.215***	-1.055**	-0.012	0.002
	(0.831)	(0.749)	(0.487)	(0.379)	(0.515)	(0.713)	(0.634)	(0.521)	(0.350)	(0.447)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,495	15,494	15,504	15,504	15,470	22,425	22,425	22,437	22,437	22,437
R-squared	0.052	0.030	0.029	0.060	0.033	0.054	0.022	0.048	0.036	0.026
Number of firms	8,390	8,390	8,393	8,393	8,380	7,779	7,779	7,779	7,779	7,779
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.

Note: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include an indicator for protected firms, log of employment, log of asset, industrial zone indicator, and dummy variables for ownership. Profit and productivity variables are deflated using annual gross domestic product deflators. Micro firms are those with fewer than 10 employees. Small firms are those with more than 10 and fewer than 200 employees.

Source: Author's calculation from the Enterprise Censuses in 2010–2017.

We also explore the impact of the trade protection policy on different sectors. We expect that the effect of trade protection on the steel sector is significantly stronger on downstream sectors that use steel intensively (such as fabricated metals and machinery), than on those that do not. We restrict our sample to downstream industries that use more than 10% steel in their intermediate inputs. The results are reported in Table 9. Column 1 shows that when imposing trade protection on the steel sector, a one standard deviation increase in steel input share by downstream firms is associated with production sales that are 15.9% lower. In addition, as indicated in Columns 2, 4, and 5, additional trade protection results in downstream firm prices that are 14.3% higher in and productivity that is 9.8% lower.

Table 9: Effects on Downstream Firms that Use Steel Intensively

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln (1+sales)	Ln (price)	Ln (1+profit)	Ln (labour productivity)	Ln (TFP)
Dummy for steel sector since 2016 × Steel input share	-1.138***	1.024***	-0.194	-0.699***	-0.902***
	(0.341)	(0.299)	(0.334)	(0.254)	(0.326)
Steel input share	4.673***	-4.675***	-1.125***	0.297	0.365
	(0.579)	(0.539)	(0.428)	(0.280)	(0.358)
Other variables	Yes	Yes	Yes	Yes	Yes
Observations	37,802	37,801	37,825	37,825	37,792
R-squared	0.062	0.031	0.050	0.040	0.026
Number of firms	13,387	13,387	13,388	13,388	13,377
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes

Ln = natural logarithm, TFP = total factor productivity.
Note: Standard errors are robust to heteroskedasticity and clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Other variables include an indicator for protected firms, log of employment, log of asset, industrial zone indicator, and dummy variables for ownership. Profit and productivity variables are deflated using annual gross domestic product deflators. The sample includes downstream firms that use more than 10% of steel in their intermediate inputs.
Source: Author's calculation from the Enterprise Censuses in 2010–2017.

5. Conclusion

Many governments have used trade protection to guide the development of key sectors in their economies and spur general economic development. Governments often make extensive use of trade protection on sectors that are key inputs in the economy, such as steel, presumably because, in the long run, trade protection will lead to a highly competitive sector that no longer needs trade protection and will ultimately deliver low-cost inputs to the rest of the economy. However, many of the trade protections may raise the prices of the protected sector in the country, potentially hurting the competitiveness and development of downstream sectors that use the products of these protected sectors as inputs.

Using the difference-in-difference method, this study evaluated the impacts of safeguard measures applied since 2016 on the performances of steel firms and other firms in downstream sectors in Viet Nam. We find strong evidence that, although steel-sector protection benefits protected firms, it has a significant negative impact on the performance of downstream industries. During the period in which trade protection has been applied to the steel sector, a one standard deviation increase in steel input share is associated with a decrease of 7.8% in sales and 6.1% in labour productivity for an average downstream firm. Trade protection also has detrimental effects on the productivity of downstream sectors. This effect can be as marked as sales that are 15.9% lower and prices 14.3% higher for firms in the sectors that use steel most intensively. Exploring the outcome based on firm sizes reveals that this trade protection policy has had a harmful effect on small downstream firms.

This empirical analysis provides insights into the effects of trade protection on the steel sector and its downstream sectors. Our results suggest that governments should be careful in selecting industrial policies as a trade protection tool, as these may benefit some firms or sectors while harming other sectors.

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