

Amanta, Felippa; Gupta, Krisna

Research Report

Trade for economic recovery: Import policies to support Indonesia's F&B sector

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Policy Paper No. 51

Trade for Economic Recovery: Import Policies to Support Indonesia's F&B Sector

by Felippa Amanta & Krisna Gupta

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Policy Paper No. 51
Trade for Economic Recovery:
Import Policies to Support Indonesia's F&B Sector

Authors:
Felippa Amanta & Krisna Gupta
Center for Indonesian Policy Studies (CIPS)

Jakarta, Indonesia
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GLOSSARY

API-P:

Angka Pengenal Importir-Produsen/Producer Import Identification Number

API-U:

Angka Pengenal Importir-Umum/General Import Identification Number

ARDL:

Autoregressive Distributed Lag

F&B:

Food and Beverages

GFC:

Global Financial Crisis

GVC:

Global Value Chain

HS:

Harmonized Systems Code

NK:

Neraca Komoditas

NTM:

Non - Tariff Measures

OECD:

The Organization for Economic Co-operation and Development

PI:

Persetujuan Impor or Import License

RCA:

Revealed Comparative Advantage

SPS:

Sanitary and phyto-sanitary

TBT:

Technical Barriers to Trade

WIOD:

World Input-Output Database

EXECUTIVE SUMMARY

Food and beverage industry is one of the prioritized manufacturing sectors that can support Indonesia's economic recovery and structural transformation post Covid-19 pandemic. In 2021, the sector contributed 6% of Indonesia's national Gross Domestic Product and 20% of total exports to a value of \$45.4 billion. The sector is dominated by micro- and small- medium enterprises and employs an aggregate of 4.6 million people, providing livelihood for many. However, the industry has experienced stagnating growth in the past two decades, particularly due to weak global value chain linkages.

This study provides two key takeaways from Indonesia's food industry. Firstly, although the government often cites Indonesia's downstream products to showcase Indonesia's competitiveness in the food industry, the industry is dominated by palm oil related products. Indonesia is actually a net importer of food products if palm oil related goods are excluded from the trade statistics. Heavy reliance on the palm oil industry skews Indonesia's global value chain dynamics toward forward linkages (exports of raw materials) with limited backward linkages (imports of raw materials to be processed further in the country). Palm oil products are less complex compared to types of final products of the food and beverage industry, and rely mostly on Indonesia's climatic advantage. Given the different characteristics, it is important to distinguish the palm oil industries from the other processed food and beverage manufacturing industries, if Indonesia wishes to design its policy around increasing production complexity and improving domestic value added to its food and beverage industry.

The second point is the importance of importing value added to move toward a more complex value chain downstream. Due to natural limitations, the food and beverage industry needs imported inputs as they tend to combine various ingredients that may not be produced in one location. Moreover, various studies suggest imported inputs have also been associated with higher firm productivity and quality of products. This study finds that a 1% increase of intermediate input imports correlates with the growth of final good exports by 0.96%. Considering how important Indonesia's domestic market is for downstream products, this result suggests how critical importing input is to the industry.

Indonesia should open itself to importing products that are more efficiently produced elsewhere. However, access to imported inputs, especially food and agricultural products, are limited by Indonesia's complex and protectionist trade regulations. Non-tariff measures have proliferated in the sector covering almost 100% of animal, vegetable, and animal products. As a whole, non-tariff measures compound compliance costs and cause delays that inhibits firms' access to a reliable stream of imported inputs, and hence disrupting production. Among the non-tariff measures, quantitative restrictions and import licensing system stood out as causing the greatest distortion to the market and significant restrictions to trade.

The quantitative restrictions and import licensing system are regulated in Ministry of Trade Regulations No. 25/2022 that outlines specific requirements to obtain *Persetujuan Impor* (import license) for each regulated traded product. For some products, such as dairy products, the PI application process requires firms to obtain recommendations from the provincial government

and technical ministry. In addition, the Indonesian government also rolled out *Neraca Komoditas* in 2022 through Presidential Regulations No. 32/2022 that introduced a new trade licensing system based on an integrated supply-demand-stock database. The *Neraca Komoditas* promises a simplified import licensing system that eliminates the need for technical recommendations, but it presents potentially new problems for firms particularly around the reliability of the database and its focus on quantity of goods available as a factor in approval decision.

To facilitate firms' access to imported input, the Ministry of Trade should lead a review and harmonize existing regulations that still present trade barriers to firms. The Ministry of Trade should also consider removing quantitative restrictions and allowing firms with API-P who have met the technical requirements to import without quantity limits. Last but not least, *Neraca Komoditas* should serve solely to inform broader strategic policy decisions rather than to decide import allowance for firms.

CURRENT SITUATION OF INDONESIA'S FOOD AND BEVERAGE INDUSTRY

The Food and Beverage (F&B) industry is the largest non-oil and gas manufacturing sector in Indonesia. In 2021, the sector constituted 38.4% of the non-oil and gas manufacturing industry and contributed 6.7% to Indonesia's national Gross Domestic Product (GDP) (Ministry of Industry, 2021; Statistics Indonesia, 2022). The same year, Indonesia's F&B industry recorded a total export worth \$ 45.4 billion, a 44% growth from previous year's export and 20% share of Indonesia's total export (Ministry of Trade, 2022). This indicates a strong rebound from the general downturn experienced throughout the manufacturing during the Covid-19 pandemic.

The dynamics of Indonesian F&B growth is quite volatile compared to the general economic growth and the growth of the overall manufacturing industry. This is especially true during the Global Financial Crisis (GFC) in 2008 and the weakening of global trade soon after (around 2011). The volatility of the F&B industry is because it is sensitive to changes in food commodity prices on one hand, and consumers' purchasing power on the other. However, most of the time, the Indonesian F&B industry grows much faster than both aggregate economic growth and manufacturing growth, which shows the importance of this industry in boosting Indonesia's economic growth (Figure 1). This promising performance also appears in the industry's strong rebound after the Covid-19 pandemic.

Figure 1.
GDP Growth of Food & Beverage, Manufacturing, and the Indonesian Economy



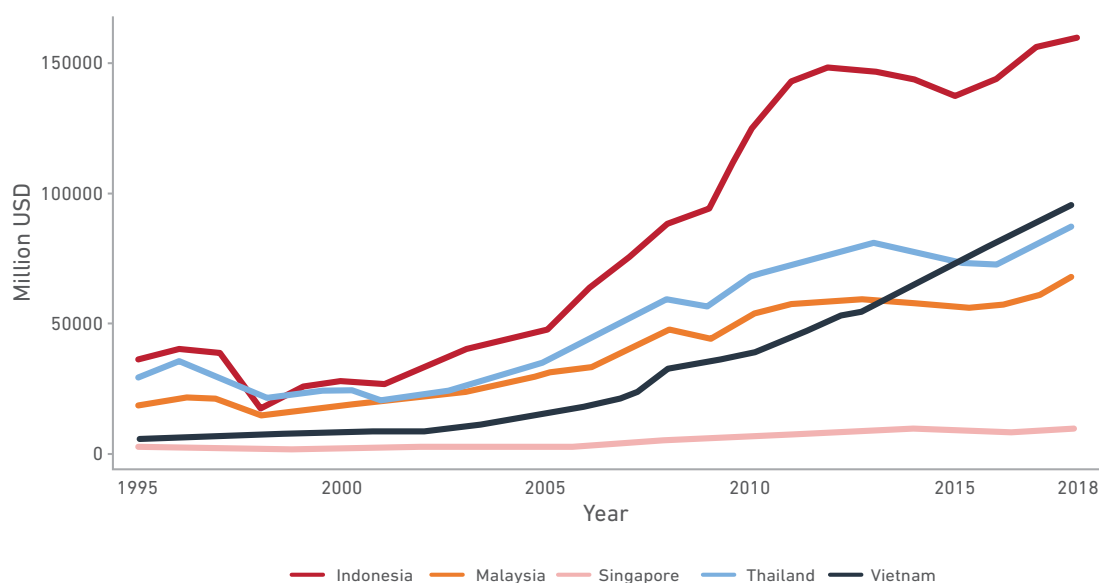
Source: BPS

Note: NPS provides two sets of growth data: 2002-2014 using 2000 base year and 2011-2021 using 2010 base year. We use geometric mean for overlapping year 2011-2014

¹ Author's calculation based on Harmonized Systems (HS) Code 1-23. HS Code refers to an internationally standardized industry classification system that assigns digits to identify traded products.

Indonesia's F&B Industry also produces more products compared to its peers in Association of Southeast Asian Nations (ASEAN). According to the Trade in Value Added (TiVA)² database from OECD, Indonesia's production of food, beverage, and tobacco industries are much higher than Malaysia, Singapore, Thailand and Vietnam (Figure 2). While in nominal terms this should not be surprising given Indonesia's large population, its growth rate is also much faster than the other ASEAN countries especially after 2005.

Figure 2.
Gross Production of Food, Beverage, and Tobacco



Source: OECD

“Due to its economic significance, the F&B industry is among the priority sectors for the Indonesian government's economic recovery and structural reforms plans.”

Due to its economic significance, the F&B industry is among the priority sectors for the Indonesian government's economic recovery and structural reforms plans. The 2022 Government Work Plan, authorized in the Presidential Regulation No. 115/2021, aims to strengthen Indonesia's competitiveness in modern manufacturing and services with high added value, including in the F&B industry. This plan envisions a shift away from an economy that is dependent on heavy natural resources extraction towards an economic development led by the growth of the services and manufacturing industries, with the F&B industry being one of the promising sectors. The prioritization of the F&B industry aligns with studies that show a high and increasing comparative advantage in the sector (Islamic Development Bank & Asian Development Bank, 2021). Hence, the F&B sector has huge potential to support Indonesia's economic recovery.

² Trade in Value Added refers to the value adding activity conducted in a particular country on a good that is enjoyed worldwide.

In addition to its economic contribution, the Indonesian F&B industry is also an important sector for entrepreneurial and employment opportunities. The F&B industry is dominated by micro and small businesses³ that make up 99% of the sector and employ close to 3.5 million people in 2019 (Statistics Indonesia, 2021a). An additional 1.1 million people work in the medium- and large-scale F&B industries, 36% of which are female (Statistics Indonesia, 2021b; Statistics Indonesia, 2021c). Together, the F&B industry absorbs 29% of the labor force in the industrial sector and provides jobs for 4.6 million people in 2019. The sector provides livelihood for low- and middle-income Indonesians especially throughout the Covid-19 pandemic.

Last but not least, the F&B industry supports Indonesia's food security and fulfills the increasing consumer demand. The scope of the F&B industry includes all processing activities in a food value chain needed to get agricultural products from farms to the consumers. The F&B industry thus includes milling industries, production of intermediary goods such as salt and sugar, and food processing for packaged foods. These processing activities are crucial parts of the complex food system.

Stagnating Growth of the F&B Industry

Despite the potential and significance of the F&B industry in Indonesia, the manufacturing industry overall has experienced slow growth in the past two decades. Only a few companies have become huge and internationally renowned, such as Indofood and Mayora. However, the majority of the F&B industry remained micro and small. This is not only an issue in the F&B industry, but rather a problem in the overall manufacturing industry (Aswicahyono & Hill, 2018). The manufacturing sector has seen a decline in productivity per worker, as its share to GDP has declined while share to employment has increased (Table 1) (Dartanto, Yuan, & Sofiyandi, 2017).

³ Statistics Indonesia defines micro businesses as those that employ 1 to 4 people, while small businesses are those that employ 5 to 19 people.

Table 1.
Sectoral Gross Domestic Product and Employment

	1985	1996	2005	2015	2019
Sectoral composition of GDP (% of GDP)					
Agriculture	23.2	16.7	13.1	13.5	12.7
Manufacturing	35.9	43.5	46.5	39.9	39
Services	40.9	39.9	40.3	46.6	44.2
Sectoral composition of employment (% of employment)					
Agriculture	54.4	44.3	44.9	34.0	28.5
Manufacturing	8.2	17.4	17.8	20.7	22.4
Services	29.7	38.4	37.3	45.3	49.1

Source: Dartanto, Yuan, & Sofiyandi, 2017, World Bank, 2019

The F&B sector in particular was significantly affected by the economic downturn because of reduced demand, supply chain disruption, mobility restrictions that limit production capacity, and reduced labor force or working hours to curb transmissions or adjust to the lower demand.

The slowing down of the manufacturing sector was made worse during the Covid-19 pandemic. The F&B sector in particular was significantly affected by the economic downturn because of reduced demand, supply chain disruption, mobility restrictions that limit production capacity, and reduced labor force or working hours to curb transmissions or adjust to the lower demand. Many firms have had to shut down their operations. In the fourth quarter of 2021, the GDP of the F&B industry declined by 5.7% compared to the previous quarter.

Despite the large difference of F&B production between Indonesia and other countries (Figure 2), Indonesian F&B exports are comparable with its peers, with Thailand exporting more F&B goods than Indonesia most times (Figure 3). This can be attributed to the large domestic market in Indonesia that consumes most of the F&B products. At the same time, it also means that there is still an opportunity for Indonesia to increase F&B exports.

Figure 3.
Gross Exports of Food, Beverage, and Tobacco

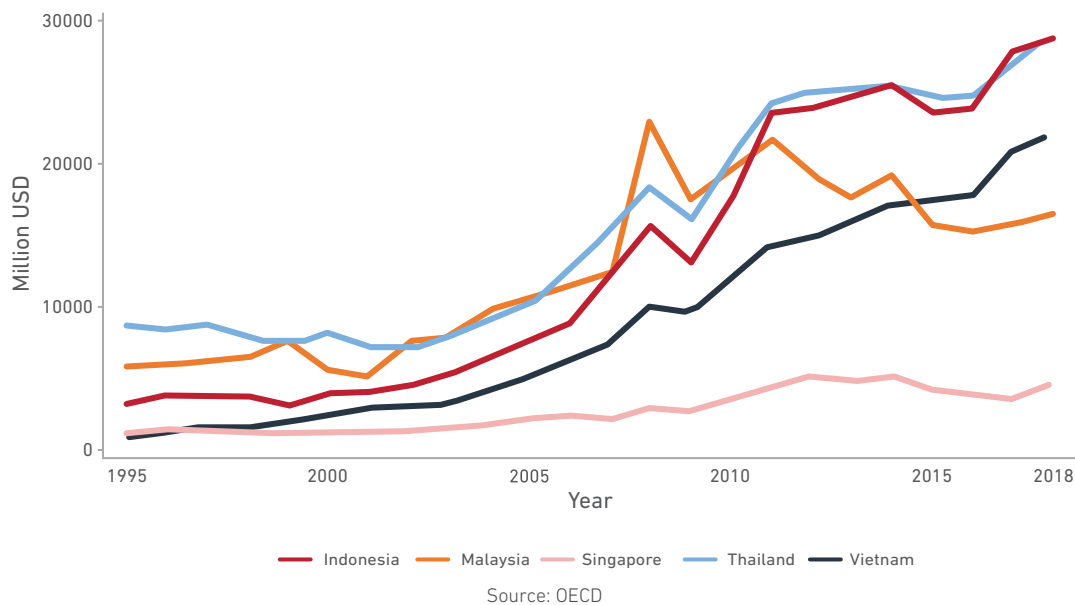
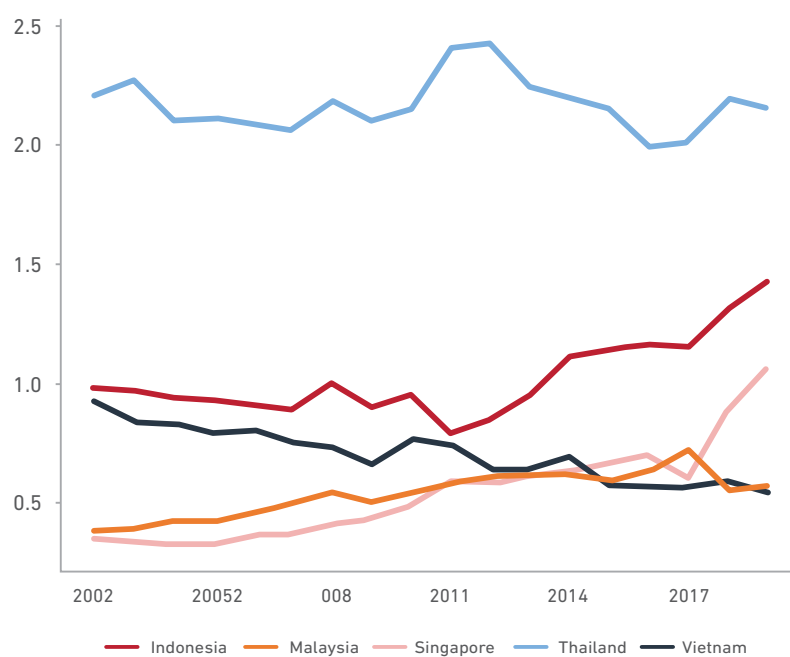


Figure 4 shows the Revealed Comparative Advantage (RCA), a metric often used to show countries' comparative advantage in different goods. A country is considered good at exporting something when it has RCA larger than 1. Using RCA calculated by the World Bank's World Integrated Trade Solutions database, the Indonesian F&B industry appears to be relatively competitive among other ASEAN countries after 2013, but still far below Thailand's RCA.

Figure 4.
Revealed Comparative Advantage of Food Products in 5 ASEAN Countries



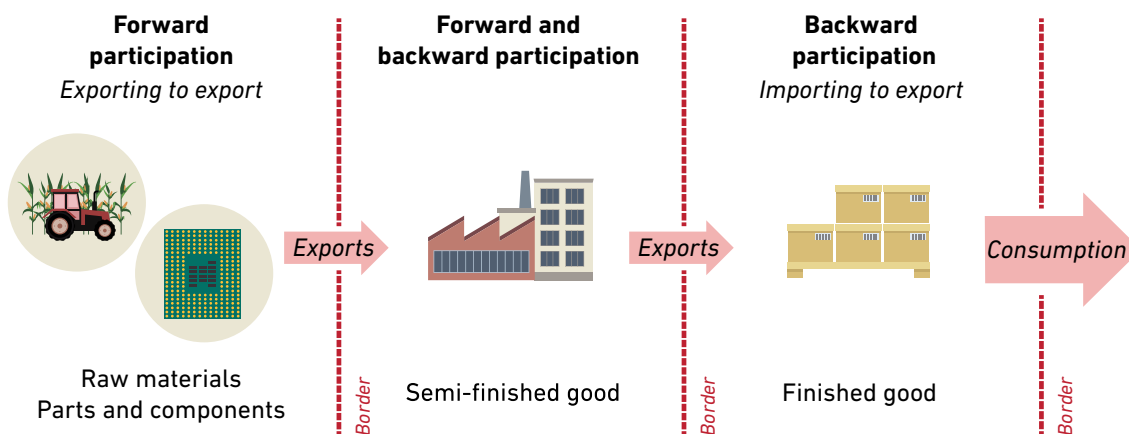
Thailand's RCA is much higher than the rest of the four ASEAN countries used in this comparison. Indeed, Thailand has a very strong F&B industry that exports to various developed countries (Hill & Menon, 2021). The key to their success is in how they utilize the Global Value Chain (GVC), which refers to sharing the range of activities needed to process goods across firms located in different countries. Vietnam sees a similar path to development, integrating itself to the GVC by opening itself with the world, utilizing inputs and markets from all around the world (World Bank, 2020). Understanding and utilizing GVC seems to be the key for Indonesia to grow its F&B industry even further.

BENEFITS AND RISKS OF GLOBAL VALUE CHAIN

Globally, 70% of international trade is now organized around a global value chain (OECD, 2020). This means instead of building their own supply chain to produce exported goods, firms become a part of existing production networks where raw materials, parts, and components of the goods are produced and traded across different countries. GVC increases overall production efficiency through hyperspecialization. As such, GVC has been characterizing manufacturing in the last three decades (Antràs, 2020).

GVC involvement can be stylized as forward participation and backward participation (World Bank, 2020). A country is said to join GVC through forward participation when most of its domestic products are embedded in other countries' exports. Countries which participate in a forward manner in the GVC are more likely to be exporters of natural resources products which are then processed further in the importing country. On the other hand, backward participation is when a country imports other countries' value added in their products which are then exported to a third country. Countries which have little natural resources or land to produce agricultural products are able to produce manufactured food products through backward participation by sourcing raw materials from other countries (Figure 5).

Figure 5.
Global Value Chain Linkages



Source: Reproduced from the World Bank

GVC participation can facilitate firms' access to networks, supplies, knowledge, and technology.

GVC participation can facilitate firms' access to networks, supplies, knowledge, and technology. The boost in manufacturing activities in turn supports a country's economic development. A study in 189 countries found that involvement in the GVC has been associated with positive impacts on income per capita and productivity (Ignatenko, Raei, & Mircheva, 2019). GVC is also correlated with economic growth, greater employment, and better jobs in more productive manufacturing activities, which in turn reduces poverty (World Bank, 2020). The link between GVC and economic growth is mediated through enabling policies on monetary stability, property rights, logistics, government integrity, labor, ease of doing business, and investment (Jangam & Rath, 2021).

However, the benefits of GVC may not be distributed equally among countries or among firms of different sizes. While GVC presents a huge market opportunity for small- and medium-enterprises, they often have limited connectivity or cannot compete with larger firms due to various constraints (ADB Institute & Asian Development Bank, 2015). Moreover, the benefits of GVC are more significant for upper-middle and higher-income countries than low- and lower-middle-income countries (Ignatenko, Raei, & Mircheva, 2019). The heterogeneous effects among different countries can be attributed to the types of GVC participation, with countries that rely on commodity exports typically left behind than countries with high value-added activities.

Further, supply chain disruptions during the Covid-19 pandemic have raised concerns on the vulnerabilities of the interdependencies brought by the GVC. This concern has led to ideas of reshoring or self-sufficiency, or moving production back within a country to avoid global supply disruptions. While withdrawing from GVC may reduce firms' exposure to external shocks, they also become less efficient and paradoxically even more vulnerable to shocks because they are unable to use trade as a buffer (OECD, 2021).

In light of the Covid-19 crisis, simulations show reshoring would undermine economic recovery and worsen poverty (Brenton, Ferrantino, & Malisweska, 2022). Instead of reshoring, facilitation of trade and integration to GVC along with policies to maintain trade flows during crises can increase resilience to future shocks and support economic recovery (World Bank, 2020; OECD, 2021; Caselli, Koren, Lisicky and Tenreyro, 2020; Ardelean, Leon-Ledesma, and Puzello, 2022). GVC offers the ability to diversify risk through opening access to multiple suppliers in multiple countries (Shepherd, 2021). Investments and trade have been argued to be key for medium-term economic recovery post Covid-19 pandemic, as imports from one country also means exports for another (Basri & Fitriana, 2022).

F&B industries are among the most affected by GVC mainly due to natural constraints that limit the production of agriculture raw materials in a particular country (De Backer & Miroudot, 2013; Scoppola, 2021). F&B industries typically combine various ingredients that cannot be produced in just one place.

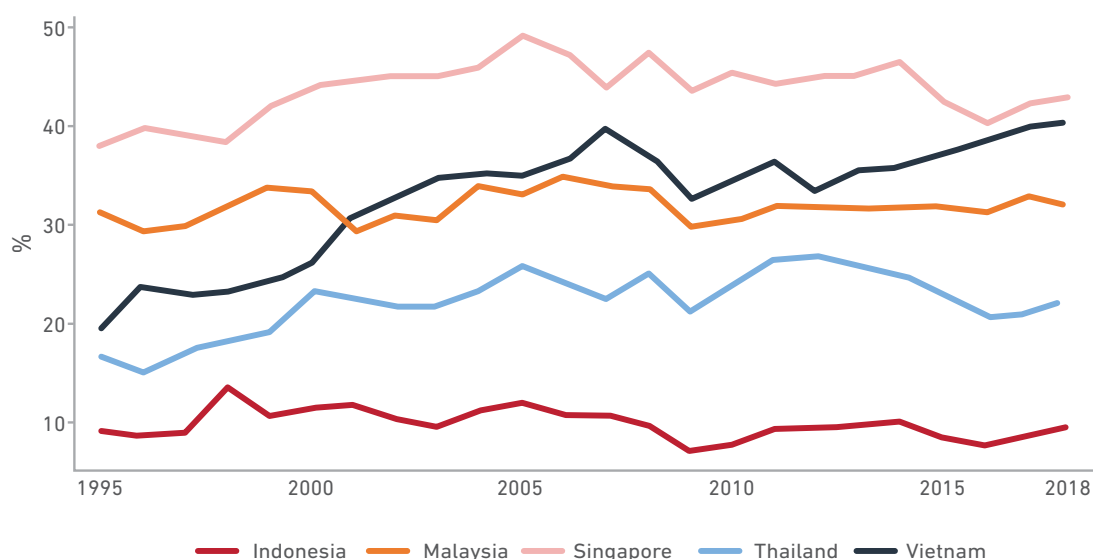
Indonesia's participation in the global value chain has been declining in recent years.

Indonesia participates in both forward and backward GVC linkages, although both can be characterized as weak integration signified by the low ratio of trade (export and import) of goods and services to GDP (World Trade Organization, 2020; Shepherd & Soejachmoen, 2018). That means Indonesia has yet to participate actively in global production

networks. Further, Indonesia's participation in the global value chain has been declining in recent years. Backward participation, measured by the ratio of the foreign value-added content to the country's total gross exports (i.e. imported inputs that are then exported again), declined from 16.9% to 10.1% between 2000 and 2017. Forward GVC participation, measured by the ratio of the domestic value added sent abroad to the economy's total gross exports, showed a steeper decline from 21.5% to 12.9% during the same time period but remained above backward participation (Islamic Development Bank & Asian Development Bank, 2019).

The limited backward participation can be observed in the low share of foreign value added in Indonesia's exports which stayed relatively constant since 1995 (Figure 6). In contrast, Singapore has the highest share of imported inputs for their F&B products that can be naturally attributed to its small land size and limited agriculture production. Vietnam's share of foreign value added keeps on increasing, suggesting increasing backward participation in GVC as Vietnam's manufacturing sector is growing.

Figure 6.
Share of Foreign Value Added in Food, Beverage, and Tobacco Export



Source: OECD

Input is an essential factor of production in manufacturing. Table 2 shows where Indonesia's F&B (and tobacco) is getting its inputs based on the World Input-Output Database (WIOD) (See Appendix 1 for the detailed methodology). The top two industries that provide inputs to Indonesia's F&B industry are agriculture and other F&B industries, accounting for around 70% of value added. Most of Indonesia's F&B inputs come from its own domestic market. However, Australia, Brazil and the United States and the rest of the world still provide important inputs that can be hard to source domestically. Nevertheless, Table 2 shows how small Indonesia's foreign value added is in the F&B industry, corroborating Figure 6.

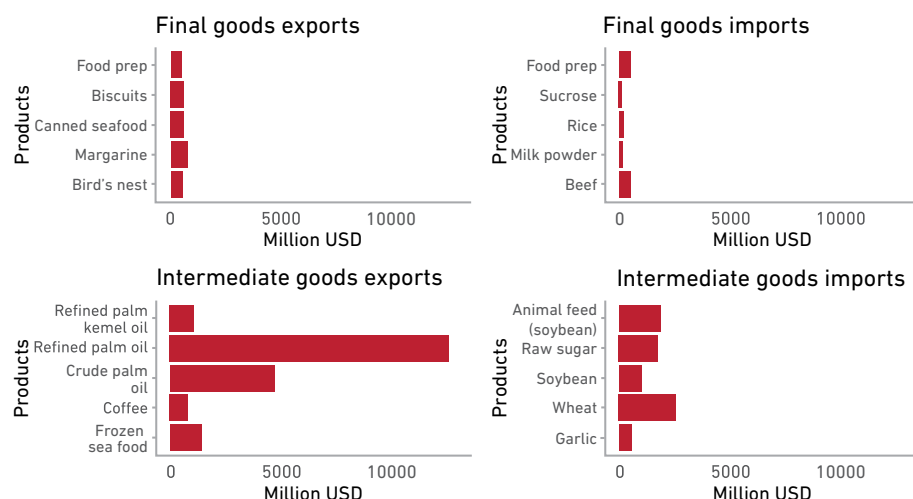
Table 2.
The Source of Indonesia's F&B Value Added Inputs, 4 Latest Available Years

Country	2011	2012	2013	2014
Indonesia	91.55%	91.69%	91.01%	90.66%
Rest of the World	3.1%	3.08%	3.07%	3.03%
Australia	1.58%	1.41%	1.64%	1.62%
Brazil	0.61%	0.73%	0.97%	1.15%
United States	0.99%	1.02%	0.97%	1.15%

Industry	2011	2012	2013	2014
Crop and animal production, hunting and related service activities	47.98%	46.87%	48.38%	47.97%
Manufacture of food products, beverages and tobacco products	24.33%	24.93%	23.48%	23.94%
Wholesale trade, except of motor vehicles and motorcycles	8.02%	7.99%	7.88%	7.69%
Fishing and aquaculture	4.31%	4.4%	4.48%	4.73%
Retail trade, except of motor vehicles and motorcycles	4.69%	4.68%	4.61%	4.5%

Based on the information in Table 2, the two industries highly important to Indonesia's F&B inputs are goods produced by agriculture and F&B sectors. Figure 7 shows the disaggregated F&B goods in four categories based on the flow of trade and its position in the value chain. Since Indonesia experiences a trade surplus in the F&B sectors, it should not be a surprise that Indonesia's exports dwarf its imports. However, the dominance of palm oil industries and its related goods is clearly shown in the data.

Figure 7.
Top Five Indonesia's Food Trade in 2020



Source: UN Comtrade Database

According to Figure 7, the top three of Indonesia's F&B exports are crude and refined palm oil as well as palm kernel oil. In the final goods department, margarine, which is mainly made from palm oil, is the top final goods of food export. Goods such as food preparations, bird's nest and garlic sometimes move out of the top 5 in different reference years, but other goods especially palm oil products are consistently sitting at the top 5 even when we use different reference years.

In fact, Indonesia's food exports get significantly smaller if we do not consider palm oil products. Three figures below demonstrate how important palm oil and its derivatives are to the Indonesian F&B industry. Figure 8 shows Indonesia's F&B exports in three categories, namely palm oil and its related products, intermediate goods, and final goods. As we can see from the graph, Indonesia's palm oil products dominate the food industry. Moreover, the fluctuation coming from Indonesia's F&B export performance is coming mainly from palm oil and its related products.

Figure 9 shows Indonesia's top 5 F&B products' trade in 2020 without palm oil related goods, which are significantly smaller in value than with palm oil considered. Without palm oil-related products, we can see more clearly the other part of Indonesia's F&B industries, in particular if one wants to look at its more downstream F&B products.

In fact, Indonesia's food exports get significantly smaller if we do not consider palm oil products.

Figure 10 shows Indonesia's aggregate export & import of F&B goods without palm oil from 2002 to 2020, which emphasizes the importance of intermediate inputs in Indonesia's F&B industry. Without palm oil-related products, Indonesia's F&B industry does not have a significantly observed net trade surplus. Figure 10 also shows a large dip in Indonesia's F&B imports in 2012, especially for F&B products categorized as intermediate inputs. Interestingly, exports of Indonesia's final F&B products dropped at the same time. This will significantly reduce Indonesia's backward participation in the F&B industry.

Figure 8.
Indonesian Food Exports, 2002-2020

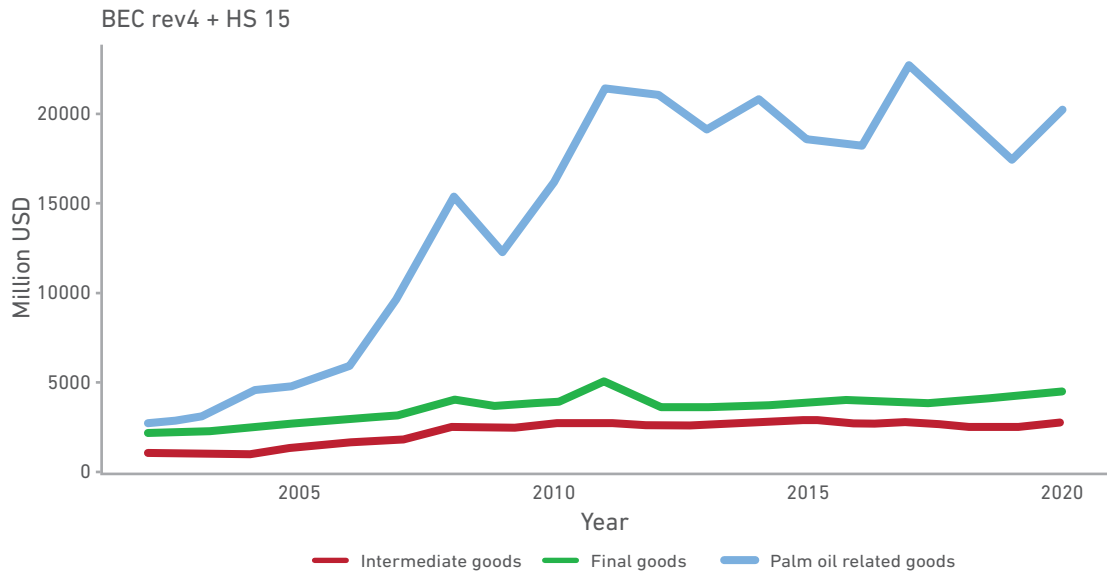


Figure 9.
Top 5 Indonesia's Food Trade in 2020 (Palm Oil and Its Derivatives Excluded)

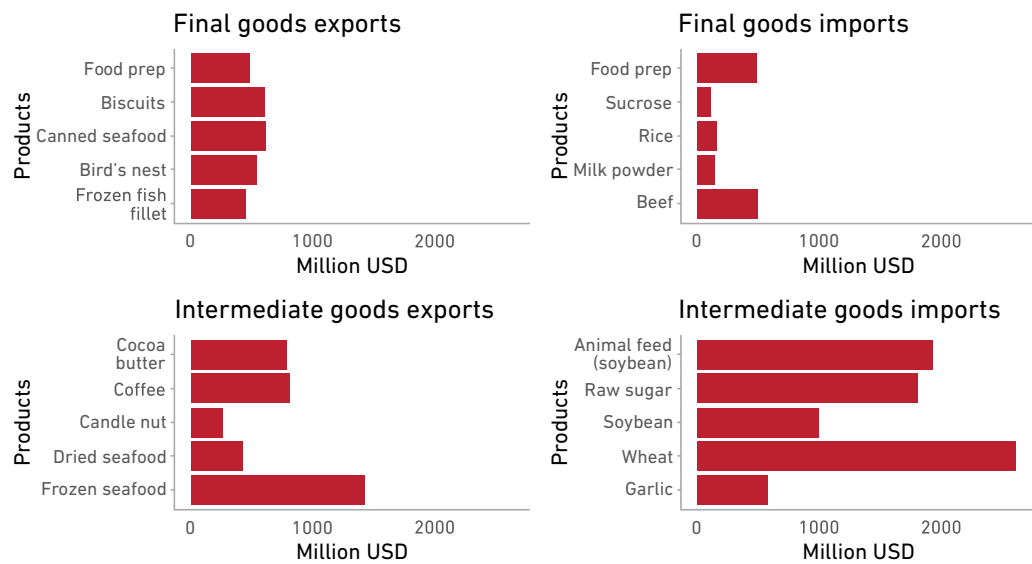


Figure 10.
Indonesian Food Exports and Imports, 2002-2020

BEC rev4 classification, without palm oil products



Source: UN Comtrade Database

The fact that Indonesia's F&B industry is dominated by the palm oil industry shows two things. Firstly, Indonesia's F&B industry position in the GVC is forward participation. That is, Indonesia's F&B industry is responsible for supplying an important intermediate product to the world, namely palm oil. Moreover, any policy aiming at reducing its F&B inputs' import will only strengthen Indonesia's forward participation by reducing its backward participation in the GVC.

Secondly, without the palm oil industry, Indonesia's F&B industry can hardly be considered a global player. If policy makers intend to use F&B to drive Indonesia's economic transformation away from natural resources, they need to distinguish between the palm oil industry from the rest of the F&B manufacturing industry and develop policies that better suit the latter. To use the F&B industry as a driver for economic transformation and growth, Indonesia must improve its non-palm oil related F&B production and exports and focus on more downstream products.

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Without increasing Indonesia's F&B backward participation, it is harder to pursue economic transformation. Easing import restrictions is important to improve Indonesia's backward participation. As we can see from Figure 8, a significant drop in the imported intermediate inputs seems to be associated with the drop in final goods' exports. Indeed, Indonesia is a net importer of agricultural goods and many important intermediate inputs like wheat, salt and sugar, which are crucial for F&B production. Openness to trade is very important for Thailand's F&B exports (Hill and Menon, 2021), and as Figure 3 and Figure 6 seems to suggest, an important factor for Vietnam's increasing importance in the global food exports which Indonesia can learn from.

The Relationship between Import and Export

Increasing backward participation could be the key to improve Indonesia's F&B growth, especially in the higher value added manufacturing sector. According to Figure 8, some of the most important final goods exports require inputs that tops Indonesia's intermediate inputs. Wheat and sugar are necessary for the prepared food exports as well as biscuits and wafers. Intuitively, we can hypothesize that Indonesia needs to increase its imports in order to increase its exports, which support the backward participation of Indonesia's F&B industries to the GVC.

We resort to time series analysis to find evidence to back up that hypothesis. Firstly, we take a linear approximation to get the growth of Indonesia's F&B exports and imports. This allows us to have a smoother and closer to stationary data to be used in the analysis. This gives us a growth version of Figure 9, which can be seen in Figure 11.

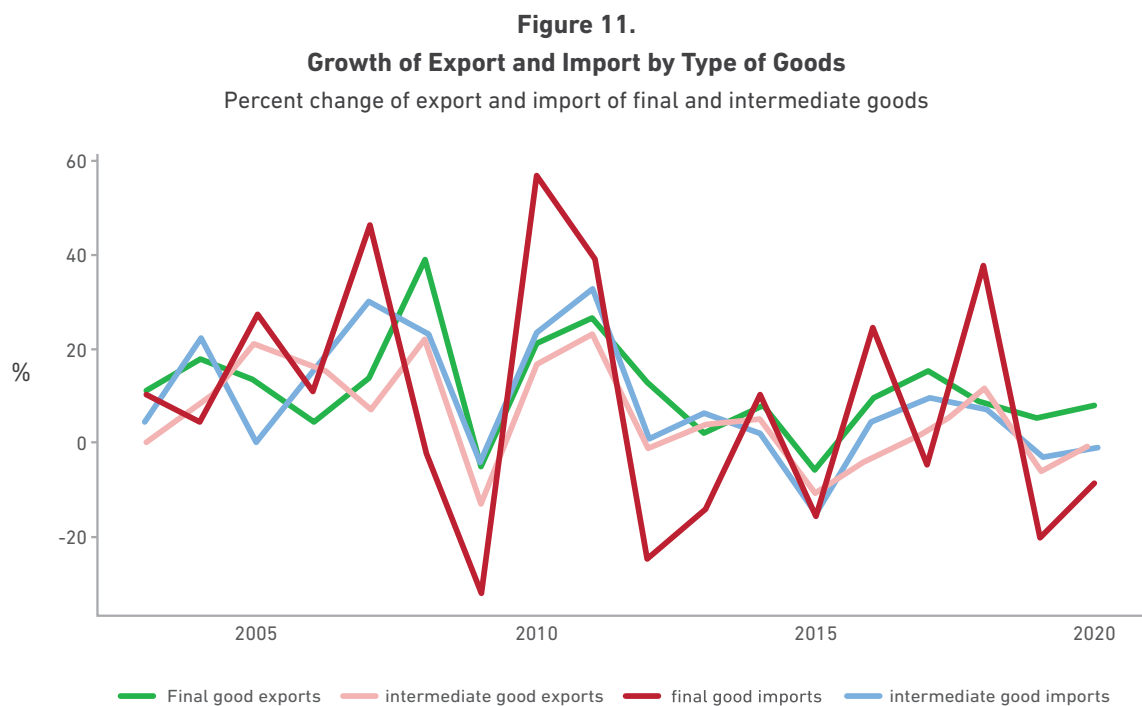


Figure 11 seems to follow the global trend of trade. That is, the growth of exports and imports were relatively higher prior to the 2008 Global Financial Crisis compared to the year after. However, we can also see a possible co-movement among variables, especially intermediate good imports and final good exports.

We use the Autoregressive Distributed Lag (ARDL) method to find the relationship between exports and imports. ARDL is an appropriate method amid the short spell and low frequency of the data used in this paper (Pesaran, Shin and Smith, 2001). The ARDL estimation uses two different dependent variables, final good exports and intermediate good exports (see Appendix 1 for detailed methodology). The result of the regression is presented in Table 3.

Table 3.
ARDL Results

Predictors	growth of final good exports			growth of intermediate good exports		
	Estimates	CI	p	Estimates	CI	p
(Intercept)	11.80	5.89 – 17.72	0.008	-10.61	-91.56 – 70.33	0.344
L(dfx, 1)	-0.70	-1.32 – -0.09	0.035			
dintm	0.96	0.51 – 1.41	0.007	-0.81	-14.81 – 13.19	0.596
L(dintm, 1)	0.53	-0.29 – 1.35	0.131	-0.24	-12.27 – 11.78	0.841
L(dintm, 2)	-0.07	-0.44 – 0.30	0.606	-0.12	-3.70 – 3.45	0.737
L(dintm, 3)	-0.23	-0.48 – 0.02	0.060	0.03	-6.34 – 6.41	0.957
L(dintm, 4)	0.05	-0.25 – 0.35	0.623	0.62	-5.50 – 6.73	0.423
L(dintm, 5)	-0.02	-0.29 – 0.24	0.789			
dfm	-0.17	-0.38 – 0.04	0.082	0.68	-5.01 – 6.37	0.370
L(dfm, 1)	-0.07	-0.31 – 0.18	0.458	0.73	-5.63 – 7.10	0.382
L(dintx, 1)				-0.69	-13.31 – 11.93	0.614
L(dintx, 2)				-0.55	-5.65 – 4.56	0.404
L(dintx, 3)				0.24	-4.38 – 4.86	0.627
L(dfm, 2)				0.74	-5.50 – 6.98	0.373
L(dfm, 3)				0.55	-3.96 – 5.05	0.366
Observations	13			14		
R ² / R ² adjusted	0.987 / 0.947			0.980 / 0.741		

“Model 1 shows an increase of intermediate input imports growth by 1% correlates with the growth of final good exports by 0.96%.”

Model 1 shows an increase of intermediate input imports growth by 1% correlates with the growth of final good exports by 0.96%. This coefficient is statistically significant in 1% tolerance. Intermediate input imports growth is able to explain the movement of final good exports growth. The growth of final good imports seems to not be able to explain very well the movement of the growth of final good exports, which suggest that the import of final goods are mainly used domestically. The result of the bound F-test of the model 1 is 26.728 which supports a possible cointegration of variables.

Model 2, on the other hand, reports a weaker explanatory power of imports to intermediate good exports. All variables show no significance whatsoever. Additionally, the bound F-test result of 2.0816 concludes that there is no possible cointegration of the model. Meaning, the growth of intermediate good exports seems to move more randomly compared to the final good exports. This suggests that Indonesia's intermediate input exports are mainly domestically sourced.

These findings are consistent with previous research on the role of imported inputs. A previous study on Indonesia's manufacturing firm found that a 1% increase in the value of imported inputs is correlated with a 0.5% increase in exports, while a 1% increase in the number of varieties of the imported inputs increases exports by 1.8% (Patunru & Pane, 2020). Further, Indonesian firms that use more imported inputs produce higher quality goods and have higher output growth and value added (Rahardja & Varela, 2015).

Intuitively, An increase of 0.96% of final good exports might seem small, since it is less than 1% of the increased intermediate good exports. However, we must not forget the welfare gained by domestic market. Since Indonesia is a large country, most of the productivity improvement associated with more access to intermediate good will be largely benefit domestic final good consumers.

More importantly, ARDL is a linear approximation of the mean parameter. In reality, this may not be the case. If intermediate inputs allow firms to penetrate advance countries' market, then export growth (along with revenue) will increase exponentially, which may be closer to Patunru and Pane (2020)'s estimation. ARDL parameter underestimates the true effect of intermediate input growth to the growth export of final goods in this case.

Thanks to its natural advantage, Indonesia is able to be a global player in the F&B industry through forward participation with its palm oil exports. However, in order to move up to more sophisticated products, Indonesian policymakers should not let this fact lull them. Moving up the value chain requires Indonesia to exploit foreign value added and improve its backward participation. As noted, Indonesian major imports are wheat, soybean, and salt—all necessary ingredients to Indonesia's famous final food products such as instant noodles and tofu. Alas, improving Indonesia's backward participation requires a better regulatory environment for importers.

CURRENT REGULATIONS

Indonesia's GVC participation is hampered by its highly complex regulatory framework that often results in overlapping or even contradicting policies (Surianta, 2020). This is evident in the food and agriculture sector. Despite the benefits of trade and imported inputs on F&B industry's productivity and export, import of food and agriculture materials are heavily restricted in Indonesia through the use of non-tariff measures, even more so compared to other product groups. Non-tariff measures refer to a variety of measures other than tariffs that have implications on the quantity or quality of trade, or both, for both import and export.

“Despite the benefits of trade and imported inputs on F&B industry's productivity and export, import of food and agriculture materials are heavily restricted in Indonesia through the use of non-tariff measures, even more so compared to other product groups.”

The frequency and coverage ratio of import non-tariff measures on animal, vegetable, and food products are close to 100% (Table 4). Frequency ratio means the percentage of traded products to which one or more NTMs are applied, while coverage ratio means the value of trade that is subject to at least one NTMs. In comparison, the aggregate frequency and coverage ratio for Indonesian imports are 56% and 69% respectively (World Integrated Trade Solutions, 2022).

Table 4.
Frequency and Coverage Ratio of Non-Tariff Measures on Imports by Sector, 2015

Sector	Frequency Ratio	Coverage Ratio
Animal	100.0%	100.0%
Vegetable	99.3%	91.8%
Food products	98.8%	99.0%
Fuels	96.6%	28.2%
Transportation	82.7%	58.9%
Textiles and clothing	80.6%	78.2%
Chemicals	69.6%	54.5%
Machines and electronics	61.9%	46.0%
Metals	40.5%	30.5%
All import products	68.9%	56.3%

Source: Indonesia Non-Tariff Measures Summary. World Integrated Trade Solutions (2022)

NTMs are spread across various technical regulations, including from the Ministry of Agriculture, the Ministry of Industry, the Ministry of Trade, and the National Agency for Drug and Food Control. The NTMs are operationalized throughout the entire importing process, from applying for an import license, to packaging of the products, to the delivery and customs clearance of the products in the country.

Most of the non-tariff measures in food and agriculture products are sanitary and phyto-sanitary (SPS) policies to ensure the quality and safety of the imported products, followed by technical barriers to trade (TBT) (Table 5). SPS refers to measures that aim to protect human, animal, and plant health; while TBT measures are those that define the technical standards or required characteristics of a product (e.g. size, shape, design, labeling, marking, or packaging).

The large number of SPS are to be expected as a country's economy develops and its citizens have greater health and safety concerns (ERIA, 2019). Other non-tariff measures are not related to quality assurance of the product, but rather to limit imports such as through quantitative restrictions. On the exporting side, there are also export-related measures such as licensing requirements, export registration, and inspection. In addition to NTMs from Indonesia, Indonesian firms are also still subject to other countries' NTMs when exporting their products.

Table 5.
Types of NTM in Indonesia for Animal, Vegetable, and Food Products, 2015

Types of NTM	Animal		Vegetable		Food Products	
	Coverage Ratio	Frequency Ratio	Coverage Ratio	Frequency Ratio	Coverage Ratio	Frequency Ratio
A. Sanitary and phytosanitary measures	100%	100%	98.4%	88.9%	76.4%	97.0%
B. Technical barriers to trade	96.8%	93.8%	48.5%	19.9%	49.1%	87.6%
C. Pre-shipment inspection and other formalities	72.3%	85.3%	72.9%	59.5%	42.2%	62.7%
E. Licenses, quotas, prohibitions, and other quantity control measures	40.8%	17.3%	0.5%	0.9%	24.6%	8.5%
F. Charges, taxes, and other para-tariff measures	No data	No data	No data	No data	7.9%	12.4%
H. Anti-competitive measures	No data	No data	20.6%	2.5%	22.4%	1.5%
P. Export-related measures	99.9%	93.4%	90.8%	64.6%	16.0%	11.5%

Source: Indonesia Non-Tariff Measures Summary. World Integrated Trade Solutions (2022)

Even NTMs that are not explicitly designed for trade-restricting purposes, such as technical standards and inspections, have nevertheless restricted trade via increasing compliance costs that could lead to increased prices and reduced demand (Ing, Pangestu, & Cadot, 2018). For example, pre-shipment inspections have been associated with burdensome and costly procedures (Sembodho & Murwani, 2021). The proliferation of non-tariff measures on agriculture and food products thus creates an expensive trading environment for firms.

While the frequency and coverage ratio of NTMs other than SPS, TBT, and Pre-Shipment Inspections are relatively low, other categories of NTM can impose significant restrictions on trade. The World Trade Organization's 2020 Trade Policy Review for Indonesia identified Indonesia's import licensing regime and quantitative restrictions (under NTM category E) as particularly restrictive to trade. The quantitative restrictions in the food and agriculture sector is justified by the Indonesian government in terms of usage (e.g. of carcass meat and horticulture), prioritizing domestic produce (e.g. milk and salt), self-sufficiency goals (e.g. rice, sugar and horticulture), and monopolized state trading (e.g. feed corn and fertilizer). The quantitative restrictions are operationalized with non-automatic import licensing procedures. The quantitative restrictions and licensing procedures create the greatest potential to distort the market and result in the highest rate of protection for domestic industries (Amanta, 2021; Marks, 2015).

The World Trade Organization's 2020 Trade Policy Review for Indonesia identified Indonesia's import licensing regime and quantitative restrictions (under NTM category E) as particularly restrictive to trade.

The quantitative restrictions and import licensing procedures for agriculture and food products have the legal basis from the Food Law No. 18/2012 as amended in Job Creation Law No. 11/2020. The Law states that the Indonesian government prioritizes domestic production notwithstanding the price or quality of the products. Following the Job Creation Law, Ministry of Trade Regulation No. 20/2021 on Import Policies and Procedures was published to update Indonesia's import regulations, which are then revised in the Ministry of Trade Regulation No. 25/2022. The Ministry of Trade Regulation No. 20/2021 juncto Ministry of Trade Regulation No. 25/2022 replaces previous import regulations and determines the new import procedures for various regulated items, including on agriculture and food products (HHP Law Firm, 2022). It contains a breakdown of the various requirements to import a particular good, which may include an Import Approval (*Persetujuan Import* or PI), Surveyors Report (*Laporan Surveyor* or LS), or Post-Border verification (Table 6).

Table 6.
Import Regulations on Various Food Ingredients Regulated in Ministry of Trade Regulation No. 25/2022

Food Ingredients	Ministry of Trade Regulations No. 25/2022				Additional Technical Regulation
	PI	LS	Post-border	Additional requirements	
Live animal and livestock	✓		✓	<ul style="list-style-type: none"> Recommendation from the Ministry of Agriculture Proof of control of ranch/farm for buffalo, breeder cattle or feeder cattle import Statement that slaughter will be conducted in a slaughterhouse 	Ministry of Agriculture Regulation No. 41/2019 on Imports of Large Ruminants to Indonesia
Animal products (chilled or frozen meat, edible offals)	✓		✓	<ul style="list-style-type: none"> Recommendation from the Ministry of Agriculture Proof of control of cold storage (or statement that the imported product do not need cold storage) 	Ministry of Agriculture Regulation No. 42/2019 on Imports of Carcasses, Meats, Innards, or Its Derivatives for Food to Indonesia
Garlic, onion, shallot	✓	✓	✓	<ul style="list-style-type: none"> Supply, demand, and stock data Statement on capacity of appropriate transportation and storage Proof of control of transportation (ownership document and/or notarized lease agreement) Proof of control of cold storage (ownership document and/or notarized lease agreement) 	
Horticulture products (potato, carrot, chili, and various fruits and vegetables)	✓	✓	✓	<ul style="list-style-type: none"> Quantity will be approved based on supply, demand, and stock data Statement on capacity of appropriate transportation and storage Proof of control of transportation (ownership document and/or notarized lease agreement) Proof of control of cold storage (ownership document and/or notarized lease agreement) 	
Raw sugar*	✓	✓		<ul style="list-style-type: none"> Only for API-P Import Approval (PI) is carried out based on Neraca Komoditas when available 	
Refined sugar*	✓			<ul style="list-style-type: none"> Only for API-P Report of import realization in the past one year Monthly import and production plan 	Ministry of Industry Regulation No. 3/2021 on Guarantee of Raw Materials for Sugar Industry for Meeting National Sugar Demand
Salt	✓	✓		<ul style="list-style-type: none"> Quantity will be approved based on supply, demand, and stock data Statement that the import destination port is the closest to the industrial location as evidenced by Industrial Business License (<i>Izin Usaha Industri</i> or IUI) Statement of distribution/sales plan of products using imported salt 	

Milk and dairy products (including cheese, butter, fat, whey, etc.)	✓		✓	<ul style="list-style-type: none"> • Recommendation from Ministry of Agriculture • Proof of control of cold storage (or statement that the imported product do not need cold storage) 	
Flour other than from wheat or meslin (rice flour)	✓	✓		<ul style="list-style-type: none"> • Statement of production capacity of the firm, supported with address of company and address of storage warehouse • Import Approval (PI) is carried out based on Neraca Komoditas when available 	
Maize for industry	✓		✓	<ul style="list-style-type: none"> • Only for API-P • Report of import realization in the past one year • Proof of control of an appropriate storage • Statement of the firms' production capacity • Import Approval (PI) is carried out based on Neraca Komoditas when available 	

PI: *Persetujuan Import* or Import Approval

LS: *Laporan Surveyor* or Surveyor's Report, a technical verification process of the imported goods conducted by a certified surveyor for every shipment

Post-border: Verification of the import requirement after the shipment has entered the customs area, conducted by a certified surveyor for every shipment.

*Ministry of Finance Regulations No. 160/2018 allows firms that have registered and received export-oriented import facilitation privileges (*Kemudahan Impor untuk Tujuan Ekspor*) ease of import of refined sugar.

Quantitative restrictions and import licensing systems do not always go together; a product might require import licensing without limitation to the amount that can be imported. However, in food and agriculture, import licensing for most products is linked to quantitative restriction policy. The two policies significantly determine a firm's access to imported input.

Import Licensing System

Under the Ministry of Trade Regulation No. 20/2021 juncto Ministry of Trade Regulation No. 25/2022, a business identification number (*Nomor Induk Berusaha* or NIB) also serves as the business' import license, either as a Manufacturer Importer Identification (*Angka Pengenal Importir-Produsen* or API-P) or a General Importer Identification (*Angka Pengenal Importir-Umum* or API-U). The former means firms are importing solely for their own production and thus, they are prohibited from selling the imported goods to the domestic market. Meanwhile, a general importer can sell their imported goods elsewhere, either to other firms or to retailers.

For unregulated items, such as wheat (Box 1) or soybean, the NIB or API-P/API-U license allows firms to directly purchase and import without any restrictions. Firms need to then report their import realization data to the Ministry of Trade by the end of every January, April, July, October, and December (Ministry of Trade Regulations No. 20/2021 Article 30). However, for regulated food items (see Table 5), importers must obtain an import approval (*Persetujuan Impor* or PI) in addition to the NIB or API-P/API-U through the Ministry of Trade (Ministry of Trade Regulations No. 20/2021 Article 4). The PI states the NIB of the firm, HS code of the goods, the type and description of the goods, the planned import quantity and the unit, the country source of import, the destination port, and the period of validity (generally for one year) (Article 8).

Obtaining the PI can be time-consuming and costly as it often requires documents from other agencies in various levels of government.

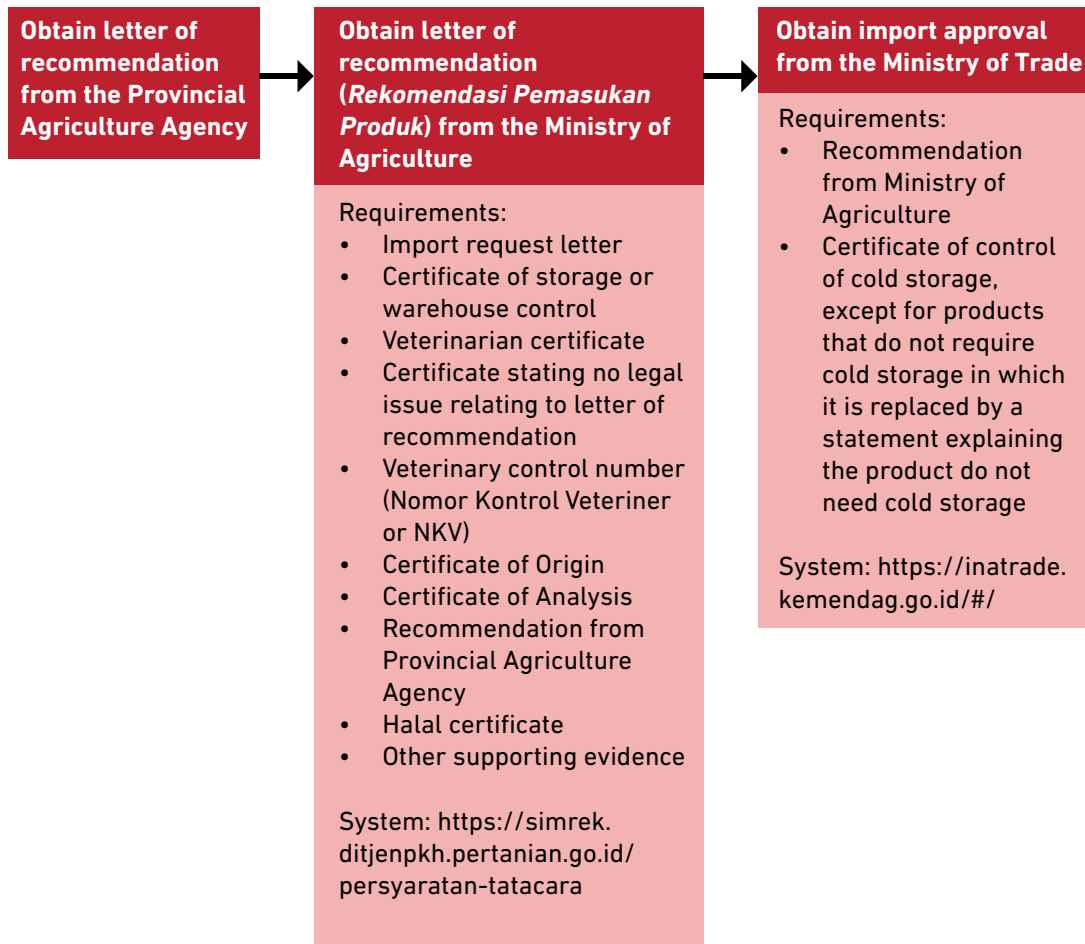
Obtaining the PI can be time-consuming and costly as it often requires documents from other agencies in various levels of government. Some products such as dairy products (elaborated in Figure 12), animal and livestock, and animal products still require import recommendations from the technical ministry in charge which often requires other documentations even including from the provincial government.

The Ministry of Trade Regulation No. 20/2021 juncto Ministry of Trade Regulation No. 25/2022 have removed many of the prior technical import requirements for some food items, such as the Ministry of Agriculture's Recommendation to Import Horticulture Product. However, as of May 2022, the technical Ministry of Agriculture Regulations No. 2/2020 on the Import Recommendation for Horticulture Products has not been revoked. The regulatory inconsistencies caused confusions for firms, as reported by the media (Timorria, 2021).

The lengthy requirements create procedural obstacles to import (International Trade Center, 2017; Amanta, 2021). Further, even after completing all the required documentations, the issuance of PI is often delayed. The delay in the issuance of import license undermines firms' ability to access imported inputs in time, which can then severely disrupt firms' production and result in significant economic loss (Rahardja & Varela, 2015).

If firms need to modify details of their import after the PI has been issued, such as regarding country source, requested amount, or port of destination, they must apply for adjustments to the PI to the Ministry of Trade. If the PI for a specific product requires recommendation from the technical ministry, firms must also request an amended recommendation again. Such inflexibility does not bode well in times of heightened risk of global supply disruptions, as felt during the Covid-19 crisis. The exporting country may suddenly halt exports or close ports which would thwart the firm's initial plan. The additional time required to amend the PI may undermine firm's ability to quickly adjust their purchasing strategy by sourcing from another country.

Figure 12.
Procedures and Requirements for Import Approval of Milk and Dairy Products



Box 1.
Indonesia's Wheat Flour Industry

Indonesia's wheat flour industry started with the establishment of the first flour milling company, PT Bogasari Flour Mills in 1971. Prior to this, the country fulfilled its demand through wheat flour imports. Bulog not only monopolized wheat imports, but was also authorized to intervene in the market, establish prices and monitor markets in all areas of the national wheat and flour trade system according to the Presidential Decision No. 142/1972. Bulog's intervention was to ensure the supply chain distribution of wheat flour and to save foreign exchange as wheat was part of the diversification program amid large imports of rice (Findi, 2017). Following the financial crisis, Indonesia signed an agreement with the International Monetary Fund (IMF) to liberalize several food commodities, including wheat. The Presidential Decision No. 19/1998 limited the duties of the Indonesian Logistics Bureau (Bulog) to rice. Thus, the procurement and sales of wheat were no longer reserved for Bulog and the private sector were not just in charge of milling.

The shift to market mechanism opened import access for new producers, which also led to higher production growth. After the deregulation, more flour mills were established. Since 1970, the number has grown more than six times, from 5 to 32 by 2022 (APTINDO, 2022). Access to raw materials is reportedly relatively easy as trade is not regulated⁴. Import duty is low – at 5%, according to the Minister of Finance Regulation No. 7/2009 concerning Import Duty Tariffs on Wheat Flour Imports (IPB University, 2020). In 2021, wheat imports reached 11.48 million metric ton. Imports mostly came from Australia (40.9%), Ukraine (26.8%) and Canada (16.7%). Based on the latest report by the Indonesian Flour Producers Association (APTINDO), domestic demand was 6.96 million metric tons (equivalent to 8.93 million metric tons of wheat). There is still an overcapacity in production since the total milling capacity is 13.1 million metric tons per year. Domestic consumption is mostly by small-medium enterprises (SMEs) and households (71%) while the rest (29%) goes to big and modern industries. Thus, wheat flour serves as a 'locomotive' used to make other food products.

Indonesia's exports are in the form of wheat flour, byproduct (wheat bran) and wheat flour-based products and amounted to \$1.19 billion in 2021. In the last 10 years, export growth ranges between 3-20% annually. Wheat flour and wheat bran, commonly used for animal feed, are mostly exported to other Asian countries. Nevertheless, exports of wheat-flour based products bring in the largest value of \$ 1.03 billion in 2021 with wafers, instant noodles and sweet biscuits being the three biggest goods.

⁴ Based on interview with APTINDO

Quantitative Restrictions

Quantitative restriction or quota is a limit on the amount of a certain good that is allowed to be imported to Indonesia. Quantitative restrictions apply to food ingredients that are considered strategic in Indonesia, including sugar, salt, maize, garlic, shallot, and chili. The quantitative restrictions are linked to the Indonesian government's ambition to achieve self-sufficiency for strategic commodities and intended to protect the domestic agriculture producers from foreign competition (Burns, Qin, & Gleeson, 2021). The import quota is established in the PI.

The quota is decided by the Ministry of Agriculture, the Ministry of Trade, or the Ministry of Industry, depending on the product, based on the estimated gap between domestic supply and the total national demand. For some commodities, this is managed through *Neraca Komoditas*, which will be explained in the next section. For example, the Ministry of Agriculture has the authority to set import quotas for horticulture products, while the Ministry of Industry who regulates the sugar mills has the authority to set the import quota for refined sugar.

The Ministries may decide to approve, partially approve, or reject the application based on the production and stock data. However, the notorious overestimation of Indonesia's production and the tendency to underestimate demand have led to a longstanding problem of quota miscalculation that causes shortages in the market (Sayaka & Erwidodo, 2013).

While the Indonesian agriculture sector does produce food ingredients domestically, the quantity, specification, and quality of the ingredients often do not meet the needs and standards of the firms (Interview Unilever; Eurocham, 2022a). Further, some firms need intermediary goods such as fruit essence, or milk powder that are not yet available in Indonesia (Interview GAPMMI). Hence, firms still need a variety of imported inputs to maintain their production, which are limited by quantitative restrictions.

Neraca Komoditas and Material Center

In 2020, the Indonesian government introduced a new licensing mechanism termed *Neraca Komoditas*, literally translated as Commodity Balance Sheet in Law No. 11/2020 on Job Creation. The system was then elaborated further in Government Regulation No. 28/2021 on Implementation of Industry Sector and in Presidential Regulation No. 32/2022 on *Neraca Komoditas*. This new import licensing system is piloted on five regulated goods—rice, salt, sugar, beef, and fisheries—starting in 2022 and will be expanded even further to more goods in the following years.

The *Neraca Komoditas* will determine the issuance of PI including the import quota based on an integrated supply and demand database (Presidential Regulation No. 32/2022 Article 2(2)). The *Neraca Komoditas* aims to revoke the requirement to obtain recommendations from technical agencies and ministries, and replace it with a unified system that can be accessed by all related ministries. The *Neraca Komoditas* has the potential to simplify and fasten the import licensing process, especially through the provision of automatic approval within a certain time period if there are no objections from the government. However, the reliance on quantity data as the primary mechanism of approving import licenses and the absence of proper evaluation of the new system are still problematic (Gupta, Pane & Pasaribu, 2020). Firms have recommended

that the *Neraca Komoditas* system take into account the quality and specification of products (Eurocham, 2022b).

Since the *Neraca Komoditas* was just rolled out in the beginning of 2022, its product coverage is still limited. For other products that do not have *Neraca Komoditas* yet, the import procedures rely on the former process as explained above.

In addition to *Neraca Komoditas*, Government Regulation No. 28/2021 also mentions a material center (Article 19), which are then elaborated further in Ministry of Industry Regulation No. 21/2021. The purpose of the material center is to provide raw and intermediate materials for small and medium businesses who do not have the capacity to import themselves. Material centers are businesses with API-U designation who are then able to supply raw or intermediate materials to small and medium businesses through a contractual arrangement. The material center also follows the import procedures as elaborated in *Neraca Komoditas*, or in the general import process in cases where *Neraca Komoditas* is not yet available.

CONCLUSION AND POLICY RECOMMENDATIONS

The food and beverage industry significantly contributes to Indonesia's economic development and has great potential to support Indonesia's goal of structural transformation of its economy. The food and beverage manufacturing firms need reliable and easy access to imported raw materials in order to process further and even to export to other markets. This manufacturing process is increasingly organized through global value chains. Yet, Indonesia's participation in the global value chain has been limited and even declining in recent years, reflected by the low share of foreign value added in Indonesia's exports. This can be attributed to Indonesia's reluctance to import, especially demonstrable in the food and agriculture sector.

Import has been associated with export, increased production, productivity, and quality of the finished products. However, this access to raw materials sourced from abroad is restricted by Indonesia's complex regulation on import process and procedures. The lengthy and unreliable import process and procedures raises compliance costs which affects production cost, often disrupts production, and limits firm's flexibility to quickly adjust their purchasing decision during a supply chain crisis. In contrast, openness to trade and import have been associated with greater resilience and economic growth.

To strengthen the position of Indonesia's food and beverage industry in the global value chain, the following policy recommendations should be considered:

- **The Ministry of Trade must clarify and simplify the import licensing procedures.** To facilitate the transition to the full implementation of the new Ministry of Trade Regulation No. 20/2021 juncto Ministry of Trade Regulation No. 25/2022, the Ministry of Trade must lead a comprehensive review of existing regulations that are contradictory. After identifying the regulations, the Ministry of Trade should coordinate with the technical ministries to amend or revoke the inconsistent regulations, such as the Ministry of Agriculture Regulation No. 2/2020.
- **The Ministry of Trade, the Ministry of Agriculture, and the Ministry of Industry must relax quantitative restrictions placed on agriculture and food products that are used for F&B manufacturing production.** Quantitative restrictions arbitrarily limit supply of raw materials and hinder firms' production. Quantitative restrictions also cannot capture the diversity of types and quality of products that a firm may need in its production. Hence, quantitative restrictions should be removed on agriculture and food products. The Ministry of Trade can look to the case of wheat, in which deregulation and openness to trade have led firms to flourish. By removing quantitative restrictions, firms with API-P should be able to immediately import without having to apply for PI.

Removal of the quantitative restrictions can be done through revision to the PI provisions in the Ministry of Trade Regulation No. 20/2021. Firms with API-P should be allowed to import without PI, similar to the policy in place for wheat and soybeans.

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- The Ministry of Trade should continue to evaluate the Neraca Komoditas and amend its role as import licensing process. Related to the removal of quantitative restrictions, the import approval process should not be linked to the data in the Neraca Komoditas. This requires a revision to Presidential Regulation No. 32/2022 Article 2(2)(a) to remove Neraca Komoditas' function as the basis for export and import consideration. Instead, the Neraca Komoditas should serve only as an integrated statistical database to inform strategic policy decisions on food stability.

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APPENDIX 1: METHODOLOGY

Input Output Method

Studying the importance of GVC in any industry is non-trivial mainly because of the data availability. Studying GVC requires detailed firm level data with information on its disaggregated imports and exports as well as domestic inputs and outputs. This data is not widely available in many countries including Indonesia.

The second best source of data to study GVC is input-output databases. Input-output data tracks industries' purchases and productions and the relationship of chains of value between industries. In the Indonesian case, the latest available input-output data is provided by the National Statistical Body, BPS. However, this database, along with the typical national input-output database, does not provide an industry level intermediate input imports.

An international input-output database is required to study GVC. That is, inputs purchased by an industry must be disaggregated by industries as well as countries. This paper resorts to the World Input-Output Database (WIOD) (Timmer, Dietzenbacher, Los, Stehrer and de Vries, 2015) to gain such information. WIOD can be seen as a connected national input-output table from many countries. It covers 40 countries and 1 Rest-of-the-World region, and 59 industries. The food industry is aggregated as Food, Beverage and Tobacco industries in the WIOD.

WIOD, as with other input-output databases, aggregates all Food, beverage and tobacco industries into one category. Amid this aggregation, we are unable to separate various subclasses of the food, beverage and tobacco industry. As noted from table 1, F&B is itself an important input source for itself. Obviously there are chains of values in the industry that are lost in the aggregation. This is still true when we look at Indonesia's national input-output table which has 185 industries.

While the Harmonized System classification (HS Code) is widely used to study trade and industry, a standard classification of goods by the stage of production is needed in order to study the global value chain. This distinction is even more important in studying F&B amid various types of product contained in the F&B aggregation. Our definition of intermediate inputs and final goods of F&B products rely on BEC Rev. 4 classification.

Autoregressive Distributed Lag (ARDL)

We use the Autoregressive Distributed Lag (ARDL) method to find the relationship between exports and imports. ARDL is an appropriate method especially because of the non-stationarity of the variables used in this study (Pesaran, Shin and Smith, 2001). Additionally, the short spell and low frequency of the data used in this paper (Pesaran, Shin and Smith, 2001). That is, the annual timeframe of around 20 observations is not enough to use more autoregressive heavy techniques. More importantly, if a firm imports intermediate products to be used for production of its export products, the import and export should happen in the same year. In this case, ARDL is more appropriate to be used compared to a Vector Autoregression, for example.

We run two ARDL estimations with two different dependent variables. The first one is final good exports, while the second is intermediate good exports. As the regressors, we use their own lag(s) accompanied by intermediate good imports and final good imports. Namely:

$$dfx_t = c_0 + \sum_{i=1}^p \alpha_i dfx_{t-i} + \sum_{j=1}^q \beta_j dintm_{t-j} + \sum_{k=1}^r \gamma_k dfm_{t-k} + \varepsilon_t \quad (\text{model 1})$$

$$dintx_t = c_0 + \sum_{i=1}^x \delta_i dintx_{t-i} + \sum_{m=1}^y \rho_m dintm_{t-m} + \sum_{n=1}^z \gamma_n dfm_{t-n} + v_t \quad (\text{model 2})$$

where dfx_t and $dintx_t$ represent the growth final good exports and intermediate good exports at time t , respectively, and $dintm_t$ and dfm_t are growth of intermediate good imports and final good imports at time t , respectively. Akaike criterion gives us a set of lags $\{p,q,r,x,y,z\}=L \in \{1,5,1,3,4,3\}$.

Tables & figures replication: <https://github.com/imedkrisna/noodle>

ABOUT THE AUTHORS

Felippa Amanta is currently a Ph.D. scholar at Oxford University. Previously, she was the Head of Research at CIPS. She also worked as a Program Associate at the Institute for Research on Labor and Employment, UC Berkeley, and at the Women and Youth Development Institute of Indonesia in Surabaya. She received her Bachelor in Sociology degree from the University of California, Berkeley, and Master of Public Administration from the Australian National University.

Dr. Krisna Gupta is an economist who uses various types of panel data regressions and other quantitative tools to evaluate international trade and investment policies as well as Indonesian manufacturing growth. He holds a Ph.D. from Crawford School of Public Policy, Australian National University, and two Masters's degrees in economics from Universitas Indonesia and VU University Amsterdam

In 2019, he was awarded the Hadi Soesastro Prize by the Australian government for his outstanding academic excellence in Indonesian development research.

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