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JPEPA, a Decade After: Evaluating the Effects in Philippine Exports using the Synthetic Control Method

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Abstract

Free trade agreements (FTAs) and regional trade agreements (RTAs), as a national policy, have proliferated in the recent decades as countries perceived trade agreements to effectively reduce trade barriers, thus helping expand market access, protect local markets, and enhance efficiency and productivity of domestic industries. Such preferential trade agreements, however, can have advantages or disadvantages. The Japan-Philippines Economic Partnership Agreement, which is the first and only FTA of the Philippines, was entered into in order to facilitate and promote free trans-border flow of goods, services, capital, and people between the two countries. Whether it was able to deliver its intended benefits and what determined its success are two focal national interests. Evaluating such agreement can be done through detailed examinations of economic conditions before and after the implementation. This requires a comparison group whose outcomes can be contrasted with the outcome of the agreement to separate the effects that are attributable to this agreement from the effects of other factors. This, however, is a rigorous and difficult task and existing approaches fall short in providing sufficient measures. In order to understand the effects of JPEPA, particularly on Philippine exports, without being hampered by the limitations in existing approaches, this paper explores the use of Synthetic control method (SCM). The results generally reveal that Philippine exports benefited from the agreement as determined by the difference in the actual exports and the counterfactual exports. Investigating the effects at the sector-level, however, yield varying results.

Keywords: *Japan-Philippines Economic Cooperation, JPEPA, Synthetic Control Method, SCM, bilateral trade agreement, Free Trade Agreement, FTA, Trade in Goods*

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JPEPA, a decade after: Evaluating the effects in Philippine exports using the Synthetic Control Method (SCM)

Mark Anthony A. Barral and Francis Mark A. Quimba***

1. Introduction

In order to strengthen economic partnership, the Philippines and Japan pursued cooperation under various fields. The Japan-Philippines Economic Partnership Agreement (JPEPA)[1] is a comprehensive economic agreement signed between Japan and the Philippines on September 9, 2006. It was ratified in the Philippine Senate two years after, on October 8, 2008, and was finally entered into force on December 11, 2008. JPEPA is the first and only bilateral agreement of the Philippines. The agreement covers a diverse number of fields and areas of cooperation (Table 1).

Table 1. Cooperation under JPEPA

Fields	Areas/Forms of Cooperation
Human Resource Development	· education and training · harmonization of competency standards
Financial Services	· promotion of regulatory cooperation in financial services · improvement of financial market infrastructure
Information and Communications Technology (ICT)	· human resource development in the ICT sector development of ICT infrastructure, ICT-related services and digital content
Energy and Environment	· improvement of utilization of energy · protection and management of the environment
Science and Technology	advanced science and technology · agriculture, forestry, fisheries and management of natural resources · human health and nutrition
Trade and Investment Promotion	· trade and investment activities, including those conducted by private enterprises
Small and Medium Enterprises (SMEs)	· strengthening of management and competitiveness of SMEs · human resource development
Tourism	· promotion and development of tourism · human resource development
Transportation	· improvement of the technology of transportation · human resource development
Road Development	· improvement of the technology of road development · human resource development

Source: PHILEXPORT 2007

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[1] Interchangeably, Philippine-Japan Economic Partnership Agreement (JPEPA); but for consistency, JPEPA will be used throughout this paper.

Anchored on three pillars of liberalization, facilitation, and cooperation, JPEPA aims to facilitate and promote free trans-border flow of goods and services, capital, and people across Japan and the Philippines, and to strengthen the existing ties between the two. With the proliferation of bilateral agreements due to the slower progress in the WTO in facilitating trade, as globally observed, the Philippines took a similar action in advancing its relationship with Japan (PHILEXPORT 2007). As a comprehensive economic partnership, it does not only concern eliminating tariff and non-tariff barriers but emphasizes cooperation in various areas. It is also considered one of the "new age" FTAs, developed to address the pressures of regionalism, globalization and technological progress (Medalla et al. 2007).

Prior to the signing of the Agreement, the Philippines' total value of trade with Japan amounted to US$15,188 million in 2006, with a three-year average of US$15,374 million from 2004-2006. The top exports of Philippines included electronic products, woodcrafts and furniture, ignition wiring sets, fresh bananas, and iron ore agglomerates. Imports, on the other hand, included electronic products, industrial machinery and equipment, transport equipment, iron and steel, and telecommunication equipment and electrical machinery.

Japan has been one of the top sources of the country's foreign direct investment, with an estimated total of P143.5 billion from 2000 to 2006 alone (SEPO 2007). More recent figures show that Japan, with an average annual share of about 18.8 percent is among the top 10 source countries of approved investments from 2012 to 2016.The Bureau of Investments (BOI) further projected that FDI from Japan would reach P559 billion between 2007 and 2016, generating more than 35 thousand more jobs (Table 2).

Table 2. Projected increase in Japanese FDI to the Philippines

Particulars	1995-2005	2007-2016
Project Cost (in billion PhP)	137	559
Employment	35,731	35,477
Revenue (in billion PhP)	4.75	4.72

Note: Latest estimate from BOI enabling estimation of direct employment and revenue (withholding, other taxes and licenses) for the projected period.
Source: Adopted from the Department of Trade and Industry (as cited in SEPO 2007)

With regard to exports of goods, Philippine exports to Japan was projected to increase up to 13 percent in 2011. With JPEPA, however, it was expected to reach between 16 to 20 percent from an initial 9 to 9.5 percent (Table 3).

Table 3. Projected increases in exports (in billion US$)

Year	Projected Annual Growth Rate		
	Without JPEPA* (10%)	With JPEPA	
		Low (15%)	High (20%)
2007	8.71	9.08	9.47**
2008	9.62	10.44	11.37
2009	10.63	12.00	13.64
2010	11.76	13.81	16.37
2011	13.00	15.88	19.64

*Based on average growth from 2001 to 2006 (annualized January – August) of 10.4% compared to total Philippine exports average growth of 13%
**Based on Philippine Export Development Plan (PEDP) Projections
Source: DTI as cited in SEPO 2007

1.1 Objectives of the study

The interest of this paper falls particularly on export promotion. This study assesses the contribution of JPEPA to Philippine export of goods. Specifically, this study aims to

1. Explore the potential determinants of Philippine exports to Japan;
2. Evaluate the effect of JPEPA using synthetic control method;
3. Determine how similar agreements have contributed to the exports of selected export partners of Japan.

1.2 Significance of the study

Pursuing trade agreements and economic cooperation have been adopted as national policies to expand trade and stimulate economic development for a number of East Asian countries (Kawai M. & Wignaraja, G. 2010).

Particularly for the Philippines that aims to promote its position in the global platform, understanding how a bilateral trade agreement affected its exports to one of its major partners should be an important interest. This research supports the Philippine strategy of utilizing existing FTAs as a means of increasing both its agricultural and manufacturing exports (NEDA 2011; NEDA 2017).

The proliferation of trade agreements and its evolution from a traditional to a "new age" agreement also suggest that more economies have perceived it to be more beneficial as trade liberalization under the WTO has progressed very slowly (Urata 2005). For the Philippines, the assessment on the benefits of Philippine FTAs has shown mixed results (Wignaraja, Lazaro and De Guzman 2010; Aldaba 2015; Aldaba 2017). This study provides a different perspective on assessing the impact of Philippine FTAs by looking at the impact on exports to Japan

In addition, this paper contributes to the body of knowledge on the impact assessment of FTAs through the use of a novel method of calculating a counterfactual for the exports[2]. Research on the impact of FTAs at a micro-level has relied on surveys of establishments to understand FTA utilization rate (Wignaraja, Lazaro and De Guzman 2010; Aldaba 2015; Aldaba 2017). Given the difficulty of conducting firm-level surveys, the researchers explored using country data to assess the impact of FTAs using SCM.

[2] Other researches (Navarrete and Tatlonghari 2018) have explored utilizing a gravity model to estimate the benefits of an FTA however their method does not resolve the identification problem common to impact evaluation studies. Yotov et al. (2016) presents a methodology of using the gravity model to calculate for counterfactuals and estimate the impact of trade agreements.

1.3 Limitations of the study

This study aims to evaluate the performance of trade exports of the Philippines to Japan considering only its own-specific attributes, with reference to the exports and attributes of the other export partners of Japan. Imports and importer-specific attributes are not considered in the analysis as this paper wishes to focus on the expansion of the Philippines' access to Japanese market

The analysis is also limited to the effects of JPEPA on trade and the paper does not consider other areas of cooperation and provisions in the agreement. This is because of the limited information and data quantifying the other areas of cooperation and provisions in the agreement.

2. Coverage of JPEPA and Areas of Cooperation

The agreement contains salient provisions on investments, trade, movement of Filipino professionals, and other provisions related to competition policy, government procurement, and dispute settlement (SEPO 2007). These provisions cover 15 areas (PHILEXPORT 2007), including:

a. *Trade in Goods* – reducing and eventually eliminating tariffs on industrial and agricultural products
b. *Emergency Measures* – providing rules to address serious injury or threats from increased imports
c. *Rules of Origin* – determining the originating foods for which preferential tariff treatment will be accorded
d. *Customs Procedures* – provides for information exchange and cooperation to facilitate trade through simplified and harmonized customs procedures, including maximizing the use of ICT
e. *Paperless Trading* – sharing of information on best practices and encouraging cooperation between private entities
f. *Mutual Recognition* – facilitates trade in electrical products and other products such that both parties shall accept the results of conformity assessment as conducted by the other party
g. *Trade in Services* – provides standstill obligation or liberalization of services sectors, including outsourcing, air transport, health and social services, tourism and travel, maritime transport, telecommunications and banking
h. *Investment* – provision on national treatment, MFN, and prohibition of performance requirements for the liberalization of investment, and on enhancement of transparency by specifying all exceptions to these provisions
i. *Movement of Natural Persons* – Easing the entry of qualified Filipino nurses and certified caregivers through language training, providing clear guidelines on the exercise of profession/occupation
j. *Intellectual Property* – enhances the understanding of protecting the intellectual property, given Japanese practices; includes cooperation and appropriate protection and enforcement elements
k. *Government Procurement* – increases the transparency of government procurement laws, regulations, and procedures and possible liberalization of government

procurement activities in accordance to the development, financial, and trade needs of both parties

l. *Competition* – ensuring protection of fair competition, including measure to promote competition by addressing anticompetitive activities and through cooperation
m. *Improvement of the Business Environment* – encourages cooperation to improve business environment; efficient and timely resolution addressing issues affecting Japanese and Filipino enterprises through a series of consultations
n. *Cooperation* – provision of bilateral economic assistance in ten fields within the context of Official Development Assistance (ODA)
o. *Dispute Avoidance and Settlement* – provides a mechanism to address dispute between the two governments on the interpretation and implementation procedures while relying on the primacy of consultations

The 13th and 14th provisions are not typical of a traditional trade agreement, making JPEPA to be considered comprehensive and termed as a "new age" FTA. New age FTAs, accordingly, are developed in response to the pressures of growing trends in regionalism, with globalization and technological progress (Yap et al. 2006, in PHILEXPORT 2007).

On investment, the two parties agreed to accord national treatment and most-favored-nation treatment to the investors of each party, except for investments that are reserved for Filipino nationals and that may conflict with the existing foreign ownership policy, among others. Also, it is provided that neither party can impose or enforce research and development requirement, technology transfer and hiring and appointment of nationals in higher positions such as executives, managers, or board member, for investment activities (SEPO 2007).

On trade, a total of 5,968 lines are included in the Philippine's JPEPA tariff schedule. 3,947 lines (66 percent) of these are subject to immediate tariff elimination. 32 percent are subject to gradual reduction from five to ten years. The rests are either for renegotiation or special tariff treatment. Tariff lines of 0.10 percent are excluded from the agreement (Table 4).

Table 4. Philippine tariff commitments in JPEPA

Legend	Category	Number of Lines	% of Total Lines
A	Immediate tariff elimination	3,947	66.14
B4	Equal annual tariff reduction starting 2006, final reduction on 2010	97	1.63
B4**	Tariff elimination on the 1st day of the 5th year (2011)	2	0.03
B5	5 years or six annual installments	230	3.85
B5*	5 years, 1-year grace period, 5-equal annual installments	220	3.69
B5**	One single installment at the beginning of the 6th year	14	0.23
B7	7 years or 8 equal annual installments	2	0.03
B10	10 year or 11 equal annual installments	1,077	18.05
B10*	10 years, 1-year grace period, 6 equal annual installments	154	2.58
B10**	10 years, 5 years grace period, 6 equal annual installments	103	1.73
R	Renegotiation	24	0.4
S	Special treatment tariff	92	1.54

X	Excluded from any commitment of preferential or renegotiation	6	0.1
	Total	5,968	100

Source: Philippine Tariff Commission (as cited in SEPO 2007)

Of the tariff lines subjected to immediate elimination, 92 percent are industrial goods (Table 5), including machinery and mechanical appliances, electrical machinery and equipment, clothing and textiles, organic chemicals and pharmaceutical products, and other miscellaneous manufactured products.

Table 5. Philippine imports under "A" category subject to Philippine tariff schedule

Sector	Share to Total "A" Lines (%)	2005 RP Imports from Japan (in thousand US$)
Agriculture	8.41	3,121
Industrial	91.59	2,271,702
Total	100	2,274,823

Source: Philippine Tariff Commission (as cited in SEPO 2007)

On the other hand, there are a total 7,476 lines of Philippine exports under Japan's commitments. 80 percent of these are subjected to immediate tariff elimination (Table 6).

Table 6. Japan tariff commitments in JPEPA

Legend	Category	Number of Lines	% of Total Lines
A	Immediate tariff elimination	5,994	80.17
B3	3 years or 4 equal annual installments	3	0.04
B5	5 years or six annual installments	148	1.98
B7	7 years or 8 equal annual installments	140	1.87
B10	10 year or 11 equal annual installments	368	4.92
B15	10 years, 1-year grace period, 6 equal annual installments	48	0.64
P	Special tariff treatment	26	0.35
Q	Tariff rate quota	11	0.15
R	Renegotiation	215	2.88
X	Excluded from any commitment of preferential treatment or renegotiation	522	6.98
	Total	7,476	100

Source: Philippine Tariff Commission (as cited in SEPO 2007)

93 percent of these exports are industrial products (Table 7), such as office machines & automatic data processing machines, electrical machinery and parts, road vehicles, telecommunication and sound recording equipment, textile yarn fabrics and clothing apparels (e.g. knitted and crocheted fabrics) and inorganic chemicals and pharmaceutical products (SEPO 2007).

Table 7. Philippine exports under "A" category subject to Japan tariff schedule

Sector	Share to Total "A" Lines (%)	2005 RP Exports to Japan (in thousand US$)
Agriculture	6.68	144,539
Industrial	93.32	575,205
Total	100	719,744

Source: Philippine Tariff Commission (as cited in SEPO 2007)

The tariff elimination applied to the Philippine exports to Japan is presented in Table 8. Prior to the enforcement, 3,714 tariff lines (41.7% of Japan's tariff) were already duty-free on an MFN basis. When the agreement was entered into force, the number increased to almost double, adding addition 3,598 lines, equivalent to 40.4 percent in Japan's schedule. In other words, immediately after the agreement was entered into force, 90% of imports from the Philippines are free of duties. The remaining lines are gradually subjected until 2023.

Table 8. Tariff elimination commitments under the Agreement and corresponding average trade (for Japan)

Duty phase-out period	Number of Lines	% of total lines in Japan's tariff schedule	Value of Japan's imports from Philippines (2004-2006) in million US$	% of Japan's total imports from Philippines 2004-2006
MFN duty free (2008)	3,714	41.7	6,220.40	80.9
2008-2010	3,598	40.4	699.8	9.1
2011-2012	4	0	0.3	0
2013-2014	175	2	60.5	0.8
2015-2016	171	1.9	6	0.1
2017	1	0	0	0
2018-2022	377	4.2	32.3	0.4
2023	58	0.7	0.1	0
Remain dutiable	814	9.1	673.3	8.8
Total	8,912	100	7,692.60	100

Note: Based on the HS 2002 nomenclature. Calculations exclude tariff lines having an in-quota rate
Source: WTO 2010

Looking at how these rates are applied to Philippine products according to the type of goods as classified in the HS 2002 nomenclature, more than half of the lines immediately subjected into tariff elimination are textiles, followed by chemicals (Table 9).

Table 9. Tariff elimination under the Agreement, by HS section (for Japan)

HS section	MFN avg. %	Total No. of lines	MFN 2008	Number of duty-free lines							No. of lines remaining dutiable	Avg. final tariff (dutiable)
				2008-2010	2011-2012	2013-2014	2015-2016	2017	2018-2022	2023		
I Live animals and animal products	8.4	508	109	60	1	69	25		4		240	15.3[a]
II Vegetable products	6.1	526	165	142		38	35		39	12	95	20.5[a]
III Animal or vegetable fats and oils	3.8	85	20	21		6			2	2	34	14.8[a]
IV Prepared foods etc.	16.4	761	77	56	3	43	70		133	44	335	23.3[a]
V Minerals	0.5	219	166	27		7			18		1	-
VI Chemicals and chemical products	2.3	1,034	403	620		1	1		3		6	13.2[a]
VII Plastics and rubber	2.4	296	103	170		6			17			
VIII Hides and skins	10.4	196	66	3			32	1	66		28	17.7
IX Wood and articles	3.4	233	83	72		3			37		38	6.6
X Pulp, paper etc.	0	172	172									
XI Textiles and textiles articles	6.5	2,058	86	1,966							6	-
XII Footwear, headgear	16.3	111	6	26			4		44		31	25.8
XIII Articles of stone	1.1	160	100	59					1			
XIV Precious stones, etc.	1.3	80	58	17					5			
XV Base metals and base metals products	0.9	842	604	230		2			6			
XVI Machinery	0.1	959	945	14								
XVII Transport equipment	0.1	147	146	1								
XVIII Precision equipment	0.2	294	285	6			3					
XIX Arms and ammunition	6.9	24	24									
XX Misc. manufactured articles	1.7	200	113	84			1		2			
XXI Works of art, etc.	0	7	7									
Total	**4.8**	**8,912**	**3,714**	**3,598**	**4**	**175**	**171**	**1**	**377**	**58**	**814**	**19.2**

Note: Based on the HS 2002 nomenclature; for tariff lines subject to TRQs only the out-of-quota duty is included in the tariff-related calculations.; a Combination of *ad valorem* and specified duties; - Specific duty.
Source: WTO 2010

2.1 FTAs and EPAs of Japan

Apart from the Philippines, Japan has several other bilateral agreements. Urata (2005) identified two motivations for Japanese negotiation of FTAs: promoting economic growth in East Asia and improving the business environment for Japanese firms. Currently, there are 16 bilateral agreements in force; the first is with Singapore, concluded in 2000, and the latest is with Mongolia in 2016 (Table 10).

Table 10. List of Bilateral Agreements of Japan

Partner	Year Signed	Year in Force
Singapore	2002	2002
Mexico	2004	2005
Malaysia	2004	2006
Philippines	2006	2008
Indonesia	2008	2008
Chile	2007	2007
Thailand	2007	2007
Brunei	2007	2008
Viet Nam	2009	2009
Switzerland	2009	2009
India	2011	2011
Peru	2011	2012
Australia	2014	2015
Mongolia	2015	2016
EU	2018	2019
ASEAN	2008	2008
TPP	2016	Discontinued

Source: ARIC Database[3]

These bilateral agreements with Japan contain varied number of provisions. Common to all is the provision on market access of goods, trade facilitation, rules of origin, services, dispute settlement, and institutional mechanism; although each chapter may contain different specific agreements across partner economies. On the other hand, the coverage of these agreements vary on other chapters, particularly on NTMs, government procurement, e-commerce, labor standards, environmental policy, and technical cooperation, among others (Table 11).

Table 11. Provisions under different agreements with Japan

Chapters	ASEAN	BRU	IND	IDS	CHL	MYS	MEX	MON	PER	PHI	SNG	CHE	THA	VNM
Market access of goods	•	•	•	•	•	•	•	•	•	•	•	•	•	•
NTMs	•	•	•	•	•	•	•	-	•	•	•	-	•	•
Trade facilitation	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Export measures	-	•	•	•	•	•	•	•	•	•	•	•	•	•
Rules of origin	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Services	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Investment	-	•	•	•	•	•	•	•	-	•	•	•	•	•
Government Procurement	-	•	•	•	•	-	•	•	•	•	•	•	•	•
Competition Policy	-	-	•	•	•	•	•	•	•	•	•	•	•	•
Intellectual Property	-	•	•	•	•	•	•	•	•	•	•	•	•	•
E-commerce	-	-	-	-	-	-	-	•	-	•	•	•	-	-
Dispute settlement	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Labor Standards	-	-	-	-	-	•	-	-	-	•	-	-	-	-
Environmental Policy	-	•	•	•	•	•	•	-	•	•	-	•	•	-
Technical cooperation	•	•	-	•	-	•	•	•	•	•	•	-	•	•
Institutional Mechanism	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Other measures	-	•	-	•	•	•	•	-	-	-	-	-	-	•

Note: "•" with provision, "-" no provision; CHE = Switzerland
Source: Compiled from ADB-ARIC 2019 database

[3] Asian Development Bank - Asia Regional Integration Center, https://aric.adb.org/database/fta, accessed on March 5, 2019

2.2 Japanese Exports and Imports Trade

Japan's world export from 2015 to 2017 averaged to US$655.97 billion, while world import averaged to US$ US$634.66. Apart from these economies that Japan is having bilateral relationship with, it is also trading with about 200 other countries. Based on average annual traded value from 2015 to 2017, 12 out of its top 20 export partners and 13 out of the top 20 import partners have no bilateral agreement with Japan.

Table 12. Top 20 exports and imports partners of Japan, average annual values (2015-2018), in billion US dollar

Country	Export Values	Country	Import Values
China	137.10	China	158.43
United States	53.87	United States	135.31
Korea, Rep.	26.81	Korea, Rep.	50.76
Australia*	22.40	Hong Kong, China	34.83
Thailand*	21.86	Thailand*	32.30
Germany	20.97	Germany	25.63
Indonesia*	17.84	Singapore*	20.35
Malaysia*	17.18	Mexico*	17.16
Singapore*	16.16	Australia*	15.69
Vietnam*	15.19	Vietnam*	15.40
Russian Federation	11.93	Malaysia*	14.40
Philippines*	11.10	Indonesia*	14.14
Qatar	10.58	Canada	12.49
Hong Kong, China	8.32	United Kingdom	12.14
Canada	8.30	United Arab Emirates	11.89
Switzerland*	7.45	India*	11.06
United Kingdom	7.09	France	10.68
France	7.02	Philippines*	10.04
Italy	6.70	Belgium	9.58
Chile*	5.96	Netherlands	8.34
Brazil	4.76	Russian Federation	8.07
India*	4.36	Saudi Arabia	7.05
South Africa	4.02	Switzerland*	4.40
Netherlands	3.81	Spain	4.22
Ireland	3.80	Brazil	4.14
Belgium	3.72	Italy	3.93
Mexico*	3.51	Turkey	3.86
Spain	2.78	Poland	3.31
New Zealand	2.15	Czech Republic	2.70
Sweden	2.14	New Zealand	2.69
Brunei*	1.98	Austria	2.27
Peru*	1.61	Chile*	2.17
Denmark	1.45	Israel	2.08
Austria	1.38	South Africa	2.07
Norway	1.25	Peru*	1.05
Norway	1.25	Mongolia*	0.38
Mongolia*	0.02	Brunei*	0.16

* bilateral trade partners of Japan
Source: UN Comtrade Database

3. Methodology

3.1 The Synthetic Control Method

The synthetic control method (SCM) was first proposed in the seminal works of Abadie and Gardeazabal (2003), Abadie et al. (2010), and Abadie et al. (2015) to estimate the impact of a treatment.

Following Abadie et al. (2010), the model assumes a J+1 regions, with which the first region is exposed to an intervention or treatment. The remaining J regions can be the potential controls or the "donor pool". The model assumes following:

- Y_t^N is the outcome that would be observed for region i at time t in the absence of intervention, for units i=1, …, J+1, and time periods t=1, …, T.
- T_0 is the number of pre-intervention periods, with $1 \leq T_0 < T$.
- Y_t^I is the outcome that would be observed for unit I at time t if unit i is exposed to the intervention in periods T_0 + 1 to T.
- The intervention is assumed no effect on the outcome prior to the intervention period, so for $t \in \{1, \dots, T_0\}$ and $i \in \{1, \dots, N\}$, $Y_t^I = Y_t^N$.
- $\alpha_{it} = Y_t^I - Y_t^N$ is the effect of the intervention for unit i at time t, and D_{it} is an indicator that tales the value of 1 if the unit i is exposed to the intervention at time t, and takes 0, otherwise. The observed outcome for unit i at time t is then $Y_{it} = Y_t^N - \alpha_{it} D_{it}$. Since the first region (region "one") is exposed to the intervention only after period T_0 (with $1 \leq T_0 < T$):

$$D_{it} = \begin{cases} 1 \text{ if } i = t > T_0, \\ 0 \text{ otherwise.} \end{cases}$$

The aim is to estimate $(\alpha_{1T_0+1}, \dots, \alpha_{1T})$. For $t > T_0$,

$$\alpha_{1t} = Y_{1t}^I - Y_{1t}^N = Y_{it} - Y_{1t}^N.$$

Because Y_{1t}^I is observed, to estimate α_{it} requires estimating the Y_{1t}^N. It can be assumed that Y_{it}^N is given by the factor model:

$$Y_{it}^N = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it},$$

where δ_t is an unknown common factor with constant factor loadings across units, Z_i is a $(r \times 1)$ vector of observed covariates (not affected by the intervention), θ_t is a $(1 \times r)$ vector of unknown parameters, λ_t is a $(1 \times F)$ vector of unobserved common factors, μ_i is an $(F \times 1)$ vector of unknown factor loadings, and the error terms ε_{it} are unobserved transitory shocks at the region level with zero mean.

Abadie et al. (2010) further discussed that $(J \times 1)$ the vector of weights $\mathbf{W} = (w_2, \dots, w_{J+1})'$ such that w$j \geq 0$ for j = 2, …, J+1 and w2+…+ wJ+1 = 1. This means that the weights as originally suggested by Abadie et al. (2010) are non-negative and sum up to one. Each

particular value of **W** represents a potential synthetic control or weighted average of control regions. The weights are, therefore, chosen to match both the pre-treatment outcomes and a set of fixed characteristics (Doudchenko and Imbens 2016). The value of the outcome variable for each synthetic control indexed by **W** is:

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \delta_t + \theta_t \sum_{j=2}^{J+1} w_j Z_t + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{jt}.$$

Supposing that there are $(w_2^*, \dots, w_{J+1}^*)$ such that

$$\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11}, \qquad \sum_{j=2}^{J+1} w_j^* Y_{j2} = Y_{12}, \qquad \dots,$$

$$\sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0}, \qquad \text{and} \qquad \sum_{j=2}^{J+1} w_j^* Z_j = Z_1.$$

Thus, the weights are determined to minimize the root mean square predictor error (RMSPE), which measures the lack of fit between the path of the outcome variable for the donor pool and its synthetic counterpart (Abadie and Gardeazabal 2003 and Abadie et al. 2010, in Abadie et al. 2015), and can be defined as

$$RMSPE = \left(\frac{1}{T_o} \sum_{t=1}^{T_o} \left(Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \right)^2 \right)^{1/2}$$

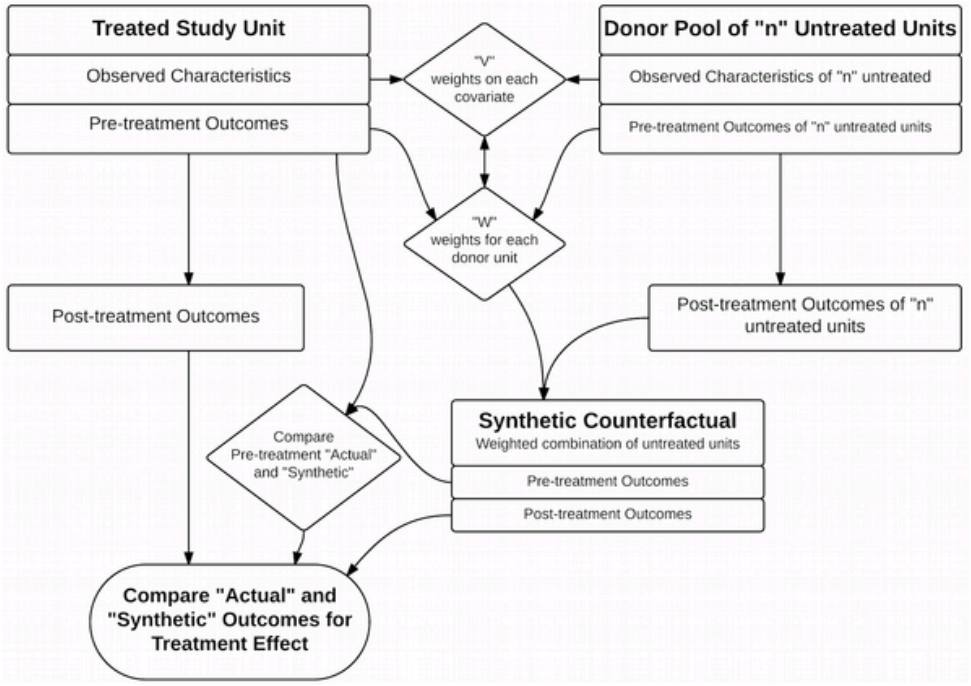
The treatment or intervention effect can then be estimated by

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \qquad \forall \quad t \in \{T_0 + 1, \dots, T\}.$$

The first step in employing the SCM begins in identifying the different units involved in the analysis, particularly the treated unit (the unit that is affected by the intervention) and the pool of untreated units (donor pool or the set of potential control units), and the outcome of interest that is observed both in the pre- and post-treatment. The donor pool or control units are determined to be similar to the treated units in terms of the factors that might generate the outcome. Both treated and untreated units contain observed and pre-treatment outcomes, as well as post-treatment outcomes. The SCM select weights (W) from these potential control units to define a linear combination of the control outcomes or the synthetic control. The weights determine the impact estimate, which is the difference between the weighted average, or synthetic, outcome and the treated unit outcome. Recall that the outcome (Y) is dependent on both observed (Z) and unobserved (U) factors (Y=BZ + U). The SCM would determine the weight W that could result to similar Y, Z, and U in the pre-treatment period. Since all

differences cannot be minimized at the same time except for some combination of characteristics and outcomes differences, another vector V is used to assign weights to Z variables and to each year in the pre-treatment Y. The next steps will then to compare the pre-treatment "actual" and "synthetic" outcomes, and the "actual" and "synthetic" outcomes for treatment effect. How closely the weighted synthetic outcomes match the outcomes for the treated unit in the pre-treatment period determines the quality of the synthetic control (Sills et al. 2015).

Figure 1. Flow diagram for SCM



Source: Sill et al. 2015

As have been mentioned, using this donor pool, the synthetic export trade between the Philippines and Japan will be constructed by getting the weighted average of past observable covariates and past realizations of the outcome variable. In order to determine the covariates to be used, the gravity model can be used to explain the bilateral trade between the treated unit and use the determinants of trade from the model as the covariates and the exports between the country pair as the outcome variable to create the counterfactual outcome. The gravity model is expressed by

$$x_{ijt} = G_t M_{jt}^{ex} M_{jt}^{im} \emptyset_{ijt}$$

where $M_{jt}^{ex}$and $M_{jt}^{im}$are indexes of the attributes of exporter i and importer j in year t, representing specific factors that represent the total amount exporters are willing to supply and the importer's total demand. $G_t$is a common year-specific factor of trade that does not depend on i or j. $\emptyset_{ijt}$ represents the variation in trade intensity or the ease of market access (Hannan 2016).

3.2 The Advantages of Using SCM

In evaluating the effectiveness and efficiency of policies, economic conditions before and after the policies (treatment) are implemented are compared. This require a comparison (control) group from which the outcomes can be compared or contrasted with the outcome of the region (treated observation) undergoing the policy. Determining the control group can be a difficult task but without it, isolating the effects of the policy from the effects that are not attributable to it can be impossible. In many cases, geographic proximity is used to determine the control group for the lack of alternatives but this is a poor measure of similarity and cannot capture the differences in political or cultural attributes. Spillover of effects should also be considered. Moreover, the use of existing and usually qualitative approaches can limit the generalization of analysis as few quantitative results can be applied to similar cases (McClelland and Gault 2017). The SCM approach of Abadie and Gardeazabal (2003), Abadie et al. (2010), and Abadie et al. (2015) have gained increasing popularity in the field of policy evaluation as it addresses these issues. McClelland and Gault (2017) identified the following as the strengths and assumptions of SCM:

Strengths

a. The SCM is transparent. The analyst can evaluate how well the synthetic control's outcome matches the affected region's outcome before the policy change.
b. The donor regions and the weights assigned to them are known, and analysts can evaluate those regions' similarity to the policy region.
c. It does not require the same strict assumptions for accurate estimation as difference-in-differences or panel data methods.[4]

Assumptions

a. No region in the pool of potential donor regions can have a similar policy change.
b. The policy in the affected region cannot affect the outcome in the pool of donor regions.
c. To avoid possible interpolation bias, the variables used to form the weights must have values for the donor pool regions that are similar to those for the affected region.
d. The values of those variables for the policy region cannot be outside any linear combination of the values for the donor pool. (The treatment region cannot be an outlier in the pretreatment period.)
e. Those variables and the outcome must have an approximate linear relationship. (The variables used in the pretreatment period for the donor pool must be comparable to that of the treatment region.)

[4] The difference-in-differences (DID) assumes that the trend of the control group provides an adequate proxy for the trend that would have been observed in the absence of the treatment. The difference in slope would be the actual treatment effect. The DID, therefore requires that the trends of the control group and the treated unit follow the same path during the pre-treatment period. Trade, flows, however might have not followed parallel trends. Even without a trade agreement, trade flows tend to change due to changes in observed and unobserved country-specific attributes.

3.3 Data and the Donor Pool

This paper employs the SCM to understand the bilateral export of Philippines to Japan under the JPEPA. JPEPA, therefore, is the "treatment" while the country pair and "treated unit" is Philippines-Japan. In order to construct the counterfactual, a donor poll, or the control group, must be determined. Following Hannan (2016), the donor pool should not include similar treatment; the donor pool for each treated unit, the donor pools should exclude all the country pairs that had a trade agreement in the same year, and it should also exclude all other agreements that the exporting country has with other countries (Hannan 2016). Considering thise criteria, the donor pool is composed of countries exporting to Japan, excluding those with existing bilateral trade agreements with Japan from 2008 to 2018. Hypothetical exports of Philippines to Japan (as the treated unit) will therefore be reconstructed based on the exports of these countries to Japan.

4. Results and Discussion

4.1 Gravity Model Estimates

Before proceeding to the main procedure, the paper tries to examine first the Philippine exports using gravity model (Annex #). The model was estimated using the intuitive OLS procedure, fixed effects, and the Poisson Pseudo-Maximum Likelihood (PPML) estimator. The results of the first OLS estimation showed expected signs and are statistically significant, particularly the exchange rate, lag of exports, GDP of partner economy, and per capita of exporter. The OLS, however, is not enough to capture the fixed effects. Considering the country-pair fixed effects revealed that the area and distance of exporters are important determinant of trade to Japan. Remoteness is notably positive, which may indicate that regions that are more isolated from the rest of the world tend to trade more with each other, as is the case of Philippines and Japan.

The results of the OLS estimation reveal that exports to Japan are strongly and positively affected the GDP of Japan in the previous year, and the prevailing exchange rates in the exporting countries. Exports, however, are negatively affected by the GDP of exporting countries during the previous year. The results of the fixed effects and PPML estimations, on the other hand, both reveal that exports to Japan positively affected by the geographical size and remoteness of exporting country, while distance negatively affected the exports to Japan. Exports during the previous year positively and strongly affected the exports as revealed in all the estimations, while the PPML estimation reveals that the interaction between exporting countries is also important determinant.

4.2 Results of the SCM Procedure

Using the SCM, the effects of JPEPA on Philippine exports are examined. First, the aggregate exports to Japan are evaluated using different combination of covariates. These combinations are classified in this paper as SCM models. An "eyeball test" and robustness check can be done. The root mean square prediction error (RMSPE) measures the goodness-of-fit to gauge the difference between the actual and the predicted (synthetic) values. Weak predictors, or using outcome variables from problematic pretreatment years as predictors, or using predictors for the treated pair with values that are extreme relative to the donor pool may result to a poor fit (McClelland and Gault 2017). The RMSPE, therefore, indicates how the model is able to approximate (or reconstruct) the actual values during the pre-treatment period and how this

information is used in order to construct the hypothetical pattern during the treatment period should the treatment have not been implemented.

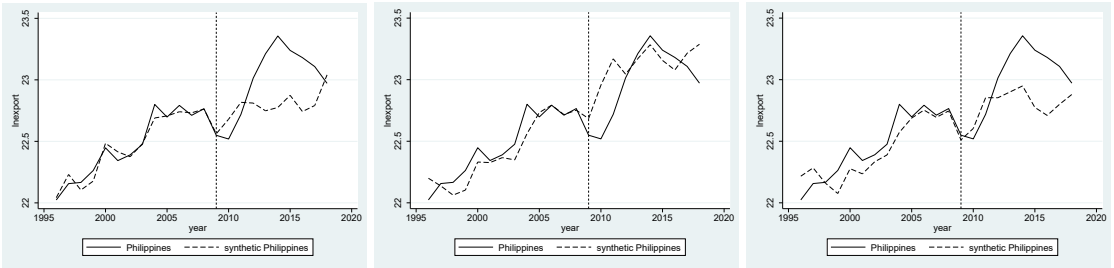
The results of the SCM procedures for the aggregate exports reveal that JPEPA generally contributed to the growth of Philippine exports to Japan (Table 13).

Table 13. SCM specification and robustness

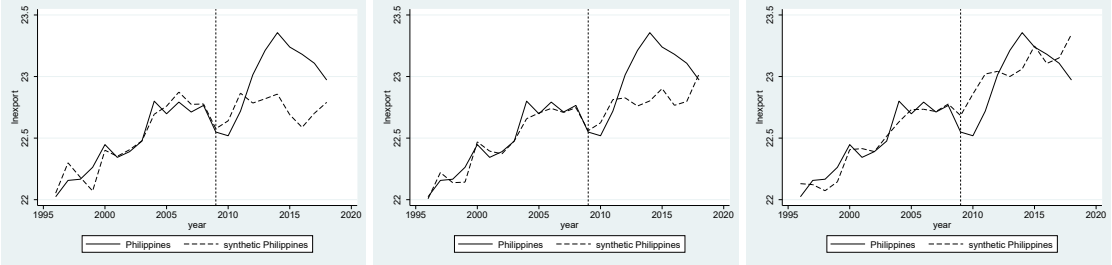
Variables	I	II	III	IV	V	VI	VII	VIII	IX
Exports value (ln)	✓	✓	✓	✓	✓	✓	✓	✓	✓
GDP of exporters (ln)	✓	✓		✓	✓	✓	✓	✓	
GDP per capita of exporters (ln)	✓	✓					✓	✓	
Population of exporters (ln)	✓	✓		✓	✓		✓	✓	
Exchange rate (ln)	✓	✓		✓			✓	✓	
Distance (ln)	✓		✓	✓	✓	✓	✓		✓
Area (ln)	✓		✓	✓	✓	✓	✓		✓
Landlocked (Dummy)	✓		✓	✓	✓	✓	✓		✓
Remoteness (ln)	✓		✓	✓	✓		✓		✓
Lag of exports					✓		✓	✓	✓
Lag of GDP							✓	✓	
Lag of per capita GDP							✓	✓	
Lag of population							✓	✓	
RMSPE	**.0546188**	.105035	.1162155	**.**0820717	**.0564138**	**.**077798	.0850199	.1052392	.1180626

SCM models 1 and 5 appeared to best describe the counterfactual exports but results of 4, 6, and 8 are also plausible. These can be examined using the following figures (Figure 2).

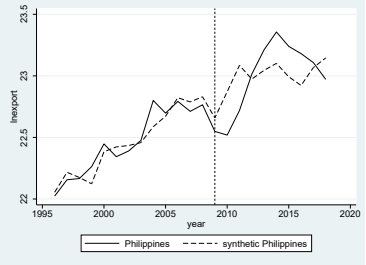
Figure 2. Synthetic counterfactual results for Philippine exports to Japan



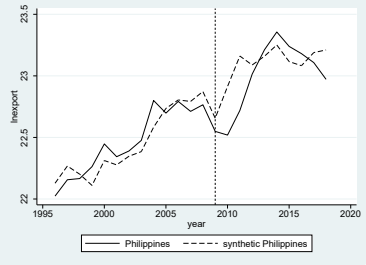
I II III



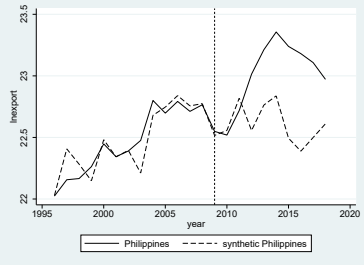
IV V VI



VII



VIII



IX

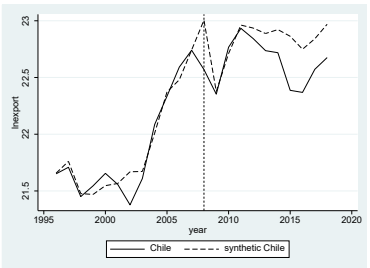
Using the models I and V, the same procedure was done to compare the effects of bilateral agreement with Japan to the exports of its other selected bilateral trade partners (Figure 3). Since the trade agreements of these countries Japan were signed and entered into force on different years, the treatment periods used in employing the SCM for these exporters vary. Table 14 presents the data of signing and effectivity of each agreement and the treatment period in employing SCM for these agreements in Figure 2.

Table 14. Date of effectivity and treatment period for selected pairs

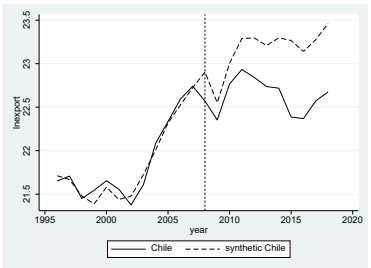
Trading Pairs	Signed and In Effect[5]	Treatment Period
Philippines-Japan	Dec-08	2009
Chile-Japan	3-Sep-07	2008
India-Japan	1-Aug-11	2011
Indonesia-Japan	1-Jul-08	2008
Switzerland-Japan	1-Sep-09	2010
Thailand-Japan	1-Nov-07	2008

Figure 3. Actual and synthetic exports of selected bilateral trade partners of Japan, using models I and V.[6]

a. Chile



I. (RMSPE: 0.1040137)

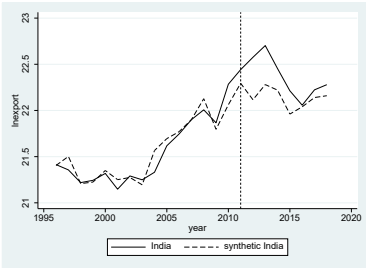


V. (RMSPE: 0.0812319)

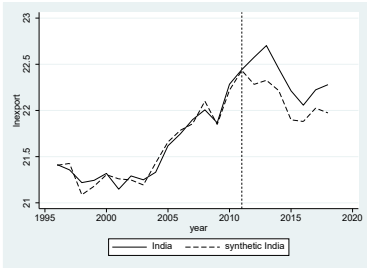
[5] Source: Asia Regional Integration Center (2019). ARIC AD, https://aric.adb.org/fta-country, accessed December 9, 2019.

[6] Treatment periods vary depending on the date agreements are entered into force.

b. India

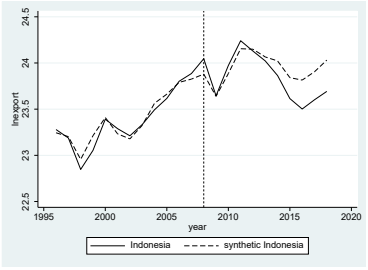


I. (RMSPE: 0.110977)

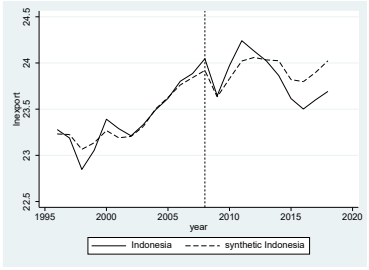


V. (RMSPE: 0.0695712)

c. Indonesia

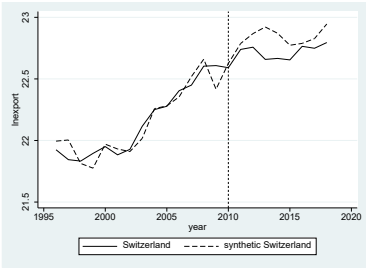


I. (RMSPE: 0.0650733)

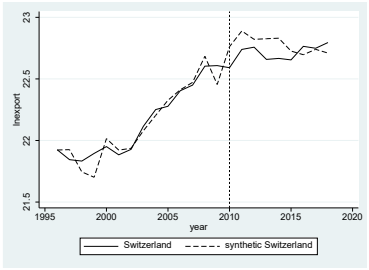


V. (RMSPE: 0.0848863)

d. Switzerland

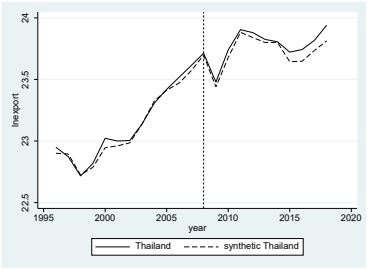


I. (RMSPE: 0.0879381)

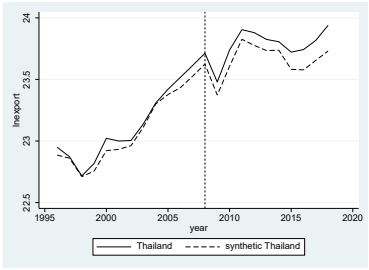


V. (RMSPE: 0.0817162)

e. Thailand



I. (RMSPE: 0.0290311)



V. (RMSPE: 0.0313785)

The figures reveal variations in the actual and counterfactual exports of bilateral partners of Japan. Noticeable differences can be observed in the exports of Chile, which seems unable to maintain the growth after the agreement was in forced. For India and Thailand, the agreements seem to have benefited their exports. For Switzerland, its exports seem unable to immediately undergo the expected transition, although it may seem to be coping. For Indonesia, actual exports seem to slightly surpass the hypothetical exports but eventually declined over the years.

In order to understand further how Philippine exports to Japan benefited from the agreement, the SCM procedure using models I and V identified in the foregoing procedure were used to construct the counterfactual exports at sectoral level. Goods exported to Japan, , were classified into 14 different sectors, which correspond to the classification of commodities in the HS Nomenclature 2002, which is the basis for classification of goods used in the JPEPA. Table 15 presents this classification and the sections and the corresponding sections included and used in this paper.

Table 15. Exports classification

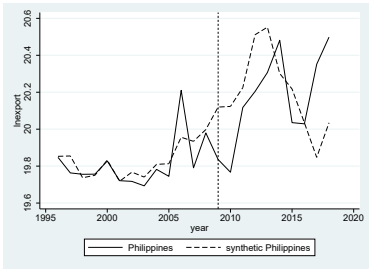
Classification	HS 2002 Sections	HS 2002 Section Notes/ Chapters
Agriculture	I, II, III	1-15
Food Manufactures	IV	16-24
Minerals	V	25-27
Chemicals	VI	28-38
Plastic and Rubber	VII	39-40
Leather	VIII	41-43
Wood	IX, X	44-49
Textiles, Textile Articles, and Other Articles	XI, XII	50-67
Nonmetals	XIII, XIV	68-71
Metals	XV	72-83
Machinery and Mechanical Appliances	XVI	84
Electrical Machinery and Equipment	XVI	85
Vehicles, Aircraft, Vessels, and Transport Equipment	XVII	86-89
Others	XIX, XX, XXI	90-97

The results of the SCM estimation revealed varying effects on each sector (Figure 4). The effects on agriculture and nonmetals do not seem to prevail much as compared to other sectors. The results also show that for certain sectors, the agreement did not immediately bring improvements in the exports of that sector. This is evident in the patterns for Agricultural products, Plastic and Rubber, Textiles, Electrical Machinery and Others. For these sectors the counterfactual exports have been greater than the actual exports for some years immediately after JPEPA. Actual exports have risen above the counterfactual exports only after some time. This result implies that there are other impediments to the export of these goods to Japan apart from tariff because the agreement has provided that upon its entry into force most products that fall under HS sections XI (textiles), and VI (chemicals) would be immediately liberalized.

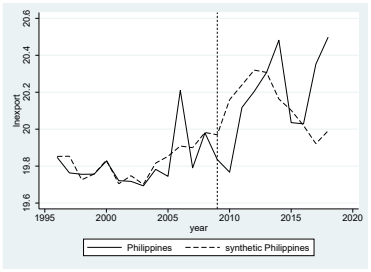
While the resultsgenerally reveal that the agreement benefited trade exports for most of the sectors, the machinery and mechanical appliances seem to have not benefited from JPEPA as shown by counterfactual exports consistently being higher than actual exports to Japan.

Figure 4. Synthetic exports at sector level, using Models I and V

a. Agricultural Products

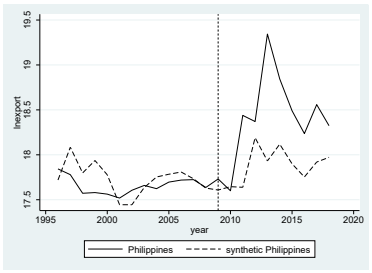


I. (RMSPE: 0.088678)

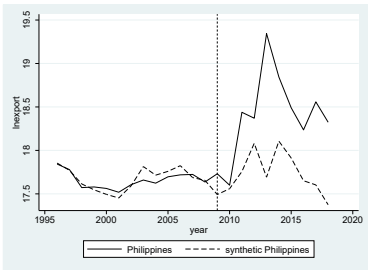


V (RMSPE.0982052)

b. Food Manufactures

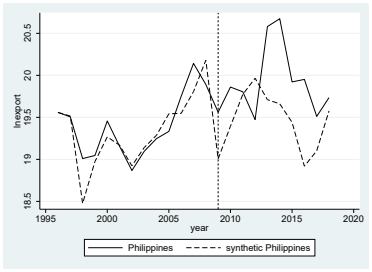


I. (RMSPE: 0.1681742)

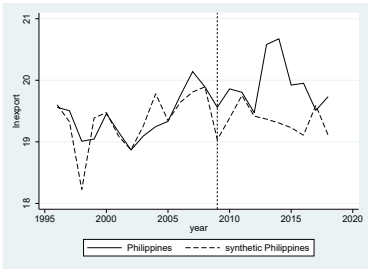


V (RMSPE 0.0657323)

c. Minerals

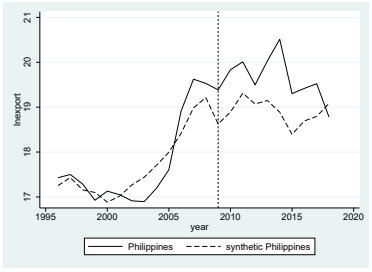


I. (RMSPE: 0.2173544)

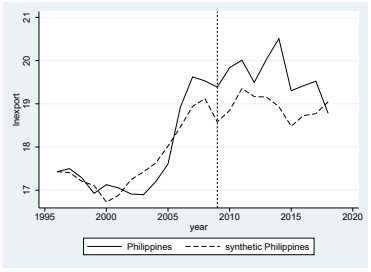


V (RMSPE 0.304694)

d. Chemicals

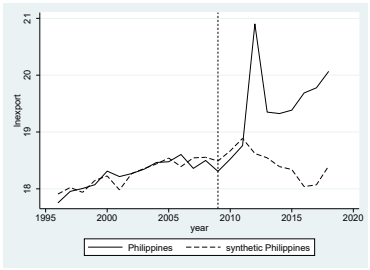


I. (RMSPE: 0.3652073)

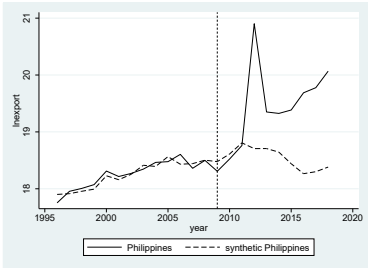


V (RMSPE 0.375144)

e. Plastic and Rubber

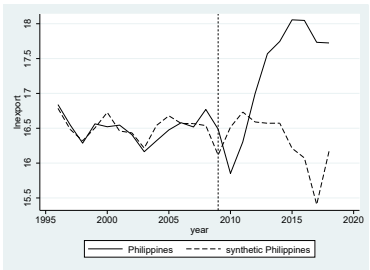


I. (RMSPE: 0.120729)

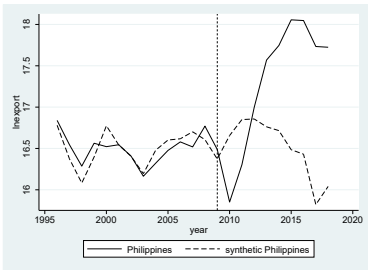


V (RMSPE 0.0856642)

f. Leather

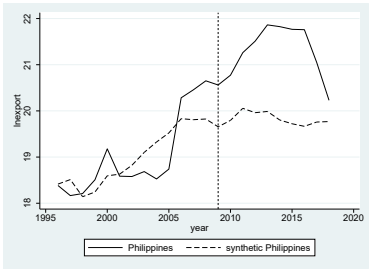


I. (RMSPE: 0.1272539)

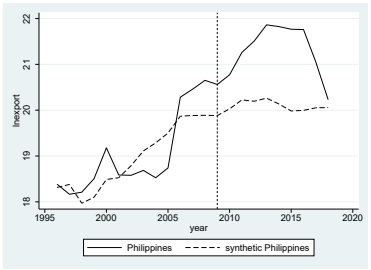


V (RMSPE 0.1439041)

g. Wood

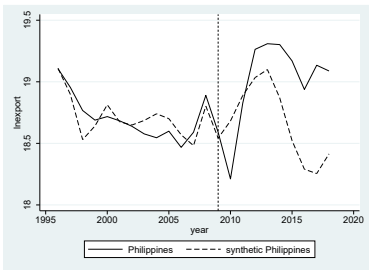


I. (RMSPE: 0.5073863)

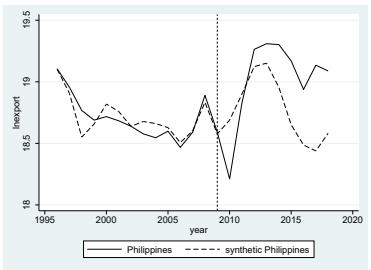


V (RMSPE 0.497534)

h. Textiles

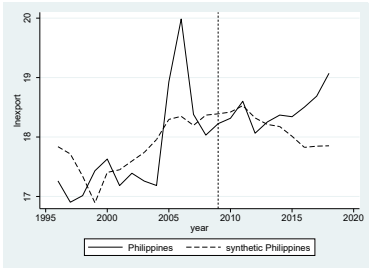


I. (RMSPE: 0.1109782)

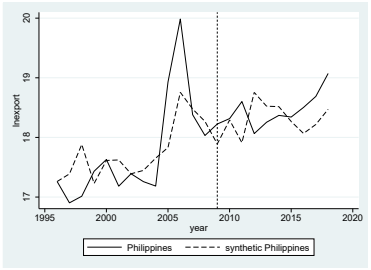


V (RMSPE 0.0856382)

i. Nonmetals

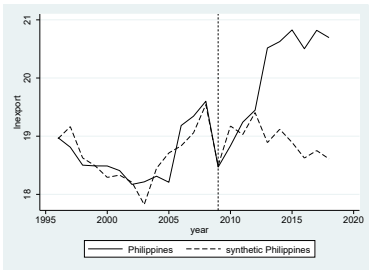


I. (RMSPE: 0.656242)

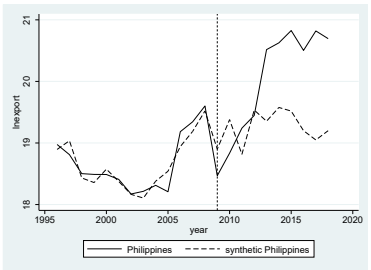


V (RMSPE 0.5725963)

j. Metals

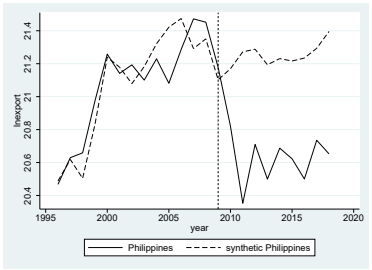


I. (RMSPE: 0.2506397)

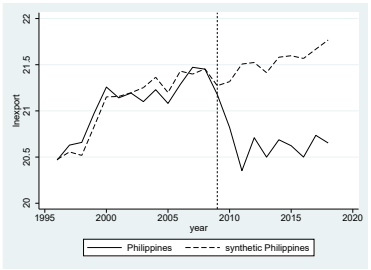


V (RMSPE 0.1524746)

k. Machinery and Mechanical Appliances

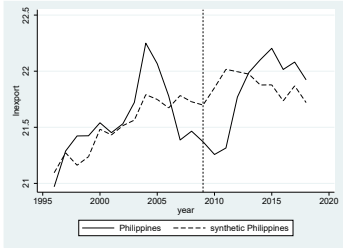


I. (RMSPE: 0.1447)

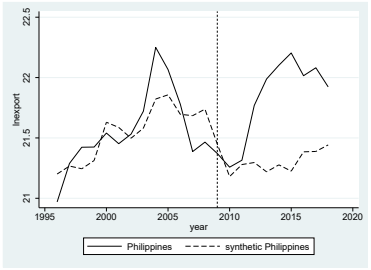


V (RMSPE 0.1030114)

l. Electrical Machinery and Equipment

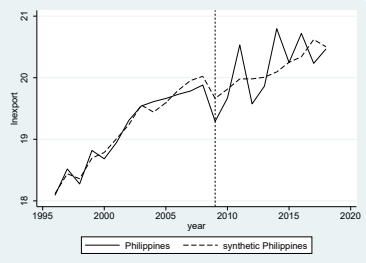


I. (RMSPE: 0.2276206)

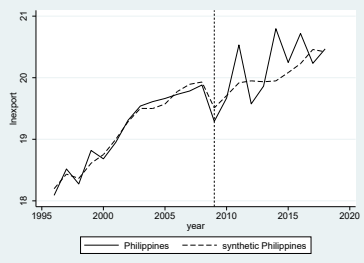


V (RMSPE 0.2041212)

m. Vehicles

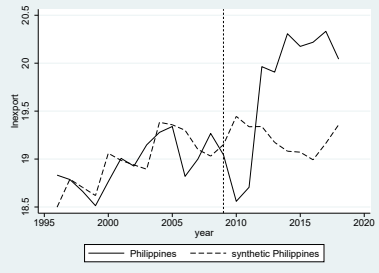


I. (RMSPE: 0.1014767)

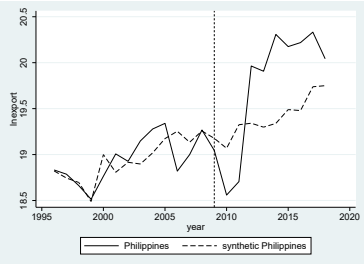


V (RMSPE 0.0945569)

n. Others



I. (RMSPE: 0.2109442)



V (RMSPE 0.1887321)

Looking at how the Philippine exports evolved before and after the agreement was entered into force, it can be observed that Vehicles have the largest leaped from the 10th export (based on average from 2006-2008) to becoming the 4th export (based on average from 2016-2018) sector. This was followed by Plastic and Rubber, which from 12th jumped to the 7th place. The rest of the sectors do not seem to have changed ranks. The Nonmetals, however, from 2nd, dropped immediately to 12th, which more or less was its position all through the years (Annex 2).

On the other hand, comparing the position of the Philippine exports before and after the agreement was entered into force, relative to the top exporters of Japan, the Agriculture sector dropped from the 7th (based on 2006-2008 average) _to 16th. It can be noted, however, that Agriculture sector was in this position even during the previous years. Food Manufactures, Minerals, Vehicles and Others seemed to drop prior to agreement but regained its position after the agreement was entered into force. The rest of the sectors seemed fluctuated through time but most notable improvements can be observed in Leather, Wood, and Metals. Noticeable drops can be observed in Machinery and Electrical Machinery (Annex 3).

5. Conclusion and Policy Recommendations

5.1 Conclusion

The synthetic control method simulates the impact of the JPEPA by constructing the counterfactual of the exports of the Philippines to Japan using a pool of other bilateral exports to of Japan. The synthetic export provides an idea what the export would be if the JPEPA had not been implemented. The SCM algorithm predicts and creates the hypothetical counterfactual of the treated unit by getting the weighted average of pre-intervention outcomes or predictors from the donor pool using selected covariates, such as GDP, GDP per capita, and geographic attributes, among others. This helps identity the donor units or predictors and their influence in the prediction. Thus, the covariates, which affect the outcome and the outcome variable itself before the JPEPA is implemented, determine the selection of donor units and the weights. The SCM was able to assess the effect of JPEPA on Philippine exports to Japan, which reveals the predictive capacity of the technique that can be used to complement other qualitative and quantitative techniques over a wide array of uses. Since it has less assumptions, it exhibits several advantages over other quantitative methods.

The results generally suggest that the agreement between Japan and the Philippines benefited the aggregate exports to Japan. On specific sectors, however, the results suggest that the agreement did not immediately bring improvements, particularly for Agricultural products, Plastic and Rubber, Textiles, Electrical Machinery and Others. Immediate improvements, on the other hand, were realized for the Food Manufacturing, Minerals, Chemicals, and Wood products.

The results also show that the trade agreements with Japan have varying effects on the exports of its bilateral partners. Improvements in exports of India and Thailand were realized, while Chile and Switzerland's export seem to suffer. For Indonesia, improvements were realized immediately after its agreement with Japan was entered into force but eventually declined below the synthetic exports. The results verified that the realized growth in the Philippine exports to Japan during the duration of the agreement was in fact due to the strengthened trading partnership between the Philippines and Japan. Philippine exports to Japan could have potentially increased more than what have been actually realized.

It should be noted, however, that the procedure used for the aggregate exports does not seem to fit well to all sectors, particularly on Chemicals, Wood, Nonmetals, Electrical Machinery and Equipment, and Others. This suggests further improvements in the selection of predictor variables, the use of SCM, and further investigation.

5.2 Policy recommendations

The results have looked at the impact of JPEPA at a macro level and revealed that the Philippines has benefitted from the expansion of the Philippine market to Japan. The results, however, also show that there are some industries which the Philippines have failed to expand its exports. There is a need to conduct further analysis in order to identify the factors that allow for industries to expand their markets to Japan.

The results, in particular, show that there is a need to support the machinery and mechanical appliances sector exports to Japan. Among the industries analyzed in this study, this sector has

shown that JPEPA had a negative impact on Philippine exports from this industry. There is a need to identify what prohibits this sector from expanding its exports to Japan.

The results also imply that tariffs are not the only determinants of Philippine exports to Japan. The delays in the improvement of exports imply there are other factors influencing the market access of Philippine exports to Japan. According to Palanca-Tan (2004), the determinants of Philippine exports to Japan include highly protected Japanese market and some domestic factors such as domestic factors such as "deficient technological know-how, high shipping and packaging costs, high labor and power costs (relative to competitors), lack of credit facilities, problems on raw materials sourcing, insufficient infrastructure facilities and lack of government support." It is recommended that the Philippines focus more on the non-tariff barriers to the Japanese market using the mechanisms available in JPEPA. In addition, the Philippines needs to explore addressing the domestic issues in order to further expand the access to the Japanese market.

Consistent with a number of studies on gravity model estimation, distance is a negative determinant of trade between Philippines and Japan. The variable distance may be capturing other trade costs as well. The Philippines needs to reduce the impact of distance by improving its logistics and reducing the cost of doing business. For instance, to reduce the cost of doing business for MSME sector, the business permit and licensing procedures can be streamlined further. The Access of Small Entrepreneurs to Sound Lending Opportunities (ASENSO) Program aims to improve MSME sector's access to finance by lowering the effective cost of borrowing and ease down requirements, created wider financing system and standardize ending procedures (DTI 2018). The Department of Trade and Industry (DTI) pursue initiatives to reduce the cost of doing business through the provision of targeted and time-bound initiatives to strategic sectors that contribute to improving technology and innovation (NEDA 2017).

Because the results show the potential of Philippine manufactured goods export to penetrate the Japanese market through JPEPA, it is important that the Philippines sustains this advantage by providing further support to these key sectors. The DTI has identified key sectors for support in its most recent industrialization strategy. It is important that these key sectors are aligned with the trade strategy of the country.

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Annexes

Annex 1. Results of Gravity Model Estimations

Variables	OLS	FE	PPML
GDP of exporter (ln)	.0131852		
	(.0357647)		
GDP of partner (ln)	14.2574		
	(432.3623)		
Population of exporter (ln)	.0477567		
	(.0316099)		
Population of partner (ln)	-26.77818		
	(436.0053)		
Per capita GDP of exporter (ln)	.0713138		
	.0539808)		
Per capita GDP of partner (ln)	-12.89679		
	(433.147)		
Exchange rate of exporter (ln)	.039986**		
	(.0132634)		
Exchange rate of partner (ln)	.9687115		
	(.6761155)		
Area of exporter (ln)	.2468581	.1618519**	.0122066**
	(.0754164)	(.0698938)	(.004287)
Area of partner (ln)			
Distance of reporter (ln)	-.6843404	-.3994393**	-.0294532**
	(.1896316)	(.1629106)	(.0102359)
Distance of partner (ln)			
Landlocked (Dummy, exporter)	-.0683796	-.0185985	-.00219
	(.183167)	(.1820848)	(.0118825)
Landlocked (Dummy, reporter)			
Remoteness of reporter (ln)	.015097	.0356755**	.0024167**
	(.0205939)	(.0151428)	(.0010433)
Lag of exports	.9406363***	.5022681***	.03325***
	(.0082737)	(.0331183)	(.0021701)
Lag of GDP of exporter	.0283393		
	(.0243242)		
Lag of GDP of partner	28.41141***		
	(7.80118)		
Lag of population of exporter	-.025913		
	(.0478823)		
Lag of population of reporter			
Lag of per capita GDP of exporter	-28.10449**		
	(8.299848)		
Lag of per capita GDP of partner			
Reporter_n			.0007008**
			(.0002467)
Constant	-320.1152 (161.8821)	6.384275***	2.113028***
		(.5234476)	(.0469626)
R-squared	0.9243	0.9425	.9344
Number of Observations	3,021	3,027	2758

Robust standard errors in parentheses; Clustering by distance is specified to identify each country pair independently of the trade direction.
***p<0.01. **p<0.05, *p<0.1

Annex 2. Evolution of Philippine Exports Composition

Sectors	1996-2018		Prior to the agreement								Initial year in force		Duration of agreement					
	Average	Position	Average (1996-1999)	Position (1996-1999)	Average (2000-2002)	Position (2000-2002)	Average (2003-2005)	Position (2003-2005)	Average (2006-2008)	Position (2006-2008)	Export Value (2009)	Position (2009)	Average (2010-2012)	Position (2010-2012)	Average (2013-2015)	Position (2013-2015)	Average (2016-2018)	Position (2016-2018)
Electrical Machinery and Equipment	2,728.06	1	1,767.40	1	2,193.83	1	3,715.81	1	378.90	1	1,911.41	1	2,120.37	1	3,969.56	1	3,616.27	1
Wood	1,005.24	3	91.01	9	149.46	8	126.33	8	99.85	4	850.20	3	1,651.74	2	2,990.18	2	1,603.79	2
Machinery and Mechanical Appliances	1,260.34	2	976.68	2	1,608.50	2	1,515.77	2	149.60	3	1,574.43	2	926.25	3	889.48	3	914.54	3
Vehicles, Aircraft, Vessels, and Transport Equipment	407.26	5	104.30	8	180.84	6	327.18	4	22.39	10	238.94	8	497.33	5	706.63	6	794.21	4
Agriculture	485.31	4	389.92	3	380.37	3	374.36	3	72.89	5	411.59	4	508.28	4	649.02	7	662.44	5
Others	288.75	8	133.04	7	162.21	7	231.13	5	30.86	9	186.64	9	238.57	10	559.90	8	595.46	6
Plastic and Rubber	204.08	10	62.70	10	85.71	10	101.00	10	8.93	12	89.32	11	482.01	6	254.20	10	420.82	7
Minerals	369.12	6	243.91	4	215.56	4	224.65	6	67.79	7	313.06	5	369.22	8	755.94	4	377.38	8
Metals	369.12	7	243.91	5	215.56	5	224.65	7	67.79	8	313.06	6	369.22	9	755.94	5	377.38	9
Chemicals	209.86	9	32.89	12	25.01	13	31.80	13	68.23	6	262.50	7	398.02	7	517.35	9	238.49	10
Textiles, Textile Articles, and Other Articles	156.87	11	160.31	6	129.65	9	116.58	9	21.43	11	118.56	10	154.54	11	232.03	11	188.92	11
Nonmetals	93.86	12	28.75	13	36.68	12	75.53	11	176.06	2	82.19	12	93.29	12	90.69	13	143.68	12
Food Manufactures	73.85	13	48.67	11	42.40	11	46.73	12	1.79	13	50.17	13	80.29	13	170.57	12	96.23	13
Leather	25.40	14	15.83	14	14.55	14	12.34	14	1.69	14	14.46	14	14.60	14	54.34	14	56.32	14

Annex 3. Philippine Exports Position with Respect to Japan's Top Exporters

	1996-2018		Prior to the agreement								Initial year in force		Duration of agreement					
Sectors	Average	Position	Average (1996-1999)	Position (1996-1999)	Average (2000-2002)	Position (2000-2002)	Average (2003-2005)	Position (2003-2005)	Average (2006-2008)	Position (2006-2008)	Export Value (2009)	Position (2009)	Average (2010-2012)	Position (2010-2012)	Average (2013-2015)	Position (2013-2015)	Average (2016-2018)	Position (2016-2018)
Agriculture	485.31 (5.24%)	15	389.92 (-2.92%)	14	380.37 (-1.03%)	15	374.36 (1.08%)	15	72.89 (33.01%)	7	411.59 (-13.43%)	15	508.28 (14.80%)	16	649.02 (-2.04%)	16	662.44 (17.75%)	14
Food Manufactures	73.85 (8.89%)	28	48.67 (-8.04%)	27	42.40 (1.02%)	23	46.73 (3.19%)	26	1.79 (4.32%)	41	50.17 (9.91%)	29	80.29 (37.49%)	26	170.57 (31.89%)	22	96.23 (-1.77%)	25
Minerals	369.12 (9.66%)	24	243.91 (-13.57%)	19	215.56 (-0.08%)	22	224.65 (16.98%)	24	67.79 (32.02%)	29	313.06 (-28.09%)	19	369.22 (0.40%)	26	755.94 (53.15%)	21	377.38 (-2.51%)	23
Chemicals	209.86 (21.10%)	24	32.89 (-14.02%)	33	25.01 (0.71%)	35	31.80 (28.00%)	37	68.23 (99.92%)	12	262.50 (-13.42%)	21	398.02 (11.87%)	18	517.35 (20.73%)	17	238.49 (-9.71%)	25
Plastic and Rubber	204.08 (39.71%)	12	62.70 (11.53%)	15	85.71 (7.78%)	13	101.00 (7.25%)	15	8.93 (16.01%)	13	89.32 (-17.45%)	16	482.01 (267.09%)	10	254.20 (-25.05%)	11	420.82 (26.15%)	10
Leather	25.40 (9.30%)	15	15.83 (-5.47%)	17	14.55 (-4.85%)	17	12.34 (4.05%)	21	1.69 (11.62%)	17	14.46 (-24.64%)	18	14.60 (36.80%)	22	54.34 (44.23%)	9	56.32 (-9.57%)	10
Wood	1,005.24 (24.11%)	6	91.01 (6.51%)	19	149.46 (16.71%)	16	126.33 (6.78%)	19	99.85 (154.80%)	4	850.20 (-8.62%)	6	1,651.74 (38.21%)	3	2,990.18 (11.03%)	2	1,603.79 (-35.85%)	3
Textiles, …	156.87 (2.68%)	16	160.31 (-12.89%)	14	129.65 (-1.60%)	15	116.58 (-1.20%)	15	21.43 (16.14%)	8	118.56 (-25.83%)	17	154.54 (36.09%)	17	232.03 (-2.80%)	16	188.92 (-1.18%)	15
Nonmetals	93.86 (32.32%)	24	28.75 (11.21%)	26	36.68 (2.95%)	24	75.53 (150.98%)	18	176.06 (107.65%)	3	82.19 (21.18%)	20	93.29 (0.35%)	21	90.69 (10.14%)	21	143.68 (28.24%)	19
Metals	369.12 (18.96%)	14	243.91 (-14.33%)	21	215.56 (-9.64%)	22	224.65 (1.59%)	27	67.79 (63.05%)	20	313.06 (-67.76%)	25	369.22 (39.07%)	22	755.94 (74.99%)	8	377.38 (-0.71%)	6
Machinery…	1,260.34 (3.23%)	9	976.68 (19.19%)	10	1,608.50 (9.06%)	7	1,515.77 (-2.95%)	8	149.60 (10.50%)	6	1,574.43 (-24.01%)	7	926.25 (-8.16%)	10	889.48 (-1.51%)	10	914.54 (2.34%)	10
Electrical…	2,728.06 (7.03%)	9	1,767.40 (17.36%)	10	2,193.83 (4.04%)	7	3,715.81 (24.60%)	8	378.90 (16.38%)	6	1,911.41 (-9.00%)	7	2,120.37 (17.55%)	10	3,969.56 (15.75%)	10	3,616.27 (-8.33%)	10
Vehicles, …	407.26 (22.60%)	10	104.30 (34.73%)	16	180.84 (20.37%)	13	327.18 (12.90%)	11	22.39 (1.78%)	24	238.94 (-44.56%)	11	497.33 (40.43%)	9	706.63 (48.48%)	8	794.21 (16.06%)	9
Others	288.75 (13.87%)	17	133.04 (-9.99%)	18	162.21 (16.08%)	17	231.13 (15.01%)	17	30.86 (29.22%)	15	186.64 (-19.96%)	19	238.57 (76.41%)	19	559.90 (10.44%)	14	595.46 (-2.88%)	14