



INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE

IFPRI Discussion Paper 01921

April 2020

Patterns of Regional Agri-food Trade in Asia

Xinshen Diao

Ruoxin Li

Development Strategy and Governance Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI), a CGIAR Research Center established in 1975, provides research-based policy solutions to sustainably reduce poverty and end hunger and malnutrition. IFPRI's strategic research aims to foster a climate-resilient and sustainable food supply; promote healthy diets and nutrition for all; build inclusive and efficient markets, trade systems, and food industries; transform agricultural and rural economies; and strengthen institutions and governance. Gender is integrated in all the Institute's work. Partnerships, communications, capacity strengthening, and data and knowledge management are essential components to translate IFPRI's research from action to impact. The Institute's regional and country programs play a critical role in responding to demand for food policy research and in delivering holistic support for country-led development. IFPRI collaborates with partners around the world.

AUTHORS

Xinshen Diao (x.diao@cgiar.org) is Deputy Division Director in the Development Strategy and Governance Division of the International Food Policy Research Institute (IFPRI), Washington, DC.

Ruoxin Li (ruoxinli11@gmail.com) is an independent consultant from China.

Notices

¹ IFPRI Discussion Papers contain preliminary material and research results and are circulated in order to stimulate discussion and critical comment. They have not been subject to a formal external review via IFPRI's Publications Review Committee. Any opinions stated herein are those of the author(s) and are not necessarily representative of or endorsed by IFPRI.

² The boundaries and names shown and the designations used on the map(s) herein do not imply official endorsement or acceptance by the International Food Policy Research Institute (IFPRI) or its partners and contributors.

³ Copyright remains with the authors. The authors are free to proceed, without further IFPRI permission, to publish this paper, or any revised version of it, in outlets such as journals, books, and other publications.

Contents

ABSTRACT	vi
ACKNOWLEDGMENTS	vii
1. Introduction	1
2. The recent trends of regional agri-food trade among Asian countries	3
3. Trade in nutritious and processed foods	10
4. Concentration of agri-food trade in Asia	16
5. Measuring trade complementarity within sub-region	26
6. Conclusion	35
References	36
APPENDIX	37

List of Tables

Table 1: Country coverage and some economic indicators	3
Table 2: Share of GDP and Agricultural GDP in sub-regional total.....	5
Table 3: Share of agri-food trade in total trade and GDP (%)	6
Table 4: Agri-food trade within Asia and each sub-region in total agri-food trade (country level total agri-food trade = 100).....	8
Table 5a: Contribution of nutritious food exports to increased total agri-food exports between 1998- 2002 and 2013-2017 (Increased total agri-food exports for each country = 100).....	11
Table 5b: Contribution of nutritious food imports to increased total agri-food imports between 1998-2002 and 2013-2017 (Increased total agri-food imports for each country = 100).....	12
Table 6a: Contribution of processed food exports to increased total agri-food exports between 1998- 2002 and 2013-2017 (Increased total agri-food exports for each country = 100).....	13
Table 6b: Contribution of processed food imports to increased total agri-food imports between 1998-2002 and 2013-2017 (Increased total agri-food imports for each country = 100).....	14
Table 7: Number of agri-food commodities exported and imported at HS 4-digit level	17
Table 8a: Shares of top 10 commodity items in total agri-food exports and agri-food exports to different markets (based on HS 4-digit code commodity classification, total agri-food exports and exports to individual markets = 100)	18
Table 8b: Shares of top 10 commodity items in agri-food imports and agri-food imports to different markets (based on HS 4-digit code commodity classification, total agri-food imports and imports from individual markets = 100)	19
Table 9a: Number of top-10 commodities same in both periods, shares of their export value in 2013-2017 agri-food exports, and export value of new top-10 items in 2013-2017 agri-food exports (based on HS 4-digit code commodity classification)	20
Table 9b: Number of top-10 commodities same in both periods, shares of their import value in 2013-2017 agri-food imports, and import value of new top-10 items in 2013-2017 agri-food imports (based on HS 4-digit code commodity classification)	21
Table 10a: Shares of destinations for top 10 export commodities in 2013-2017 (South Asia, a country's total top-10 exports = 100).....	22
Table 10b: Share of destinations for top 10 export commodities in 2012-2016 (Southeast Asia, a country's total top-10 exports = 100).....	22
Table 10c: Share of destinations for top 10 export commodities in 2013-2017 (Central Asia, a country's total top-10 exports = 100).....	22
Table 11a: Modified Trade Complementarity Index for South Asian Countries 2013-2017	28
Table 11b: Modified Trade Complementarity Index for Southeast Asian Countries 2013-2017	29
Table 11c: Trade Complementarity Index for Central Asian Countries 2013-2017.....	30
Table 12a: Share of bilateral trade in total trade 2013-2017 (South Asia, a country's total exports or imports = 1.00).....	30
Table 12b: Share of bilateral trade in total trade 2012-2016 (Southeast Asia, a country's total exports or imports = 1.00).....	31
Table 12c: Share of bilateral trade in total trade 2013-2017 (Central Asia, a country's total exports or imports = 1.00)	32
Table A1: The list of top 10 agri-food export commodities in 2013-2017, Bangladesh	37
Table A2: The list of top 10 agri-food export commodities in 2013-2017, India.....	37
Table A3: The list of top 10 agri-food export commodities in 2013-2017, Nepal	38
Table A4: The list of top 10 agri-food export commodities in 2013-2017, Pakistan	38
Table A5: The list of top 10 agri-food export commodities in 2013-2017, Sri Lanka	39
Table A6: The list of top 10 agri-food export commodities in 2013-2017, Indonesia.....	39
Table A7: The list of top 10 agri-food export commodities in 2013-2017, Cambodia.....	40

Table A8: The list of top 10 agri-food export commodities in 2013-2017, Lao, PDR	40
Table A9: The list of top 10 agri-food export commodities in 2013-2017, Myanmar.....	41
Table A10: The list of top 10 agri-food export commodities in 2013-2017, Malaysia	41
Table A11: The list of top 10 agri-food export commodities in 2013-2017, Philippines	42
Table A12: The list of top 10 agri-food export commodities in 2013-2017, Thailand.....	42
Table A13: The list of top 10 agri-food export commodities in 2013-2017, Vietnam	43
Table A14: The list of top 10 agri-food export commodities in 2013-2017, Kazakhstan	43
Table A15: The list of top 10 agri-food export commodities in 2013-2017, Kyrgyz Republic.....	44
Table A16: The list of top 10 agri-food export commodities in 2013-2017, Tajikistan	44
Table A17: The list of top 10 agri-food export commodities in 2013-2017, Tajikistan	45

List of Figures

Figure 1: A map for the studied 17 Asian countries.....	4
Figure 2: Shares for top-10 agri-food commodities exported to sub-region, the rest of Asia and the rest of the world in 2013-2017 (total top-10 exports = 100).....	23
Figure 3: Relationship between MTCI for exporters and export shares for each sub-region.....	33

ABSTRACT

This paper analyzes the implication of economic structural change and dietary transformation on changing patterns of agri-food trade among 17 Asian development countries. Sub-regional trade in Central, South, and Southeast Asia is the focus of the paper, along with trade with other partners outside the sub-regions. The paper finds that Asian markets for total agri-food exports and exports of nutritious foods are generally more important than the markets outside of Asia and for many of them, the importance of Asian markets increases over time. While net exporters and importers co-exist in each sub-region, with a few exceptions, sub-regional trade is often less important. Many small countries trade only with one or two large neighbors and less so with each other.

The dietary transformation impacts trade in nutritious foods in diverse ways. With income growth, increased domestic demand for nutritious foods seem to lead to more imports of these foods. While many South and Southeast Asian countries have a comparative advantage in exports of some nutritious food products, growth in these exports can be negatively affected by rising domestic demand. Although nutritious food exports continue to play important roles in total agri-food exports, export growth of nutritious food is often slower than overall growth of agri-food exports. The dietary transformation also seems to lead to increases in demand for processed foods which many Asian countries meet through imports, often, accounting for a large component of total agri-food imports. On the other hand, processed foods generally account for a small portion of agri-food exports. However, there are a few countries where processed food export growth is rapid. In these cases, the sub-regional market is expanding, but with few exceptions, it is still less important than trade with countries outside the sub-regions.

The paper also finds that agri-food exports and imports are highly concentrated, and a small group of commodities dominate most countries export and import portfolios and remain unchanged over time. The main markets for these important commodities are generally not in the sub-regions and this mismatch between demand and supply of agri-food commodities within sub-region is a natural barrier for promoting regional trade.

The modified trade complementary index developed in this paper is based on Michaely (1996) and shows that trade complementarity measures are positively correlated with actual bilateral trade. Small countries tend to enjoy higher levels of complementarity with one or two large trading partners than with other small countries in the same sub-region. This implies that small countries could be better off from bilateral trade arrangements with large partners compared to a regional trade agreement within the sub-region. Because the sub-regional market is oftentimes not large enough to meet large countries' import demand or consume their export supply, regional trade agreements within sub-regions may be less likely to serve their needs for trade expansion than negotiating with large trading partners outside the sub-regions. While many Asian developing countries' governments have been pushing for trade diversification and want to reduce export dependencies concentrated on one or two large trading partners, this paper shows the challenges to achieve this policy goal. For small countries, focusing on bilateral trade arrangements with their dominant trading partners seems to be a more practical and effective strategy than regional trade agreements within sub-regions. Long-term trade arrangements, consistent trade policies, and various preferential trade arrangements should be pursued by small countries with their larger trading partners to promote agri-food exports.

ACKNOWLEDGMENTS

We would like to thank the U.S. Agency for International Development and the CGIAR Research Program on Policies, Institutions, and Markets (PIM) led by the International Food Policy Research Institute (IFPRI) for providing financial support to conduct this study. Authors also thank Adam Kenya for his comments, suggestions and English editing of the manuscript. Authors are responsible for the remaining errors.

1. INTRODUCTION

Economic growth is commonly accompanied by structural change in which the share of agriculture in an economy falls with growth. Per capita income growth is also accompanied by dietary transformation whereby the demand for nutritious and processed foods grows more rapidly than traditional staples as incomes grow (Muyanga et al. 2019; Reardon et al. 2019; Hernandez et al. 2017; Popkin 2017). This paper focuses on the implication of economic structural change and dietary transformation on changing patterns of regional agri-food trade in selected Asian countries.

Agri-food trade is quite important to many Asian countries and agri-food exports account for more than one-fifth of their total exports. In addition, exports of nutritious foods including fish, meat, vegetables, fruits, and vegetable oils are important for many Asian countries particularly in recent years. To study agri-food trade in Asia, we pay particular attention to such trade within Asia and with neighboring countries in a same sub-region. Indeed, for most Asian developing countries, Asian markets are more important than the markets outside Asia both for their total agri-food exports and exports of nutritious foods. For many countries, exports to Asia account for more than 50 percent of their total agri-food trade as well as their exports of nutritious foods. However, with a few exceptions, sub-regional trade is often less important, and many small countries trade only with one or two large neighbors and less so with each other.

By focusing on sub-regional agri-food trade in Asia, we try to understand why many neighboring countries did not trade much with each other both in nutritious and processed foods and in agri-food in general, and why small countries trade only with one or two large countries in the same sub-region. We find that agri-food exports and imports are highly concentrated and a small group of commodities dominate most countries' exports and imports. Many of such dominant export or import commodities are the same over time. While this small group of commodities are similarly important both for a country's total exports and regional exports, the main markets for these important commodities are not in the sub-regions. The main reason is that what dominant commodities a country exports are not the same dominant commodities imported by other countries in the same sub-region. The mismatch between demand and supply of agri-food trade within sub-region is an obviously natural barrier for promoting regional trade.

The modified trade complementary index developed in this paper is based on Michaely (1996) and further shows that trade complementarity measures are positively correlated with actual bilateral trade. Small countries tend to enjoy higher level of complementarity with one or two large trading partners than with other small countries in the same sub-region. This indicates that small countries may benefit from bilateral trade arrangements with large partners compared to regional trade agreements, given their relatively low capacity in export supply (production) and level of import demand. For large countries, because the sub-regional market is oftentimes not large enough to meet their import demand or consume their export supply, a regional trade agreement within the sub-region may be less likely to serve their needs for trade expansion than negotiating with large trading partners outside the sub-region. While many Asian developing countries' governments have been pushing their countries' trade diversification and want to reduce current export dependencies concentrated on one or two large trading partners, this paper shows the challenges for achieving such policy goals. For small countries, policies focusing on bilateral trade arrangements with their dominant trading partners seem to be more practical and effective than regional trade agreements within sub-regions. Policies such as multi-year longer-term trade arrangements, requirement of fair-trade treatment, requirement of consistent trade policies implemented by large partner countries, and various preferential trade arrangements can be pursued by small countries to promote agri-food exports.

In the rest of the paper, we first focus on the trends of agri-food trade at country level for 17 developing Asian countries, which are grouped into three sub-regions, Central Asia, South Asia and Southeast Asia. Section 2 describes trends in agri-food trade, paying particularly attention to sub-regional trade. Except for Nepal in South Asia and Cambodia and Laos in Southeast Asia, and most Central Asian countries, agri-food trade within the sub-region is less important to the focused Asian countries. This is

particularly true for exports. Moreover, smaller countries often trade with one or two large neighboring countries and less so with other small countries in the same sub-region.

Section 3 focuses on trade in nutritious foods and processed foods. By comparing trade values between 1998-2002 and 2013-2017, we show the diverse impact of dietary transformation on the trade of nutritious foods across Asian countries. Many South and Southeast Asian countries have a comparative advantage in exports of some nutritious food products, while growth in such exports can be negatively affected by rising domestic demand. For the trade in processed foods, Section 3 shows that many Asian countries rely on import of such foods, which often account for a large component of total agri-food imports. Dietary transformation seems to lead to further increases in import demand for such foods. On the other hand, processed foods generally account for a small portion of agri-food exports.

Section 4 focuses on the 10 most important agri-food commodities for each country's exports and imports. These top 10 commodities often dominate each country's trade, accounting for 70 – 90 percent of Asian countries' total agri-food exports and more than 60 percent of their imports. While this small group of commodities are similarly important both for a country's total exports and regional exports, the main markets for these important commodities are not in the sub-regions. The main reason is that what dominant commodities a country exports are not the same dominant commodities imported by other countries in the same region. The mismatch between demand and supply of agri-food trade within sub-region seems to be a natural barrier for promoting regional trade.

In Section 5, we develop a modified trade complementary index (MTCI) based on Michaely's TCI (1996) to measure the complementarity of each country's exports with individual sub-regional partners' imports. The MTCI for each pair of countries is then compared with actual bilateral trade between them. We find that trade complementarity measures are positively correlated with current actual bilateral trade. Small countries tend to enjoy higher level of complementarity with one or two large trading partners than with other small countries in the same sub-region.

These findings lead to a conclusion section (Section 6). For small countries, policies focusing on bilateral trade arrangements with their dominant trading partners seem to be more practical and effective than regional trade agreements within sub-regions.

2. THE RECENT TRENDS OF REGIONAL AGRI-FOOD TRADE AMONG ASIAN COUNTRIES

Following the United Nations geo-scheme for Asia, we group the 17 select countries into three sub-regions: Central Asia, South Asia and Southeast Asia. Figure 1 shows these 17 countries in a map, while Table 1 provides a list of the 17 developing Asian countries along with a few economic indicators, including per capita GDP in 2000 and 2017, growth rate of per capita GDP between 2000 and 2017, and income status classified by the World Bank. We cover 4 of 5 Central Asian countries (excluding Turkmenistan), 5 of 8 South Asian countries (excluding Afghanistan, Maldives and Bhutan) and 8 of 11 Southeast Asian countries (excluding Singapore, Brunei Darussalam and Timor-Leste). We did not cover East Asian countries in this paper and included China only when China is considered an important trade partner of these 17 countries.

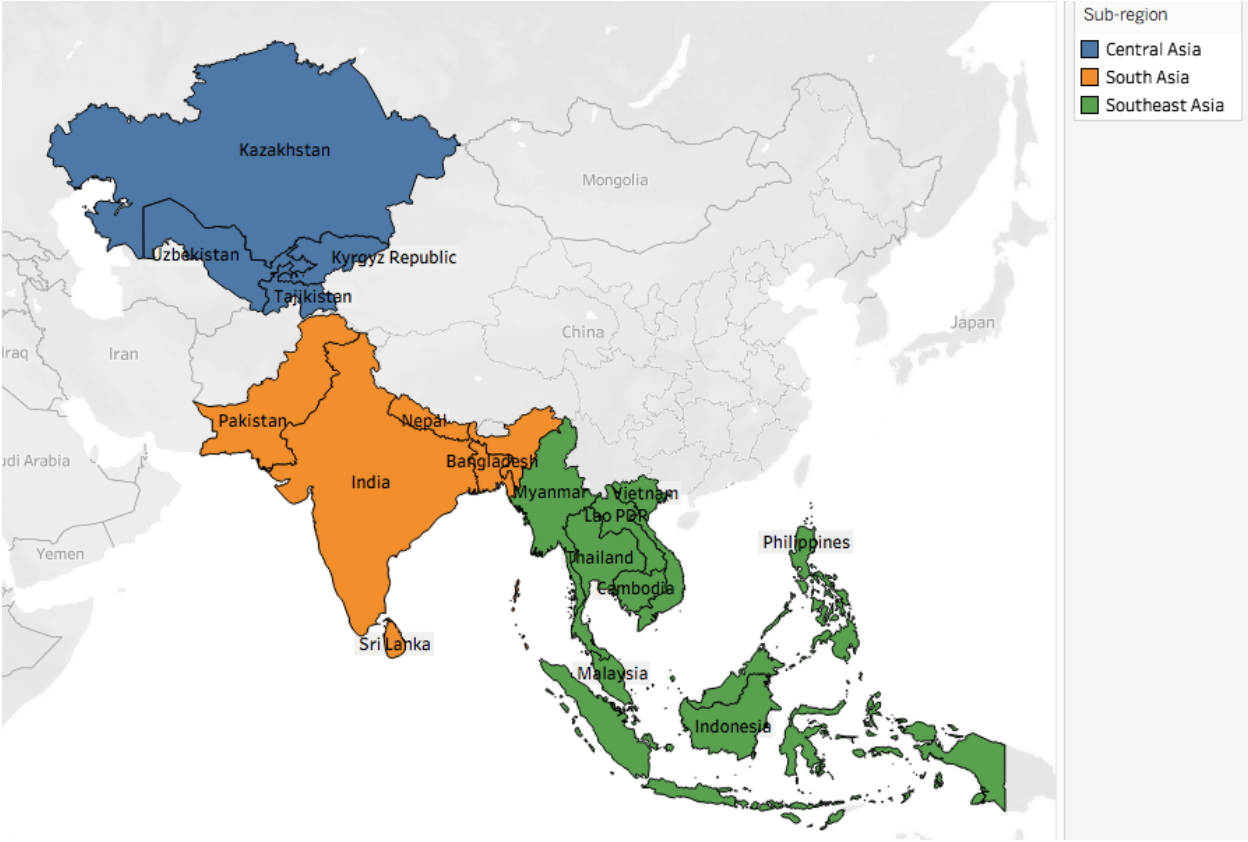
Table 1: Country coverage and some economic indicators

Country	Sub-region	GDP pc in constant 2010 US\$		World Bank income status classification		GDP pc annual growth rate (%)
		2000	2017	2000	2017	2000-2017
Bangladesh	SA	525	1,127	L	LM	4.7
India	SA	827	1,987	L	LM	5.3
Sri Lanka	SA	1,825	3,854	LM	LM	5.2
Nepal	SA	455	777	L	L	3.4
Pakistan	SA	826	1,159	LM	LM	1.9
Indonesia	SEA	2,144	4,120	L	LM	4.1
Cambodia	SEA	431	1,138	L	LM	5.8
Lao PDR	SEA	673	1,706	L	LM	5.9
Myanmar	SEA	342	1,489	L	LM	9.2
Malaysia	SEA	7,007	11,721	UM	UM	3.2
Philippines	SEA	1,607	2,884	LM	LM	3.5
Thailand	SEA	3,458	6,129	LM	UM	3.3
Vietnam	SEA	765	1,853	L	LM	5.3
Kazakhstan	CA	4,492	10,868	LM	UM	5.0
Kyrgyz Republic	CA	654	1,070	L	LM	3.0
Tajikistan	CA	415	1,025	L	LM	5.2
Uzbekistan	CA	818	1,961	L	LM	5.8

Note: SA stands for South Asia, SEA for Southeast Asia, and CA for Central Asia. L stands for low income country, LM for low-middle income country, and UM for upper-middle income country.

Source: Authors' calculation using World Development Indicators (World Bank 2019)

Figure 1: A map for the studied 17 Asian countries



Source: created by authors

As of 2017, the 17 countries account for 92 percent of population in Central Asia, 98 percent in South Asia, and 99 percent in Southeast Asia (Table 2, columns 2 and 3). Their shares in sub-regional GDP and agricultural GDP are also displayed in Table 2.

Table 2: Share of GDP and Agricultural GDP in sub-regional total

	Share of population		Share of GDP		Share of Agricultural GDP	
	2000	2017	2000	2017	2000	2017
South Asia						
Bangladesh	9.2	8.9	8.6	7.5	8.8	6.3
India	76.0	74.7	75.3	79.2	73.2	77.3
Sri Lanka	1.3	1.2	2.6	2.6	2.4	1.3
Nepal	1.7	1.5	0.9	0.7	1.5	1.2
Pakistan	10.2	11.6	11.9	9.1	12.9	13.0
5 countries total	98.4	97.9	99.2	99.2	98.7	99.1
Southeast Asia						
Indonesia	40.3	40.8	26.9	36.5	36.5	46.4
Cambodia	2.3	2.5	0.6	0.8	1.9	1.8
Lao PDR	1.0	1.1	0.3	0.6	0.8	0.9
Myanmar	8.9	8.2	1.4	2.4	7.2	5.4
Malaysia	4.4	4.8	15.3	11.3	11.4	9.6
Philippines	14.9	16.2	13.2	11.3	16.0	10.5
Thailand	12.0	10.7	20.6	16.4	15.2	13.2
Vietnam	15.2	14.6	5.1	8.0	10.8	11.9
8 countries total	99.0	98.9	83.3	87.3	99.6	99.8
Central Asia						
Kazakhstan	27.0	25.3	49.2	59.3	21.3	21.8
Kyrgyz Republic	8.9	8.7	3.7	2.8	6.7	2.4
Tajikistan	11.3	12.5	2.3	2.6	3.1	4.3
Uzbekistan	44.7	45.4	37.0	21.5	59.4	63.2
4 countries total	91.8	91.9	92.2	86.2	90.6	91.6

Note: AgGDP Data for Turkmenistan in 2017 is missing in WDI. Therefore, we use 2015 for AgGDP share for the 4 CA countries.

Source: Authors' calculation using World Development Indicators (World Bank 2019)

Compared with the world average annual per capita GDP growth rate of 1.6 percent between 2000 and 2017, economic growth is much more rapid in all 17 countries except for Pakistan whose per capita GDP growth rate is 1.9 percent per year. There are six countries whose per capita GDP growth rate is 3 – 4 percent and 10 countries with an annual growth above 5 percent from 2000 to 2017 (Table 1, the last columns). Many of the fastest growing economies in the world are among the 17 countries chosen for this study including India in South Asia, Cambodia, Laos, Myanmar and Vietnam in Southeast Asia and Uzbekistan in Central Asia. Rapid economic growth has led many of these countries to graduate from “low-income” to “low-middle-income” or from “low-middle-income” to “upper-middle-income” status (Table 1, columns 4 and 5). In fact, according to the World Bank classification, there is only one of the 17

countries – Nepal that currently still remains a “low-income” country. The other 16 countries have achieved middle-income or upper-middle income status.

Economic growth is often accompanied by rapid structural change, which means that the share of agricultural GDP falls over time with growth. This is also the case among the 17 Asian countries with Pakistan and Uzbekistan as exceptions. There are only six countries with agriculture accounting for more than 20 percent of GDP in 2015, while in 2001, there were 12 such countries.

Growth in per capita income is also associated with dietary transformation – at higher level of income, consumers tend to spend disproportionately more on nutritious and processed foods than on traditional staple foods (Muyanga et al. 2019). Such dietary transformation could have implication both for growth in trade and change in trade structure.

Table 3 first reports shares of agri-food exports/imports in total exports/imports and GDP in 2001 and 2015. Agri-food shares in total trade allow us to assess the importance of agri-food trade to a country’s total trade, while agri-food shares in GDP allow us to compare growth in agri-food trade with growth in GDP.

Table 3: Share of agri-food trade in total trade and GDP (%)

	Share in total trade				Share in GDP				Increases/decreases in agri-food trade	
	In total exports		In total imports		Agri-food Exports		Agri-food Imports			
	2001	2015	2001	2015	2001	2015	2001	2015	Exports	Imports
South Asia										
Bangladesh	7.1	3.5	23.8	23.0	0.8	0.6	4.0	5.0	--	-+
India	14.4	13.1	9.8	7.8	1.3	1.7	1.0	1.4	-+	-+
Sri Lanka	22.8	28.1	15.7	15.3	7.0	3.7	5.9	3.6	+-	--
Nepal	10.4	30.0	16.4	20.1	1.5	1.0	4.7	6.2	+-	++
Pakistan	12.6	21.1	16.8	16.2	1.6	1.7	2.4	2.6	++	-+
Southeast Asia										
Indonesia	12.5	26.6	17.4	12.9	4.5	4.6	4.1	2.1	++	--
Cambodia	3.6	6.9	12.3	10.5	1.3	3.3	6.5	7.7	++	-+
Lao PDR*	28.1	27.4	12.0	5.5	6.9	7.0	3.5	2.2	-+	--
Myanmar*	30.2	32.3	8.7	11.3	5.3	6.2	0.8	3.2	++	++
Malaysia	8.2	12.7	6.6	10.6	7.7	8.5	5.3	6.3	++	++
Philippines	6.1	8.7	8.8	12.4	2.6	1.8	4.0	3.2	+-	+-
Thailand	18.5	17.5	8.0	8.2	10.0	9.3	4.1	4.2	--	++
Vietnam	28.5	16.5	9.6	12.1	13.1	13.3	4.8	9.6	-+	++
Central Asia										
Kazakhstan	6.8	4.8	9.2	11.4	2.7	1.2	2.7	1.9	--	+-
Kyrgyz Republic	32.6	21.5	14.2	14.9	10.2	4.6	4.3	9.1	--	++
Tajikistan	35.1	21.1	31.5	14.8	10.9	2.3	9.0	6.7	--	--
Uzbekistan	46.4	18.2	11.9	11.9	7.6	1.4	2.1	1.5	--	+-

Notes: Agri-food trade data for Lao and Myanmar is not available in the early years in WDI and the first year is 2010 instead of 2001 in the table. Agri-food trade data for Vietnam is not available for 2015 in WDI and the most recent year for such data is 2014 in the table. Agri-food trade data for Tajikistan and Uzbekistan is not available in WDI the data from BACI is used instead.

Source: Authors’ calculation using World Development Indicators (World Bank 2019)

In 2015, agri-food exports accounted for about 20 percent of total exports in 11 of 17 countries, indicating the importance of agri-food exports. Moreover, growth in agri-food exports is more rapid than total exports in eight countries – Sri Lanka, Nepal and Pakistan in SA and Cambodia, Indonesia, Myanmar, Malaysia and Philippines in SEA, where the share of agri-food exports in total exports increases over time (indicated by the first positive sign “+” in column 12 in Table 3). There are also countries with rising share of agri-food exports in GDP between 2001 and 2015 (indicated by the second positive sign in column 12). A rising agri-food export share in GDP indicates that a country’s agri-food exports have grown more rapidly than its GDP. However, there are more countries (ten in total) with agri-food imports growing more rapidly than GDP. Rising shares of agri-food exports and imports is possibly associated with increases in trade of nutritious and processed foods. They often have higher value than traditional trade commodities and their demand could grow more rapidly. We will assess trade in nutritious and processed food later in Section 3.

A comparison between a country’s share of agri-food exports in GDP and its share of agri-food imports in GDP allows us to distinguish an agricultural net exporter from a net importer. When a country’s share of agri-food exports in GDP is more (less) than the share of imports in GDP, this country is an agri-food net exporter (importer). Of the 17 countries, more countries are agri-food net exporters than net importers. Moreover, most countries did not change net exporter/importer status over time. Eight countries – India and Sri Lanka in SA and Indonesia, Laos, Myanmar, Malaysia, Thailand and Vietnam in SEA – are consistently agri-food net exporters in both 2001 and 2015, and six countries – Bangladesh, Nepal and Pakistan in SA, Cambodia and Philippines in SEA and Kazakhstan in CA – are consistently agri-food net importers in both years. The three CA countries – Kyrgyz Republic, Tajikistan and Uzbekistan are the only countries that switch from net exporters to net importers between 2001 and 2015. When net exporters and importers co-exist in South and Southeast regions, it is expected to create trade opportunities among neighbor countries in these two sub-regions.

Table 4 displays the 17 countries’ agri-food trade within Asia and the three sub-regions. Considering that trade flows fluctuate over time, Table 4 reports shares of agri-food trade averaged over five years for two sub-periods: the period of 1998-2002 representing the past period and the period of 2013-2017 for the current period. Table 4 is based on the data of “Base pour l’Analyse du Commerce International” (Database for International Trade Analysis in English, BACI 2020, and also see Gaulier and Zignago 2009 for a documentation of BACI dataset).

Table 4: Agri-food trade within Asia and each sub-region in total agri-food trade (country level total agri-food trade = 100)

	Agri-food Exports				Agri-food Imports				Change in Asian & sub-regional market shares between 1 st & 2 nd periods	
	1998-2002		2013-2017		1998-2002		2013-2017		Exports	Imports
	Asia	Sub-region	Asia	Sub-region	Asia	Sub-region	Asia	Sub-region		
South Asia										
Bangladesh	31.1	8.8	43.5	16.7	45.0	26.8	46.5	22.2	++	+ -
India	50.7	8.2	57.6	10.7	51.1	6.3	49.4	4.8	++	--
Sri Lanka	45.8	6.4	47.6	11.6	43.1	21.2	55.7	24.4	++	++
Nepal	98.1	93.0	95.2	87.9	73.4	39.0	76.9	59.8	--	++
Pakistan	49.4	12.8	66.4	25.2	53.1	6.1	56.1	15.1	++	++
Southeast Asia										
Indonesia	50.6	15.3	56.5	15.5	41.4	20.2	33.2	15.6	++	--
Cambodia	89.1	61.6	75.5	64.0	87.4	81.7	88.8	77.1	- +	+ -
Lao PDR	41.7	32.4	87.9	50.9	92.8	89.2	97.2	90.0	++	++
Myanmar	83.2	30.0	89.0	18.7	90.8	71.8	85.0	60.8	+ -	--
Malaysia	65.4	21.3	64.2	21.8	53.1	32.7	55.0	35.3	--	++
Philippines	49.3	5.3	55.8	10.0	32.3	15.8	44.5	27.9	++	++
Thailand	53.4	13.8	62.5	20.6	32.9	14.6	46.8	20.1	++	++
Vietnam	56.0	15.1	48.6	12.9	60.2	32.5	49.0	16.9	--	--
Central Asia										
Kazakhstan	34.1	15.3	66.0	39.0	12.7	2.4	22.5	12.2	++	++
Kyrgyz Republic	22.4	8.5	47.0	32.2	40.2	27.8	48.4	32.6	++	++
Tajikistan	5.6	0.4	36.3	25.6	52.6	35.2	56.3	49.3	++	++
Uzbekistan	16.8	0.4	76.8	35.5	31.6	19.4	51.8	40.4	++	++

Source: Authors' calculation using data from "Base pour l'Analyse du Commerce International," i.e. Database for International Trade Analysis in English (BACI 2020)

Table 4 shows that the Asian market share of total agri-food trade has increased over time for most countries. This is indicated by the first positive sign in column 9 (for exports) and column 10 (for imports). There are a few exceptions on either the export or import side, but in all of these cases, the Asian market is already important in the early period. For example, Nepal exports more than 90 percent of total agri-food products to Asian countries in both periods but the share is only slightly lower in the recent period. Similarly, while Asian market shares for Cambodia's and Vietnam's agri-food exports and imports both fall in the recent period, the shares remain above 80 percent for Cambodia and about 50

percent for Vietnam in both periods. For those countries that experienced a decline in the share of the Asian market for their agri-food exports, Asia still remains an important agri-food export destination accounting for more than 50 percent of their agri-food exports. This is also the case for imports. Indonesia is an exception. Its agri-food imports from Asia account for 33 percent of its total agri-food imports in the recent period, falling from 41 percent in the early period. Most fast growth economies also see the expansion of their Asian markets in agri-food trade.

However, many countries trade much less within their sub-region than with the rest of Asia, particularly for exports. In the recent period, Central Asia is an exception where sub-regional trade dominates. Nepal in South Asia and Cambodia, Laos and Myanmar (only for imports) in Southeast Asia are also exceptions as their trade is dominated by sub-regional trade. While sub-regional trade is less important than trade with the rest of Asia for many countries in South and Southeast Asia, the relative importance of trade within the sub-region rises in the recent period particularly for agri-food exports. The only exception is Myanmar, where sub-regional market becomes further less important for its agri-food exports as the share of sub-regional exports falls significantly in the recent period.

In short, except for Central Asia and three smaller South and Southeast Asian countries, although the sub-regional market has become more important for agri-food trade over time, the importance of sub-regional market remains less than that of the rest of Asia for most South and Southeast countries.

3. TRADE IN NUTRITIOUS AND PROCESSED FOODS

In this section, we focus on trade in nutritious foods, which include fish, shrimp, meats, eatable oils, vegetables and fruits, and high-value processed foods to assess whether the dietary transformation has influenced Asian countries' agri-food trade structure as well as intra-regional trade.

With a few countries as exceptions, nutritious foods account for a large share of total agri-food exports among South and Southeast Asian countries in both periods and Central Asian countries in the recent period. In Central Asia, nutritious food exports used to account for a small portion of agri-food exports, but these exports have grown rapidly in the recent years and become more important in total agri-food exports in three of the four Central Asian countries (except for Kazakhstan). Given that demand for nutritious food is expected to grow more rapidly than for traditional staples with income growth, we focus on the growth in nutritious food trade in the discussion and assess whether increased demand for such foods affects trade in nutritious foods.

Table 5a reports the contribution of nutritious food exports to increases in total agri-food exports between 1998-2002 and 2013-2017. The first column is for the overall contribution of nutritious food exports, while columns 2 – 5 are contributions in different markets. With increased total agri-food exports being 100, the larger the numbers in the first column of the table, the higher the contribution of nutritious food exports to the total agri-food exports in a country. For example, in Bangladesh, 55 percent of increased agri-food exports are from growth in exports of nutritious foods, mainly fish and shrimp, and the share is 37 percent in India and Pakistan. In Southeast Asia, there are four countries – Indonesia, Myanmar, Malaysia and Philippines with nutritious foods accounting for about 60 percent of increased total agri-food exports. In Central Asia, the contribution is even more than 100 percent for three countries including Uzbekistan where the contribution is almost 400 percent. When the number is more than 100 percent, it indicates that exports of some other agri-food items fall significantly over time, making these items negative contributors to growth in agri-food exports. For example, in Uzbekistan, measured in current \$US dollar, cotton exports fell by 50 percent between the earlier period 1998-2002 and the latter period of 2013-2017. The increased exports of vegetables and fruits have more than compensated for the decline in cotton exports, leading nutritious food exports to contribute almost 400 percent of increased total agri-food exports in the country. Cotton export values also fell in the Kyrgyz Republic and Tajikistan, while exports of fish, vegetables and fruits increase significantly during the same period, making the contribution of nutritious food exports more than 100 percent of increases in total agri-food exports in both countries.

It must be pointed out that while nutritious food exports explain a large portion of growth in total agri-food exports for many countries, the reasons are different. For some countries, nutritious food exports are already important in the earlier period, and the growth of these exports is not necessarily faster than the growth for total agri-food exports. Signs in columns 6 and 7 of Table 5a represent whether growth in nutritious food exports is faster or slower than growth in total agri-food exports in total or in regional trade. A positive (negative) sign indicates faster (slower) growth of nutritious food exports than the growth of total agri-food exports. Signs in column 6 of the table are for total nutritious food exports, while signs in column 7 are for sub-regional exports. For example, although nutritious food exports contribute to 55 percent of increased total agri-food exports in Bangladesh and 37 percent in India, in both countries, export growth in nutritious food is slower than growth of total agri-food exports, causing the share of nutritious food in total agri-food exports to fall in 2013-2017 compared with that in 1998-2002 in both countries. This is indicated by the negative sign for the two countries in column 6. A similar situation occurs in Myanmar, Malaysia, Philippines and Vietnam in Southeast Asia. In these four countries, while nutritious food exports continue to be important in total agri-food exports in recent years, the share of nutritious foods in total agri-food exports is lower in 2013-2017 than in 1998-2002. There are a few countries where nutritious food exports are both important and grow more rapidly than total agri-food exports, and these countries include Pakistan in South Asia, Indonesia and Cambodia in Southeast Asia and the three Central Asian countries.

Table 5a: Contribution of nutritious food exports to increased total agri-food exports between 1998-2002 and 2013-2017 (Increased total agri-food exports for each country = 100)

	Total	Sub-region	China	Rest of Asia	Rest of World	Total	Sub-region
South Asia							
Bangladesh	55.2	7.5	10.0	6.0	31.7	-	+
India	37.0	2.5	1.6	16.9	15.9	-	+
Sri Lanka	22.4	3.9	0.2	4.0	14.3	+	+
Nepal	-13.8	-20.1	1.3	4.5	0.5	-	-
Pakistan	36.6	11.1	3.1	18.4	4.0	+	+
Southeast Asia							
Indonesia	62.7	7.1	9.3	20.7	25.6	+	-
Cambodia	41.3	39.0	2.0	-0.8	1.0	+	+
Lao PDR	23.3	11.5	10.9	0.3	0.6	+	+
Myanmar	58.9	11.4	8.8	35.5	3.2	-	-
Malaysia	60.6	9.1	7.9	18.1	25.4	-	+
Philippines	61.5	2.3	9.8	24.0	25.2	-	+
Thailand	14.5	3.0	7.3	0.6	7.0	-	-
Vietnam	40.7	3.2	7.0	6.5	24.1	-	+
Central Asia							
Kazakhstan	23.9	5.4	2.9	2.2	13.3	+	+
Kyrgyz Republic	108.9	45.6	2.6	5.4	54.4	+	+
Tajikistan	151.1	122.9	1.7	0.8	25.2	+	+
Uzbekistan	390.4	293.5	20.0	29.0	47.9	+	+

Source: Authors' calculation using data from BACI (2020)

Table 5a also reports contributions of nutritious food exporting to sub-regional markets, to China, to rest of Asia and to rest of the world. The aggregation of the contributions from exporting to these four different markets equals the total contribution of nutritious food exports reported in the first column of Table 5a. Focusing on column two for the sub-regional market, it shows that Pakistan is the only South Asian country where regional exports of nutritious foods is relatively important, explaining 11 percent of growth in total agri-food exports, while the regional market's contribution is either in low single digit number or negative for the other four South Asian countries. In Southeast Asia, increased nutritious exports are mainly destined for sub-regional market only for Cambodia and Laos. On the other hand, in the three Central Asia countries where nutritious food exports contribute to more than 100 percent of increased total agri-food exports, the sub-regional market plays an important role for such significant contribution. While sub-regional markets are less important for nutritious food exports for most Asian countries, the sub-regional market has become relatively more important over time. This is indicated by the positive sign in column 7 of table 5a for 13 of the 17 countries in this study.

Table 5b reports share of nutritious food imports in increased total agri-food imports. As shown in the first column of Table 5b, nutritious food imports explain more than 40 percent of increased agri-food total imports for most countries. Moreover, the importance of nutritious food in total agri-food imports increases over time for 13 of the 17 countries (indicated by the positive sign in column 6 of table 5b). This is an expected outcome as dietary transformation generally leads nutritious food imports to grow more rapidly than agri-food imports as a whole. Increased nutritious food imports, however, come more from countries outside the region than from countries within the same sub-region. Nepal, Laos and Myanmar are the only exceptions, where sub-regional imports either dominate total nutritious food imports or account for a large portion. In the meantime, sub-regional imports of nutritious foods grow more rapidly than imports of total agri-food products for many countries including Nepal and Pakistan in South Asia, Indonesia, Cambodia, Laos and Philippines in Southeast Asia and all the four Central Asian countries (indicated by the positive sign in column 7 of table 5b).

Table 5b: Contribution of nutritious food imports to increased total agri-food imports between 1998-2002 and 2013-2017 (Increased total agri-food imports for each country = 100)

	Total	Sub-region	China	Rest of Asia	Rest of World	Total	Sub-region
South Asia							
Bangladesh	46.2	5.1	2.5	17.5	21.2	-	-
India	76.3	2.2	1.1	34.7	38.3	+	-
Sri Lanka	48.3	7.1	4.0	12.9	24.3	+	-
Nepal	50.9	21.5	3.2	7.5	18.7	+	+
Pakistan	68.9	8.8	1.8	30.9	27.4	+	+
Southeast Asia							
Indonesia	47.3	3.3	7.1	3.1	33.7	+	+
Cambodia	22.6	14.7	0.7	3.2	3.9	+	+
Lao PDR	26.9	23.2	0.4	2.4	0.9	+	+
Myanmar	35.9	23.4	4.5	4.8	5.5	-	-
Malaysia	40.0	10.6	7.4	5.2	16.7	-	-
Philippines	51.8	10.5	6.4	2.9	32.0	+	+
Thailand	48.7	5.6	4.6	8.1	30.4	-	-
Vietnam	61.8	6.9	6.0	17.2	31.7	+	-
Central Asia							
Kazakhstan	45.8	12.7	3.9	2.4	26.7	+	+
Kyrgyz Republic	28.5	3.7	8.3	0.6	15.9	+	+
Tajikistan	25.2	3.7	1.9	2.4	17.2	+	+
Uzbekistan	40.8	8.9	0.1	4.5	27.2	+	+

Source: Authors' calculation using data from BACI (2020)

In summary, the results of Table 5a and Table 5b show the diverse impacts of the dietary transformation across Asian countries. Increased domestic demand for nutritious foods with income growth seems to lead to more imports of these foods for most countries. While many South and Southeast Asian countries have a comparative advantage in the export of some nutritious food products, growth in these exports can be negatively affected by rising domestic demand. Although nutritious food exports continue to play important roles in these countries' total agri-food exports (with Nepal as the only exception), export growth of nutritious food is slower than overall growth of agri-food exports in most of the countries with a comparative advantage in exports. On the other hand, the three Central Asian countries have significantly changed their agri-food export structure in recent years and fish, vegetables, and fruit products have come to dominate. Moreover, rapid growth in Central Asian countries' nutritious food exports have benefited from enhanced sub-regional trade.

We also assess the contribution of processed food trade to total agri-food trade in this section. We consider food products going through manufacturing processes as processed food, which includes prepared meat, fish and other aquatic products; sugar and sugar confectionery; preparations of cereals, flour, starch; milk and dairy products; preparations of vegetables, fruit and nuts; beverages; and other manufactured foods.¹ Similar as nutritious food, demand for processed foods has grown more rapidly than traditional staples. In addition, many processed food products have high value addition beyond the farmgate. Developing country governments often want to promote their export to diversify the agri-food export structure and generate more income from their export. Similar as the structure of Tables 5a and 5b, table 6a reports the contribution of processed food exports to increased total agri-food exports and table 6b is for the contribution of similar products to the imports.

¹ Manufactured tobacco products should be part of processed food. However, in HS digit 2 level, unmanufactured and manufactured tobacco products are grouped together. We therefore decided not to include tobacco in the processed food aggregation.

Table 6a: Contribution of processed food exports to increased total agri-food exports between 1998-2002 and 2013-2017 (Increased total agri-food exports for each country = 100)

	Total	Sub-region	China	Rest of Asia	Rest of World	Total	Sub-region
South Asia							
Bangladesh	14.8	3.1	1.3	5.3	5.2	+	+
India	11.3	0.9	0.1	3.6	6.7	+	-
Sri Lanka	9.2	1.5	0.1	2.3	5.3	+	+
Nepal	68.0	64.9	0.7	1.1	1.4	+	+
Pakistan	11.7	6.7	0.2	1.9	2.8	-	+
Southeast Asia							
Indonesia	10.4	3.7	0.8	1.6	4.3	-	+
Cambodia	6.2	3.3	0.2	0.2	2.6	+	+
Lao PDR	24.2	19.4	0.3	0.4	4.1	+	+
Myanmar	15.8	0.2	13.6	1.9	0.2	+	-
Malaysia	23.0	10.1	2.3	5.0	5.6	+	+
Philippines	23.8	3.5	1.3	6.6	12.5	-	+
Thailand	49.4	16.1	12.4	7.9	13.0	+	+
Vietnam	17.1	2.5	1.2	4.8	8.6	+	+
Central Asia							
Kazakhstan	10.2	5.6	0.4	0.5	3.7	+	+
Kyrgyz Republic	14.4	9.4	0.6	1.4	2.9	+	+
Tajikistan	-15.0	-0.4	0.0	2.1	-16.7	-	-
Uzbekistan	9.2	13.6	0.2	1.4	-6.1	+	+

Source: Authors' calculation using data from BACI (2020)

With Pakistan, Indonesia, Malaysia, Philippines and Thailand as exceptions, processed foods account for less than 10 percent of total agri-food exports for most Asian countries in the early period of 1998-2002. However, in the recent period of 2013-2017, the share of processed foods in agri-food exports increased to or more than 10 percent for 15 of the 17 countries.

There are a few countries where processed food export growth is very rapid. Nepal is a typical example, where processed food accounted for less than 10 percent of agri-food exports in 1998-2002, but the share jumps to close to 50 percent in 2013-2017, led mainly by exports of two items –non-alcoholic beverages such as mineral and aerated waters containing added sugar or sweeteners, and fruit and vegetable juices. Because of rapid growth in exports of these two products, processed food exports contribute to 68 percent of increased agri-food exports in Nepal (Table 6a).

Processed food exports are much more important in Thailand than in any other Asian countries in the first period, accounting for 30 percent of Thai agri-food exports. Growth is also rapid in Thailand, and the share of processed food in total agri-food exports rises to 43 percent in 2013-2017, and processed food's contribution is almost 50 percent of the increased total agri-food exports (in Table 6a). While Thailand exports various processed food products, the products that have played a dominant role in export growth are two items: prepared or preserved meat products and sugar products.

Processed food exports are also relatively important for the Philippines, accounting for 27.5 percent of total agri-food exports in 1998-2002 and 25.1 percent 2013-2017. However, growth of processed food is lower than growth of total agri-food exports, and contribution of processed food is 24 percent of increased total agri-food exports (Table 6a).

The countries where processed food exports become increasingly important also include Bangladesh, Laos, Myanmar, Malaysia and Vietnam. In 1998-2002, processed food accounted for only 1.5 percent of total agri-food exports in Bangladesh, 1.8 percent in Laos, 1.7 percent in Myanmar, and 9.2 percent in Vietnam. In 2013-2017, the share jumps to 10 percent for Bangladesh, 23.4 percent for Laos, 13.8 percent for Myanmar, and 15.7 percent for Vietnam. In Bangladesh, the growth is led by a wide

range of processed food products including prepared aquatic products, bakery products, and fruit juices. In Laos it is led by non-alcoholic beverage such as mineral and aerated waters, and sugar products, while in Myanmar it is led mainly by sugar products. Similar to Thailand, Vietnam exports various processed foods, with prepared or preserved fish and other aquatic products dominating recent growth. Processed food's contribution to increased total agri-food exports is more than 17 percent in Vietnam.

While processed food exports grow rapidly across many Asian countries, exports to sub-regional markets are relatively modest, particularly in 1998-2002. Nepal is the only country where processed food exports mainly go to the sub-region in both periods, while for Laos, the sub-regional market became important only in the more recent period. However, as indicated by the positive sign in column 7 of Table 6a, sub-regional exports grow rapidly for 14 of the 17 countries, though the share of regional market in total processed food exports is still low among many countries.

In contrast to exports, processed food imports account for a much larger part of agri-food imports. In Bangladesh, India, and Pakistan processed foods account for less than 10 percent of the total agri-food imports in the earlier period while only India and Pakistan was less than 10 percent in 2013-2017. Table 6b also shows that processed food imports grow more rapidly than total agri-food imports for most South and Southeast Asian countries (see positive sign in column 7 of Table 6b), while it is in opposite in the four Central Asian countries (all with negative signs in column 7). Further investigation in the data for Central Asia's import structure of processed foods shows that all four Central Asian countries rely heavily on sugar imports, but the growth of sugar imports is slower than many other food items. In fact, imports of processed foods other than sugar have all grown much more rapidly than growth of total agri-food imports.

Table 6b: Contribution of processed food imports to increased total agri-food imports between 1998-2002 and 2013-2017 (Increased total agri-food imports for each country = 100)

	Total	Sub-region	China	Rest of Asia	Rest of World	Total	Sub-region
South Asia							
Bangladesh	13.5	0.8	0.3	0.5	11.8	+	-
India	7.1	0.6	0.2	0.6	5.7	+	-
Sri Lanka	18.9	4.9	3.4	5.7	4.9	-	+
Nepal	14.8	8.6	0.4	2.7	3.1	+	+
Pakistan	4.5	0.2	0.5	1.4	2.4	+	+
Southeast Asia							
Indonesia	20.8	9.1	2.4	0.6	8.7	+	+
Cambodia	45.9	38.0	0.9	3.6	3.4	+	-
Lao PDR	37.0	35.3	0.5	0.3	0.8	-	-
Myanmar	32.8	26.8	4.1	1.1	1.1	+	+
Malaysia	21.9	8.1	3.0	1.4	9.4	+	+
Philippines	27.5	14.0	5.8	1.4	6.3	+	+
Thailand	18.3	7.4	3.1	1.2	6.6	+	+
Vietnam	13.2	6.6	1.0	2.8	2.7	+	-
Central Asia							
Kazakhstan	35.8	0.5	1.5	1.0	32.8	-	-
Kyrgyz Republic	32.0	8.2	1.1	0.5	22.2	-	+
Tajikistan	22.1	4.4	0.5	-0.7	17.9	-	+
Uzbekistan	8.7	0.9	0.7	0.7	6.3	-	+

Source: Authors' calculation using data from BACI (2020)

Similar to nutritious foods, imports of processed foods come mainly from suppliers outside the region. There are three countries, Cambodia, Laos, and Myanmar, that are exceptions, where imports of processed foods come mainly from the neighboring countries in the region. As shown in column 7 of Table 6b, growth in regional imports of processed foods is mixed, with 11 countries increasing regional

imports (with positive sign in the column) and six countries reducing regional imports relatively to their total agri-food imports (with negative sign in the column).

In summary, Table 6a and Table 6b show that processed foods account for a large component of agri-food imports for most Asian countries, and that the dietary transformation seems to lead to the increased import demand. Processed foods generally account for a small portion of agri-food exports among most Asian countries, while there are a few countries where growth is rapid for exports. For the countries with rapid growth, the sub-regional markets are expanding, but with the exception for Nepal and Laos, sub-regional markets are still less important than trade with countries outside the region.

4. CONCENTRATION OF AGRI-FOOD TRADE IN ASIA

To better understand why many neighboring countries in Asia do not trade much within their sub-regions, we focus on the most important commodities each country trades in this section. We identify what these commodities are, how important they are for countries' agri-food exports and imports, whether these commodities are the same over time, and whether these commodities are also important for regional trade.

4.1 Measures of trade concentration

Based on the classification of the Harmonized Commodity Description and Coding System (HS), each of the 17 Asian countries exports and imports less than 220 agri-food commodity items at the HS 4-digit level. For reference, the HS 4-digit agricultural and nonagricultural export or import commodity items together are numbered 500–1,200, i.e., agri-food commodities account for less than 20 percent of total traded commodity items for most countries. Table 7 reports the number of agri-food commodities for individual countries' exports and imports, based on the HS 4-digit commodity classification code. The number of traded commodities varies over time, and hence, consistent with Tables 4-6, we report the numbers in two periods, 1998-2002 and 2013-2017.

Table 7 shows that Asian countries generally import more items than they export, and only larger countries like India, Pakistan, Indonesia, Malaysia, Thailand and Vietnam import and export a similar number of items. When countries export fewer agri-food commodities than they import, exports are likely to be more concentrated than imports limiting sub-regional trade opportunities among the countries.² Over time, countries generally export and import more agri-food product items.

² Concentration of exports (imports) is positively correlated with the value of individual products exported (imported) and

negatively correlated with the number of products exported (imported). $H_j = \frac{\sqrt{\frac{\sum_{i=1}^N x_{i,j}^2}{x_j^2} - \frac{1}{N}}}{1 - \frac{1}{N}}$ is the normalized Herfindahl-Hirschmann index to measure the export or import concentration for country j , where $x_{i,j}$ is individual products exported (imported), x_j country's total exports (imports), and N total number of products exported (imported).

Table 7: Number of agri-food commodities exported and imported at HS 4-digit level

	Exports		Imports	
	1998-2002	2013-2017	1998-2002	2013-2017
South Asia				
Bangladesh	159	179	206	202
India	218	215	218	214
Sri Lanka	190	198	210	207
Nepal	139	171	184	212
Pakistan	191	208	207	209
Southeast Asia				
Indonesia	220	210	220	215
Cambodia	108	150	181	200
Lao PDR	87	138	151	195
Myanmar	155	179	195	210
Malaysia	219	212	219	216
Philippines	194	210	218	217
Thailand	219	217	220	217
Vietnam	198	208	214	215
Central Asia				
Kazakhstan	177	195	209	214
Kyrgyz Republic	152	159	173	201
Tajikistan	93	101	136	162
Uzbekistan	134	134	176	189

Source: Authors' calculation from BACI (2020)

While many Asian countries trade a wide range of agri-food items, the value of exports or imports is dominated by a small number of products. Table 8a reports shares of the top 10 commodities in total agri-food exports as well as exports to different destinations for the 17 Asian countries. Table 8b reports similar information about imports. These 10 commodities generally account for more than 70 percent of the countries' total agri-food exports (Table 8a columns 1 and 2) and close to or more than 60 percent of total imports (Table 8b columns 1 and 2). For Bangladesh, Laos and Uzbekistan in the early period, and Cambodia and Tajikistan in both periods, the top 10 commodities account for more than 90 percent of their total agri-food exports in terms of value. We expect that larger countries' trade should be more diverse and the top 10 commodities may not constitute as a large proportion as in small countries. However, this is the case only for India, where the top 10 commodities account for about 60 percent of its agri-food exports, while for Pakistan, Indonesia, Malaysia, Thailand and Vietnam, the shares are more similar to smaller countries and close to 70 percent of their agri-food export values.

Table 8a: Shares of top 10 commodity items in total agri-food exports and agri-food exports to different markets (based on HS 4-digit code commodity classification, total agri-food exports and exports to individual markets = 100)

	In total exports		In exports to sub-region		In exports to China		In exports to rest of Asia		In exports to rest of the World	
	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017
South Asia										
Bangladesh	97.7	81.7	96.2	67.2	98.3	92.6	95.2	54.1	98.6	92.7
India	62.1	58.0	44.3	49.8	50.9	74.0	64.7	58.5	63.4	57.7
Sri Lanka	85.1	71.1	37.2	32.3	83.1	89.1	90.1	71.8	87.3	78.4
Nepal	85.0	82.8	86.8	88.8	91.7	65.1	24.7	39.2	5.5	25.2
Pakistan	77.3	69.0	66.4	64.5	58.1	57.8	77.5	71.1	80.8	73.0
Southeast Asia										
Indonesia	68.3	76.3	60.4	50.5	78.4	78.7	66.9	82.0	70.9	80.9
Cambodia	92.8	91.5	93.8	91.9	96.8	92.7	90.3	63.8	87.9	93.7
Lao PDR	93.3	80.1	88.9	74.0	91.3	88.5	91.4	72.0	96.1	82.9
Myanmar	88.4	84.7	83.4	72.9	64.0	81.8	94.1	89.4	87.3	94.4
Malaysia	74.4	72.2	33.0	42.8	93.2	85.2	83.9	76.6	85.7	81.9
Philippines	74.3	68.8	32.3	33.9	84.7	81.4	77.7	73.2	75.3	70.3
Thailand	71.8	67.6	62.4	50.1	75.1	86.1	67.5	66.0	77.3	69.7
Vietnam	80.3	76.9	82.0	59.2	49.6	69.0	76.3	68.3	87.4	87.1
Central Asia										
Kazakhstan	85.7	77.4	90.3	78.5	38.8	59.6	97.5	92.0	84.9	69.4
Kyrgyz Republic	78.8	64.6	35.1	35.3	82.3	51.3	24.6	71.5	85.8	83.5
Tajikistan	91.4	92.0	74.8	89.6	75.6	91.7	53.4	75.6	93.0	94.5
Uzbekistan	91.5	80.2	11.4	75.5	85.6	96.1	93.7	78.4	91.5	66.8

Notes: In columns 1 and 2 total agri-food exports = 100

In columns 3 and 4 agri-food exports to the sub-regions = 100

In columns 5 and 6 agri-food exports to China = 100

In columns 7 and 8 agri-food exports to the rest of Asia = 100

In columns 9 and 10 agri-food exports to the rest of the world = 100

Source: Authors' calculation using data from BACI (2020)

Table 8b: Shares of top 10 commodity items in agri-food imports and agri-food imports to different markets (based on HS 4-digit code commodity classification, total agri-food imports and imports from individual markets = 100)

	In total imports		In imports from sub-region		In imports from China		In imports from rest of Asia		In imports from rest of the World	
	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017	1998-2002	2013-2017
South Asia										
Bangladesh	79.6	78.9	73.3	71.4	15.1	3.7	70.8	77.2	87.6	87.4
India	75.4	76.5	25.6	19.1	75.5	14.1	82.3	82.3	76.1	80.0
Sri Lanka	69.4	62.5	61.1	61.8	15.7	21.5	52.3	54.3	80.4	73.2
Nepal	60.5	54.5	59.7	48.5	70.8	64.2	54.1	57.5	63.9	66.5
Pakistan	79.6	72.6	37.1	54.7	71.7	9.0	83.4	82.3	82.0	75.9
Southeast Asia										
Indonesia	73.2	59.9	72.0	32.8	67.0	38.3	66.7	30.3	75.9	72.8
Cambodia	75.6	63.3	78.3	68.1	82.4	40.9	70.4	44.6	57.7	57.6
Lao PDR	67.5	56.0	73.0	59.7	26.3	1.5	84.4	84.9	11.1	20.0
Myanmar	70.5	64.2	76.4	74.0	46.3	18.8	22.9	73.6	65.5	52.2
Malaysia	42.5	40.9	39.2	44.5	46.4	4.2	17.9	35.8	48.7	47.6
Philippines	56.1	47.9	49.9	38.4	46.8	31.0	54.4	53.9	58.9	55.3
Thailand	63.1	50.2	39.1	24.7	30.9	22.4	66.9	53.8	69.8	66.6
Vietnam	53.7	49.5	59.3	23.4	11.6	7.0	51.3	54.6	61.2	63.0
Central Asia										
Kazakhstan	55.2	37.6	28.4	22.8	24.1	13.4	63.4	36.0	56.1	41.6
Kyrgyz Republic	60.1	58.2	71.3	65.2	18.8	39.7	65.0	21.2	57.8	60.5
Tajikistan	82.4	71.8	97.6	86.0	36.6	31.4	80.6	18.9	72.3	63.3
Uzbekistan	75.7	63.7	96.9	86.8	77.3	72.5	34.7	50.2	73.8	45.3

Notes: In columns 1 and 2 total agri-food imports = 100

In columns 3 and 4 agri-food imports from the sub-regions = 100

In columns 5 and 6 agri-food imports from China = 100

In columns 7 and 8 agri-food imports from the rest of Asia = 100

In columns 9 and 10 agri-food imports from the rest of the world = 100

Source: Authors' calculation using data from BACI (2020)

4.2. Trade concentration over time

A country's top 10 export or import items are not necessarily the same commodities in the two periods. Table 9a reports the number of top-10 export commodities that are the same in both periods, and export values of the old and new top-10 items in 2013-2017 as shares of total agri-food exports respectively. Table 9b reports similar information for imports.

As shown in the first column of Table 9a, most countries (ten in total) have 5-7 top-10 export commodities that are the same in both periods, and the other three countries have even more with 7 or 8 commodities. There are only three countries – Cambodia, Laos and Uzbekistan, which have only 3 or 4 commodities that remain top-10 export items in both periods. Large countries tend to have more similar top-10 export items in both periods; for examples, India, Malaysia and Thailand all have 7 top-10 items in both periods, Pakistan and Indonesia have 6 and Vietnam has 9. When most countries have many of the same commodities as top-10 export items in both periods, their exports concentrate in similar commodities that dominate agri-food exports. Comparing columns two and three of table 9a, we notice that there are only three countries – Nepal, Cambodia and Laos where the new top-10 items show a relatively large share of total agri-food exports in 2013-2017, and only in Nepal and Laos where the share for the new top-10 items in total agri-food exports is larger than the share for the old top-10 items. Most countries continue to concentrate on a similar small group of commodities in exports over time. However,

for many countries the new top-10 items seem to play more important roles than the old top-10 items in their sub-regional exports. Comparing columns four and five in table 9a, we notice that there are six countries where the value for the new top-10 items is close to or much higher than the value for the old top-10 items. This indicates that sub-regional exports might be more dynamic.

Table 9a: Number of top-10 commodities same in both periods, shares of their export value in 2013-2017 agri-food exports, and export value of new top-10 items in 2013-2017 agri-food exports (based on HS 4-digit code commodity classification)

	# of top 10 items same in both periods	In total food exports		In food exports to the sub-region		In food exports to China		In food exports to rest of Asia		In food exports to rest of the world	
		Old items	New items	Old items	New items	Old items	New items	Old items	New items	Old items	New items
South Asia											
Bangladesh	6	71.8	9.9	44.6	22.5	61.9	30.8	40.7	13.3	91.0	1.7
India	7	46.5	11.5	22.2	27.5	24.0	50.0	51.4	7.1	50.3	7.3
Sri Lanka	6	61.9	9.2	27.3	5.0	86.2	2.9	67.3	4.5	65.0	13.4
Nepal	5	39.6	43.2	43.8	45.0	7.5	57.7	12.5	26.7	6.9	18.3
Pakistan	6	56.0	13.1	40.2	24.2	57.8	0.0	56.1	15.0	67.3	5.7
Southeast Asia											
Indonesia	6	69.6	6.7	36.6	14.0	76.1	2.6	79.5	2.5	72.8	8.1
Cambodia	4	56.0	35.5	43.0	48.9	75.9	16.8	57.1	6.7	77.2	16.5
Lao PDR	3	33.6	46.5	17.1	56.9	47.9	40.6	69.3	2.6	43.7	39.2
Myanmar	8	65.8	18.9	52.9	20.0	35.2	46.6	86.2	3.2	90.1	4.2
Malaysia	7	64.1	8.2	25.3	17.4	78.5	6.7	70.9	5.7	76.9	5.0
Philippines	8	65.1	3.6	17.2	16.6	81.3	0.1	71.2	2.0	67.6	2.7
Thailand	7	57.2	10.4	43.4	6.7	55.8	30.2	57.1	8.9	65.4	4.3
Vietnam	9	71.9	5.0	56.0	3.2	53.3	15.7	63.7	4.6	84.6	2.5
Central Asia											
Kazakhstan	5	64.8	12.6	72.5	6.0	38.9	20.7	86.7	5.3	45.6	23.9
Kyrgyz Republic	5	45.6	19.0	10.5	24.8	1.4	49.9	25.1	46.4	76.2	7.2
Tajikistan	5	80.2	11.7	55.2	34.4	89.0	2.6	75.3	0.3	90.1	4.4
Uzbekistan	4	61.5	18.7	51.8	23.7	93.4	2.7	49.5	29.0	39.2	27.6

Notes: In columns 1 and 2 annual average of total agri-food exports for 2013-2017 = 100

In columns 3 and 4 annual average of total agri-food exports to the sub-region for 2013-2017 = 100

In columns 5 and 6 annual average of total agri-food exports to China for 2013-2017 = 100

In columns 7 and 8 annual average of total agri-food exports to the rest of Asia for 2013-2017 = 100

In columns 9 and 10 annual average of total agri-food exports to the rest of world for 2013-2017 = 100

Source: Authors' calculation using data from BACI (2020)

Similar as for exports, Table 9b for imports shows that countries seem to concentrate on a similar set of top-10 import commodities in both periods. This is particularly true in South Asia with Nepal as the only exception and Central Asia with Uzbekistan as the exception (column one of Table 9b). The situation is rather mixed in Southeast Asia. Four Southeast Asian countries have 6 to 8 top-10 import items same in both periods, while the other four countries, have only 4 of the same top-10 items in both periods (column one of table 9b). When countries import many of the same top-10 items in both periods, these commodities dominate top-10 imports. Columns two and three of Table 9b show that only in Nepal, Laos, Myanmar and Vietnam, values for the new top-10 items are close to or larger than values for the old top-10 items, while for most other countries, values for the new items are much smaller than for old items. This is also the case for sub-regional imports indicated by the comparison between columns four and five in Table 9b. For most countries, the old top 10 items dominate and these values are much higher than for the new top-10 items. Nepal, Laos, Vietnam and Kazakhstan are the four exceptions, where values for the new top-10 import items are higher than for the old items.

Table 9b: Number of top-10 commodities same in both periods, shares of their import value in 2013-2017 agri-food imports, and import value of new top-10 items in 2013-2017 agri-food imports (based on HS 4-digit code commodity classification)

	# of top 10 items same in both periods	In total food imports		In food imports from the sub-region		In food imports from China		In food imports from rest of Asia		In food imports from rest of the world	
		Old items	New items	Old items	New items	Old items	New items	Old items	New items	Old items	New items
South Asia											
Bangladesh	8	72.7	6.2	67.1	4.3	2.6	1.1	77.2	0.0	77.8	9.7
India	8	73.0	3.5	18.2	0.9	14.0	0.1	74.6	7.7	79.6	0.3
Sri Lanka	8	56.0	6.5	55.6	6.2	21.3	0.1	41.9	12.4	69.0	4.2
Nepal	2	16.8	37.7	24.0	24.5	1.0	63.2	17.2	40.3	0.7	65.7
Pakistan	8	62.1	10.4	42.7	12.0	8.5	0.5	81.7	0.5	56.7	19.2
Southeast Asia											
Indonesia	8	54.1	5.8	32.0	0.8	13.9	24.3	28.5	1.8	68.2	4.6
Cambodia	4	40.5	22.8	51.9	16.2	6.9	34.0	31.5	13.1	2.2	55.4
Lao PDR	4	15.5	40.5	17.5	42.2	0.3	1.2	0.7	84.2	2.3	17.7
Myanmar	4	32.0	32.2	49.6	24.4	8.9	9.9	3.9	69.8	2.4	49.8
Malaysia	8	28.3	12.6	27.9	16.7	4.0	0.2	11.6	24.2	37.7	9.8
Philippines	6	37.5	10.4	28.0	10.4	6.1	24.8	33.5	20.4	48.8	6.5
Thailand	7	40.9	9.2	14.3	10.4	9.4	12.9	45.0	8.8	58.7	7.9
Vietnam	4	25.4	24.1	2.1	21.3	4.0	3.0	18.0	36.6	40.2	22.8
Central Asia											
Kazakhstan	6	24.8	12.8	1.5	21.4	1.2	12.2	25.2	10.8	29.9	11.6
Kyrgyz Republic	7	44.9	13.4	56.8	8.5	0.6	39.1	19.7	1.5	49.9	10.7
Tajikistan	6	55.5	16.3	82.7	3.3	0.8	30.5	15.5	3.4	32.1	31.2
Uzbekistan	5	49.3	14.4	78.7	8.1	72.5	0.0	13.3	36.9	27.2	18.2

Notes: In columns 1 and 2 annual average of total agri-food imports for 2013-2017 = 100

In columns 3 and 4 annual average of total agri-food imports from the sub-region 2013-2017 = 100

In columns 5 and 6 annual average of total agri-food imports from China 2013-2017 = 100

In columns 7 and 8 annual average of total agri-food imports from the rest of Asia 2013-2017 = 100

In columns 9 and 10 annual average of total agri-food imports from the rest of world 2013-2017 = 100

Source: Authors' calculation using data from BACI (2020)

In summary, while not all top-10 export or import commodities are the same over time, for most Asian countries, they continue to export or import similar commodities over time. While their total agri-food exports are concentrated on a similar set of commodities, exports to sub-regional markets seem to be more dynamic and increases in regional trade opportunities often come from commodities becoming important recently. On the import side, however, sub-regional imports are similar to total agri-food imports, i.e., both total and regional imports concentrate on similar top-10 items over time.

4.3 Market structure of trade concentration

Focusing on the recent period of 2013-2017, Table 10a to Table 10c further investigate export market structure of the top-10 commodities for the three regions respectively.³ The three tables report bilateral trade within the sub-region as well as exports to rest of the sub-regional countries as a group, to China, to the rest of Asia, and to the rest of the world respectively as shares of each country's top-10 commodities' total exports. The aggregated shares for the sub-region and Asia as whole are the last two columns in each

³ Cambodia and Laos are missing data for 2017 in BACI for many commodities. Therefore, we use the 2012-2016 average for the countries in Southeast Asia.

of the three tables. Figure 2 repeats similar information as Table 10a-10c focusing on three aggregate export markets – sub-regions, the rest of Asia including China, and the rest of the world.

Table 10a: Shares of destinations for top 10 export commodities in 2013-2017 (South Asia, a country's total top-10 exports = 100)

	BGD	IND	LKA	NPL	PAK	RoSA	CHN	RoA	RoW	SA	Asia
BGD	-	11.0	0.0	0.6	3.3	0.0	10.4	12.2	62.5	14.9	37.5
IND	4.4	-	1.2	1.3	1.8	0.2	5.9	41.4	43.7	9.0	56.3
LKA	0.0	3.6	-	0.0	1.8	0.2	2.9	35.0	56.4	5.7	43.6
NPL	5.3	85.9	0.0	-	0.0	2.9	2.1	2.2	1.7	94.0	98.3
PAK	0.9	3.7	1.6	0.1	-	16.8	6.7	33.5	36.7	23.1	63.3

Notes: RoSA=rest of South Asia, RoA= rest of Asia, RoW=rest of the world, SA=South Asia, which includes BGD, IND, LKA, NPL, PAK, and RoSA, Asia=SA+CHN+RoA

Exporting countries are listed in the left column.

Source: Authors' calculation using data from BACI (2020)

Table 10b: Share of destinations for top 10 export commodities in 2012-2016 (Southeast Asia, a country's total top-10 exports = 100)

	IDN	KHM	LAO	MMR	MYS	PHL	THA	VNM	RoSEA	CHN	RoA	RoW	SEA	Asia
IDN	-	0.7	0.0	1.2	5.9	0.3	0.9	0.9	2.6	12.5	30.9	44.1	12.5	55.9
KHM	0.3	-	0.0	-	9.1	0.0	16.4	36.2	2.0	8.4	2.5	25.0	64.1	75.0
LAO	0.1	0.1	-	-	0.1	0.3	14.8	34.5	1.1	31.2	4.7	13.2	50.9	86.8
MMR	2.3	0.0	0.0	-	5.2	0.6	6.6	1.8	2.1	24.5	46.3	10.6	18.6	89.4
MYS	1.3	0.1	0.0	1.2	-	1.6	1.6	2.8	4.4	15.8	31.9	39.3	13.0	60.7
PHL	0.5	0.0	-	0.0	1.9	-	3.1	0.4	1.5	9.3	38.5	44.8	7.5	55.2
THA	3.4	1.1	0.8	0.7	5.5	0.6	-	1.0	1.6	18.8	25.3	41.1	14.7	58.9
VNM	1.9	0.2	0.0	0.0	4.1	2.3	1.9	-	1.6	13.6	19.1	55.2	12.0	44.8

Note: RoSEA=rest of Southeast Asia, RoA= rest of Asia, RoW=rest of the world, SEA=Southeast Asia, which includes IDN, KHM, LAO, MMR, MY, PHL, THA, VNM, and RoSEA, Asia=SEA+CHN+RoA

Exporting countries are listed in the left column.

Because the data for KHM and LAO is missing in BACI for 2017, 2012-2016 average is used instead.

Source: Authors' calculation using data from BACI (2020)

Table 10c: Share of destinations for top 10 export commodities in 2013-2017 (Central Asia, a country's total top-10 exports = 100)

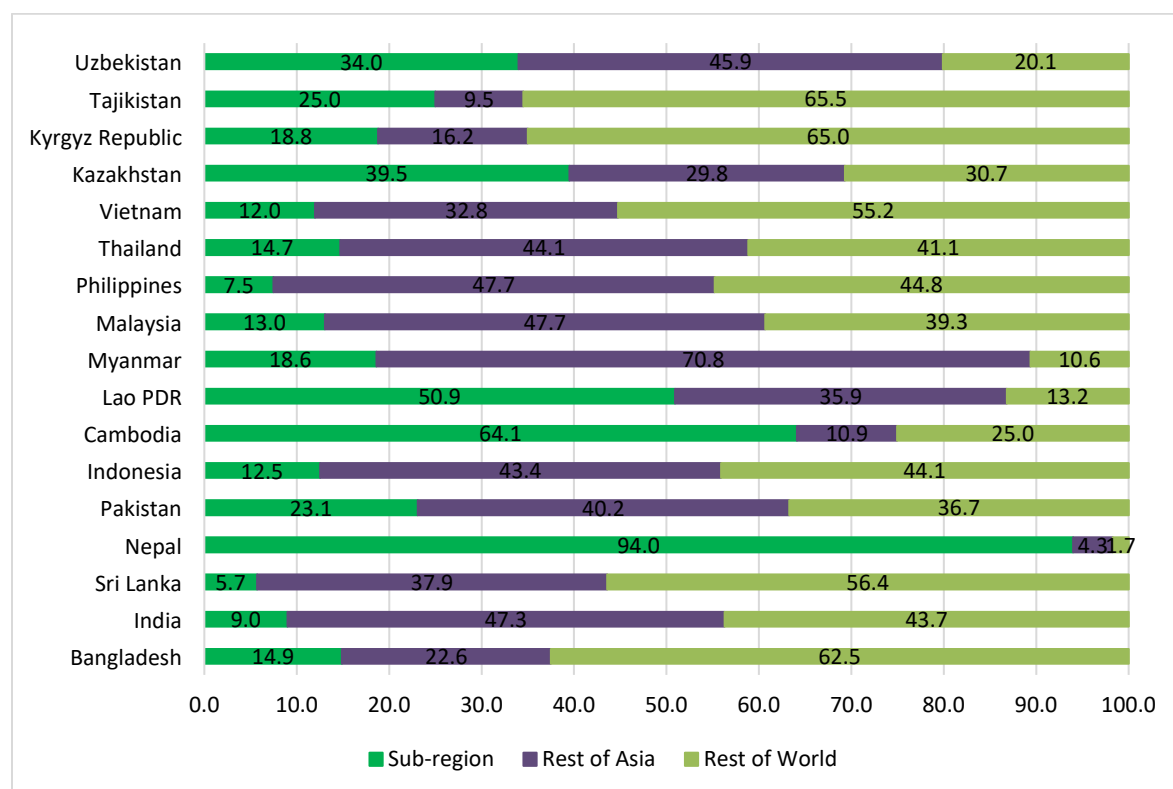
	KAZ	KGZ	TJK	UZB	RoCA	CHN	RoA	RoW	CA	Asia
KAZ	-	6.6	11.3	20.6	1.0	3.8	25.9	30.7	39.5	69.3
KGZ	18.3	-	0.1	0.2	0.2	8.8	7.5	65.0	18.8	35.0
TJK	23.4	1.6	-	-	-	4.4	5.1	65.5	25.0	34.5
UZB	33.1	0.9	-	-	-	36.1	9.8	20.1	34.0	79.9

Note: RoCA=rest of Central Asia, RoA= rest of Asia, RoW=rest of the world, CA=Central Asia, which includes KAZ, KGZ, TJK, UZB, and RoCA, Asia=CA+CHN+RoA

Exporting countries are listed in the left column.

One important finding from Table 10a-10c and Figure 2 is that, with a few exceptions (Nepal, Cambodia, Laos, and Kazakhstan), sub-regional partners are less important destinations than exports to the rest of Asia or the rest of the world for most countries' top 10 export commodities. There are five countries – Bangladesh, Sri Lanka, Vietnam, Kyrgyz Republic, and Tajikistan, where more than half of top-10 commodities' exports are destined for the rest of the world. There are seven countries – India, Sri Lanka, Pakistan, Indonesia, Myanmar, Malaysia and Philippines, where the rest of Asian market (excluding China) accounts for more than 30 percent of exports in value for their top 10 export commodities. Exports to China accounts for more than 30 percent of total top 10 commodity export value for Laos and Uzbekistan, about 25 percent for Myanmar, close to 20 percent for Thailand, and about 15 percent for Malaysia and Vietnam.

Figure 2: Shares for top-10 agri-food commodities exported to sub-region, the rest of Asia and the rest of the world in 2013-2017 (total top-10 exports = 100)



Note: 2017 data is missing for Cambodia and Lao. Therefore, shares for Southeast countries in the figure is for 2012-2016. Source: Authors' creation using data from BACI (2020).

The second finding from Table 10a-10c is that for 12 out of 17 countries, the Asian market is more important than exports to the rest of the world, but markets in the sub-regions are less important. The exceptions are Vietnam where exports going to the rest of the world outside Asia are more than to Asia and Cambodia and Laos where the sub-regional Asian market is more important than the rest of Asia.

It is understandable that small countries within the same sub-region are unlikely to become important trade partners for their large neighboring countries where exports are concentrated in a small group of commodities. Taking India as an example, the top 10 commodity exports are valued at 32 billion US dollar annually in 2013-2017, which is 70 percent more than the value of annual imports of total agri-food products by the other four South Asian countries combined. Still, 4.7 percent of India's top-10 commodity exports are destined for Bangladesh, close to the value India exports to China (Table 10a).

The third finding is that for many countries, one or two Asian countries either within or outside the sub-region are the most important trade partner for their top 10 commodity exports. A typical example is Nepal, where 80.3 percent of top 10 commodities are exported to India. Cambodia also relies on a

single within-region partner – Vietnam, which imports 36.2 percent of Cambodia’s top 10 commodity exports. Myanmar is a typical example with most important trade partners outside its sub-region. Both China and India account for more than 25 percent of Myanmar’s top 10 commodity exports each, while the Southeast Asian market accounts for only 18.6 percent. The Philippines also relies on a large partner outside its sub-region – Japan, which imports about 20 percent of Philippines’s top 10 commodity exports. Similarly, Uzbekistan in Central Asia relies on China which accounts for 31 percent of its top 10 commodity exports. Laos is an example with important trade partners both within the sub-region – Vietnam, and outside of the sub-region – China. These two countries account for 34.5 percent and 31.2 percent of Laos’ top 10 commodity exports respectively.

Many Asian countries export a concentrated group of commodities to the world. Is it possible that they export disproportionately less of these commodities to their sub-region? To answer this question, Table 8a also reports shares of the top 10 commodities in total value of agri-food commodities exported to different markets, including to the sub-region, China, the rest of Asia and the rest of the world. Table 8b reports similar information on these countries’ import markets. Table 8a shows that for some countries, the top 10 commodities in total agri-food exports are not similarly important for exports to the sub-region. For example, the top 10 commodities account for more than 70 percent of total agri-food exports for Sri Lanka, Malaysia and Philippines, 65 percent for Kyrgyz Republic in the recent period, and only about 30 – 40 percent of their exports to their respective sub-regions.

However, for most other countries, the top 10 commodities are similarly important for their total exports and exports to the sub-regions. Focusing on the recent period, the correlation between the share of total exports and share of exports to the sub-region is very high for the same top 10 commodities with a correlation coefficient of 0.809, much higher than the correlation between total exports and exports to the rest of Asia (0.051), to China (0.445) and to the rest of the world (0.317) for the same top 10 commodities. This implies that while for each of these Asian countries a small group of commodities can be important for both total exports and exports to sub-regions, the main markets for these commodities are not in the sub-regions.

Compared with exports, imports from the sub-regions have become more diverse in the recent period particularly for Southeast and Central Asian countries, while it did not happen among South Asian countries. Except for Myanmar, Malaysia and Kyrgyz Republic, shares of top 10 commodities in total agri-food imports fall about 10 percentage points between the two periods for Southeast and Central Asian countries, while the declines in the share are about 6 – 7 percent for three of the five South Asian countries and the share barely changes for the other two South Asian countries (Table 8b).

4.4 The mismatch between demand and supply in agri-food trade – an example of South Asia in the recent period

When sub-regional agri-food exports are dominated by a small group of commodities, sub-regional trade becomes important only if other countries in the same region have high import demand for these commodities. The above analysis does not seem to support this scenario. Using South Asia as an example, we demonstrate the mismatch between top 10 commodities exported from Bangladesh and top 10 commodities imported by the other four South Asian countries in 2013-2017.⁴

As we discussed above in Table 4, agri-food exports to Asia account for 43.5 percent of Bangladesh’s total agri-food exports in the recent period of 2013-2017, and exports to South Asia account for only 16.7 percent. While exports to the sub-region has almost doubled since 1998-2002, the sub-regional market is still less important to Bangladesh. On the import side, except for Nepal, where imports from South Asia account for 59.8 percent of the country’s total agri-food imports in 2013-2017, South Asia trade accounts for only 4.8 percent of India’s total agri-food imports, 24.4 percent for Sri Lanka and 15.1 percent for Pakistan in the same period (Table 4).

Among the top 10 commodities Bangladesh exports in 2013-2017, three are fishery products including live, fresh or frozen fish and crustaceans, together accounting for almost 50 percent of

⁴ Lists of top 10 agri-food export commodities in 2013-2017 for the 17 Asian countries can be found in Appendix, Table A1-A17.

Bangladesh's total agri-food exports but only 2.2 percent of its exports to South Asia. On the import side, none of these three fish products are among the top 10 import items for the other four South Asian countries. The only commodity that is one of top-10 export items for Bangladesh and also one of top-10 import items for three of the other four South Asian countries is nut products (HS 4-digit commodity code 0802). Nut products account for 4.6 percent of Bangladesh's total agri-food exports and 20.4 percent of the country's exports to South Asia. On the import side, this commodity accounts for 2.7 percent, 4.3 percent and 2.2 percent of total agri-food imports for Nepal, India and Pakistan respectively. Bangladesh's top-10 commodities that have the highest regional export share is a jute product, accounting for 43 percent of Bangladesh's agri-food exports to South Asia (and 11.7 percent of its total agri-food exports). On the import side, this commodity ranks at 18th for Nepal's imports and is not among top 20 import items for all other four countries.

One of top-10 import items important for all South Asian countries is dried legumes. However, it is among the top-10 export items only for Nepal. However, Nepal imports 4.6 times what it exports. Thus, all South Asian countries rely on imports from the rest of Asia or rest of the world for meeting domestic demand for this commodity.

Palm oil is also one of the top-10 important items imported by all South Asian countries, accounting for 27 percent of total agri-food imports for India, 31 percent for Pakistan, 13 percent for Bangladesh, and about 4 percent for Sri Lanka and Nepal. But palm oil is not among the top 20 export items for any South Asian country, and imports of palm oil comes mainly from the rest of Asia, accounting about 70 percent of Asian imports of total agri-food products for India and Pakistan, and more than 50 percent for Bangladesh.

There are a few top 10 commodities that are important for sub-regional imports and exports among South Asian countries. For examples, cotton (commodity 5201) is among the top 10 export and import commodities for India and Pakistan. Rice is among top 10 export commodities for India, and top 10 import commodity for Sri Lanka, Nepal and Bangladesh. As expected, regional trade is dominated by a few such commodities in South Asia.

In summary, this section analyzes the concentration of agri-food exports and imports. For almost all Asian countries, a small group of 10 commodities dominate their exports and imports. Many of these commodities are same over time. While a small group of commodities is similarly important both for a country's total exports and exports to the sub-regions, the main markets for these important commodities are not in the sub-regions. The main reason is that what dominant commodities a country exports are not the same dominant commodities imported by other countries in the same region. The mismatch between demand and supply of agri-food trade within sub-regions is an obvious natural barrier for promoting regional trade.

5. MEASURING TRADE COMPLEMENTARITY WITHIN SUB-REGION

In this section, we further investigate the mismatch issue in sub-regional trade using an index approach. It is often argued that countries that are geographically proximate and trade a lot with each other are “natural” trading partners who would benefit more from free trade agreements (Lipsey 1960; Wonnacott and Lutz 1989; Krugman 1991; Summers 1991; Schiff 2001). However, a number of studies suggest that “natural” trading partners would not necessarily gain from preferential trade arrangements such as Regional Trade Agreements (RTAs) (Bhagwati and Panagariya, 1996; Panagariya, 1997; Krishna, 2003). Countries may actually lose from entering into an RTA with “natural” trading partners depending on pre-agreement tariff levels and the proportion of trade with other countries, among other factors. Despite little consensus on whether preferential trade agreements are welfare enhancing to “natural” trading partners, the number of RTAs have increased considerably since the 1990s. To explore the potential for trade diversion and creation in the region and, subsequently, the potential for regional trade agreements, it is important to first figure out the relationship between export and import structures of countries within a region. One commonly used tool for the analysis of this relationship is the Trade Compatibility Index (TCI) developed by Michaely (1996), which was used to measure the potential for trade diversion and the relevance of potential preferential trade agreements among countries in the Latin American (LAC) region. For the home country, higher levels of compatibility with a partner country in LAC indicates more potential for displacement of trade with other countries and a larger scope of trade expansion following an RTA in the region. He identified four variables that affect the level of the index: export concentration, economic size, nation’s wealth, and the share of manufacturing. He found little evidence that intra-Latin America free trade agreements would succeed. Other commonly used trade complementarity indicators include revealed comparative advantage (RCA) introduced by Balassa (1965), normalized revealed comparative advantage (NRCA) by Laursen (1998), export specialization index (ESI), a slightly modified RCA, applied in Bernatonyte (2009), and the trade intensity index by Yamazawa (1970). Hoang (2018) used a number of different trade complementarity indicators listed above to analyze agricultural trade complementarity among ASEAN countries for the period of 1997-2015. He found that ASEAN countries are weakly complementary with each other in agricultural trade and the level of complementarity slightly decreases over time. He suggested that ASEAN countries benefit more from global integration than regional integration.

High trade complementarity between large and small countries may sometimes be misleading because of the difference in the level of trade between them. Moreover, because agri-food trade commodities in this study account for less than 20 percent of total trade commodities for most Asian countries and small Asian countries tend to export (import) fewer items than large countries, pairing a small country’s export (import) share with a large country’s import (export) share within the sub-region non-discriminately using the method developed by Michaely (1996) is expected to generate an extremely small TCI value for a small country.⁵ To deal with this issue, we develop a Modified Trade Complementarity Index (MTCI) to assess agri-food trade potential and complementarity among countries within the same sub-region. Using data on bilateral trade at HS 6-digit level for the period of 2013-2017, we calculate two MTCIs for each pair of countries to measure the extent to which their export and import structures match.⁶ The index can take on any value between 0 and 1, with 0 indicating no complementarity and 1 indicating perfect complementarity.

The $MTCI^{EX}$ that measures how compatible a partner’s imports are with a home country’s exports is defined as follow:

⁵ The TCI in Michaely (1996) is defined as follows: $TCI_{j,t} = 1 - \frac{\sum_i |EXshare_{i,j} - IMshare_{i,t}|}{2}$ where country j is a home country and t a partner country, $EXshare_{i,j}$ is country j ’s export value of commodity i divided by country j ’s total exports, and $IMshare_{i,t}$ is country t ’s import value divided by country t ’s total imports. If j is a small country and t a large country, $EXshare_{i,j} - IMshare_{i,t}$ could be negative for many i , which implies that the sum of the absolute value of $EXshare_{i,j} - IMshare_{i,t}$ could become very large, pushing $TCI_{j,t}$ to be an extremely small number.

⁶ Due to missing data for Cambodia and Laos in 2017, 4-year average trade values (2013-2016) for these two countries are used to calculate MTCIs.

$$MTCI_{j,t}^{EX} = 1 - \frac{\sum_i^N EX_{i,j} - IM_{i,t}}{EX_j}$$

where $EX_{i,j}$ is the 5-year average value of commodity i exported by home country j in 2013-2017, $i \in N$ and N is the total number of commodities that country j exports more in value than country t imports, $IM_{i,t}$ 5-year average value of i imported by partner country t , and EX_j 5-year average value of total agri-food exports of home country j in 2013-2017. $MTCI_{j,t}^{EX}$ measures how complementary partner country t 's imports are with home country j 's exports. In attempt to control for potential bias introduced by the large difference between a small home exporting country's export value and a large importing partner country's import value, two modifications are made to the TCI developed by Michaely (1996). First, the home country j 's export value and the partner country t 's import value of commodity i are both divided by home country j 's total exports in $MTCI_{j,t}^{EX}$ (as opposed to partner country t 's import value of commodity i divided by country t 's own total imports in the conventional TCI presented in footnote 4). Second, only a subset of commodities is included, i.e., commodity i is included only if $EX_{i,j} > IM_{i,t}$, and $EX_{i,j} - IM_{i,t}$ is set to 0 if $EX_{i,j} < IM_{i,t}$. That is, the negative value of $EX_{i,j} - IM_{i,t}$ will be excluded from the calculation including when $EX_{i,j} = 0$ and $IM_{i,t} > 0$. With this setting, we do not take the absolute value of $EX_{i,j} - IM_{i,t}$.

Similarly, the $MTCI^{IM}$ that measures how compatible a partner's exports are with a home country's imports is defined as follow:

$$MTCI_{j,t}^{IM} = 1 - \frac{\sum_i^N IM_{i,j} - EX_{i,t}}{IM_j}$$

where $IM_{i,j}$ is the 5-year average value of commodity i imported by home country j , $EX_{i,t}$ is the 5-year average value of i exported by partner country t , and IM_j is the 5-year average value of total agri-food imports of home country j . Again, in attempt to control for potential bias introduced by the large difference between a small home importing country's import value and a large partner exporting country's export value, N includes commodity i only if $IM_{i,j} > EX_{i,t}$, and $IM_{i,j} - EX_{i,t}$ is set to 0 if $IM_{i,j} < EX_{i,t}$. Again, items that partner country t exports but home country j does not import are excluded from N .

The results of the MTCI calculation suggest that, after controlling for possible bias against small countries, smaller countries tend to enjoy a higher level of complementarity with their sub-regional partners especially when they are large. On the other hand, large countries tend to have a lower level of complementarity with partners within the same sub-region, especially when they are small. Nevertheless, given the larger and more diversified trade portfolio large countries typically have, the $MTCI_{j,t}^{EX}$ and $MTCI_{j,t}^{IM}$ for large countries tend to be underestimated. In the case of $MTCI_{j,t}^{EX}$ for a large exporting home country, because small partners' imports $IM_{i,t}$ are measured against the large home country' total exports EX_j , and it is less likely for large exporting home countries to have $EX_{i,j} < IM_{i,t}$, the values of $MTCI_{j,t}^{EX}$ tends to be driven lower.

Consistent with our findings in Section 4 that small countries trade disproportionately more with one or two large partners in the sub-region, the level of complementarity between a small exporting home country and a large importing partner country is generally higher than other pairs of countries. The same is true for a small importing home country and a large exporting partner country. On the other hand, large exporting home countries and small importing partner countries or large importing home countries and small exporting partner countries are generally the least compatible as measured by the MTCI due to the reason explained above. The MTCI values for a pair of two small countries or of two large countries tend to be in the middle with the exception of Nepal as an exporter.

Unlike in the conventional TCI, the values of MTCI for a pair of countries are not necessarily symmetric. That a home country's exports are a good match with a partner's imports does not imply that

the reserve is true. For example, the values of $MTCI^{IM}$ matching Southeast Asian countries' (excluding Indonesia and Vietnam's) import structures with their exporting partner Thailand's export structure range from 0.40 to 0.93 (the second panel of Table 11b), which suggests that as one of the dominant exporters in Southeast Asia, Thailand's exports would be considered a good complement to the imports of the these Southeast Asian countries. However, Thailand would find the imports of these small Southeast Asian countries less compatible with its exports given that values of $MTCI^{EX}$ range from 0.02 to 0.22 (the first panel of Table 11b). This asymmetric relationship between large and small countries in sub-regional trade makes more sense than the symmetric relationship obtained from the conventional TCI, because in reality a large country tends to export more in volume and value than a small country does. Our MTCI also suggests that from the perspective of small countries, the larger a partner is, the more compatible it is likely to be. On the other hand, large countries would typically find that a partner of similar size or with similarly diverse and large trade portfolio tends to be a less compatible partner. In the example of Thailand above, imports of Laos, the smallest country in Southeast Asia, are the least compatible with Thailand's exports (with $MTCI^{EX} = 0.02$ as shown in the first panel of Table 11b), while Malaysia, a relatively large country in the sub-region, has import demand that is the most compatible with Thailand's export supply (with $MTCI^{EX} = 0.22$ as shown in the first panel of Table 11b). Our MTCI results suggest that small countries with highly compatible large trade partners in the same sub-region may have more incentives to enter into bilateral trade arrangements with large partners than joining a regional trade agreement, given their relatively low capacity to supply exports and level of import demand. For the large countries, because the sub-regional market is oftentimes not large enough to meet their import demand or consume their export supply, a regional trade agreement may be less likely to serve their needs for trade expansion.

When we compare MTCIs in Table 11a-c with shares of actual trade flows in Table 12a-c, we find that trade complementarity in general is positively associated with actual trade flows and patterns (Figure 3).⁷

Table 11a: Modified Trade Complementarity Index for South Asian Countries 2013-2017

<i>MTCI^{EX}</i>						
	BGD_IM	IND_IM	LKA_IM	NPL_IM	PAK_IM	Average
BGD_EX		0.29	0.14	0.17	0.19	0.20
IND_EX	0.12		0.05	0.03	0.09	0.07
LKA_EX	0.12	0.27		0.10	0.31	0.20
NPL_EX	0.40	0.99	0.31		0.43	0.53
PAK_EX	0.19	0.20	0.17	0.11		0.17
<i>MTCI^{IM}</i>						
	BGD_EX	IND_EX	LKA_EX	NPL_EX	PAK_EX	Average
BGD_IM		0.55	0.04	0.01	0.11	0.18
IND_IM	0.02		0.04	0.01	0.04	0.03
LKA_IM	0.07	0.74		0.03	0.31	0.29
NPL_IM	0.14	0.78	0.22		0.39	0.38
PAK_IM	0.03	0.51	0.14	0.02		0.18

Source: Authors' calculation using data from BACI (2020)

⁷ Due to missing data for Cambodia and Laos in 2017, the shares of 5-year average bilateral trade in 5-year average trade of all Southeast Asian countries are calculated using data for 2012-2016.

Table 11b: Modified Trade Complementarity Index for Southeast Asian Countries 2013-2017

<i>MTCI^{EX}</i>									
	IDN_IM	KHM_IM	LAO_IM	MMR_IM	MYS_IM	PHL_IM	THA_IM	VNM_IM	Average
IDN_EX		0.02	0.01	0.04	0.15	0.07	0.09	0.15	0.07
KHM_EX	0.44		0.11	0.10	0.63	0.46	0.30	0.51	0.37
LAO_EX	0.51	0.34		0.30	0.79	0.49	0.52	0.76	0.53
MMR_EX	0.27	0.09	0.06		0.43	0.19	0.28	0.37	0.24
MYS_EX	0.12	0.06	0.02	0.09		0.15	0.16	0.18	0.11
PHL_EX	0.17	0.10	0.05	0.09	0.29		0.23	0.25	0.17
THA_EX	0.14	0.04	0.02	0.06	0.22	0.11		0.16	0.11
VNM_EX	0.11	0.05	0.03	0.05	0.22	0.11	0.16		0.10
<i>MTCI^{IM}</i>									
	IDN_EX	KHM_EX	LAO_EX	MMR_EX	MYS_EX	PHL_EX	THA_EX	VNM_EX	Average
IDN_IM		0.03	0.02	0.05	0.18	0.07	0.28	0.14	0.10
KHM_IM	0.54		0.14	0.14	0.76	0.37	0.73	0.58	0.46
LAO_IM	0.55	0.15		0.20	0.63	0.41	0.93	0.63	0.50
MMR_IM	0.53	0.03	0.07		0.69	0.20	0.63	0.33	0.35
MYS_IM	0.37	0.04	0.03	0.07		0.12	0.45	0.26	0.19
PHL_IM	0.31	0.05	0.04	0.06	0.38		0.40	0.25	0.21
THA_IM	0.28	0.02	0.03	0.06	0.30	0.12		0.24	0.15
VNM_IM	0.26	0.02	0.02	0.05	0.19	0.08	0.25		0.13

Source: Authors' calculation using data from BACI (2020)

Table 11c: Trade Complementarity Index for Central Asian Countries 2013-2017

<i>MTCI^{EX}</i>					
	KAZ_IM	KGZ_IM	TJK_IM	UZB_IM	Average
KAZ_EX		0.17	0.17	0.26	0.20
KGZ_EX	0.58		0.19	0.23	0.33
TJK_EX	0.40	0.11		0.07	0.20
UZB_EX	0.45	0.06	0.03		0.18
<i>MTCI^{IM}</i>					
	KAZ_EX	KGZ_EX	TJK_EX	UZB_EX	Average
KAZ_IM		0.03	0.02	0.13	0.06
KGZ_IM	0.59		0.02	0.09	0.24
TJK_IM	0.80	0.08		0.06	0.31
UZB_IM	0.58	0.04	0.01		0.21

Source: Authors' calculation using data from BACI (2020)

Results in Table 12a-c show that countries with lower average trade complementarity with sub-regional partners based on the MTCI calculation tend to rely more on the rest of Asia and/or the rest of the world for trade. For example, India and Indonesia have the lowest level of trade complementarity on average with their sub-regional partners as measured by the MTCI. Over 89 percent of India's agri-food exports are destined for countries outside of South Asia and over 95 percent of its agri-food imports are from non-South Asian countries. Agri-food trade with non-Southeast Asian countries accounts for more than 83 percent of Indonesia's total agri-food trade. Similarly, Uzbekistan has an export supply that is the least complementary with its sub-regional partners' import demand and it in turn relies heavily on China and the rest of the world for its exports. Nepal and Laos, on the other hand, have the highest level of trade complementarity with their sub-regional partners as measured by MTCI and they trade more within the sub-region relative to their peers.

Table 12a: Share of bilateral trade in total trade 2013-2017 (South Asia, a country's total exports or imports = 1.00)

	In total exports								
	BGD	IND	LKA	NPL	PAK	RoSA	CHN	RoA	RoW
BGD_EX	-	0.12	0.01	0.02	0.03	0.00	0.09	0.17	0.57
IND_EX	0.05	-	0.01	0.02	0.02	0.01	0.05	0.42	0.42
LKA_EX	0.00	0.08	-	-	0.02	0.02	0.02	0.34	0.52
NPL_EX	0.05	0.80	-	-	-	0.03	0.03	0.05	0.05
PAK_EX	0.01	0.03	0.02	0.00	-	0.19	0.08	0.33	0.34
	In total imports								
	BGD	IND	LKA	NPL	PAK	RoSA	CHN	RoA	RoW
BGD_IM	-	0.21	0.00	0.00	0.01	0.00	0.03	0.21	0.54
IND_IM	0.01	-	0.01	0.01	0.01	0.01	0.02	0.42	0.51
LKA_IM	0.00	0.21	-	-	0.03	0.01	0.06	0.25	0.44
NPL_IM	0.01	0.58	0.00	-	0.00	-	0.04	0.13	0.23
PAK_IM	0.01	0.11	0.01	-	-	0.03	0.04	0.37	0.44

Notes: RoSA stands for the rest of South Asia, which is for aggregate other South Asian countries that are not individually listed; RoA stands for the rest of Asia excluding South Asia and China; and RoW stands for rest of the world.

Source: Authors' calculation using data from BACI (2020)

Table 12b: Share of bilateral trade in total trade 2012-2016 (Southeast Asia, a country's total exports or imports = 1.00)

	In total exports											
	IDN	KHM	LAO	MMR	MYS	PHL	THA	VNM	RoSEA	CHN	RoA	RoW
IDN_EX	-	0.01	-	0.01	0.06	0.01	0.02	0.02	0.04	0.12	0.29	0.43
KHM_EX	0.00	-	0.00	-	0.09	-	0.17	0.36	0.02	0.08	0.03	0.25
LAO_EX	0.02	0.01	-	-	0.00	0.00	0.17	0.31	0.01	0.30	0.05	0.13
MMR_EX	0.02	0.00	-	-	0.05	0.01	0.07	0.02	0.02	0.26	0.45	0.10
MYS_EX	0.02	0.00	-	0.01	-	0.02	0.02	0.03	0.10	0.14	0.30	0.36
PHL_EX	0.01	-	-	-	0.04	-	0.03	0.01	0.02	0.08	0.38	0.43
THA_EX	0.03	0.02	0.02	0.03	0.06	0.01	-	0.03	0.02	0.16	0.25	0.38
VNM_EX	0.02	0.01	0.00	0.00	0.04	0.02	0.02	-	0.02	0.15	0.21	0.50
	In total imports											
	IDN	KHM	LAO	MMR	MYS	PHL	THA	VNM	RoSEA	CHN	RoA	RoW
IDN_IM	-	-	0.00	0.00	0.04	0.01	0.07	0.02	0.03	0.10	0.08	0.66
KHM_IM	0.13	-	0.00	0.00	0.03	0.00	0.42	0.15	0.04	0.03	0.09	0.11
LAO_IM	0.00	0.00	-	-	0.00	-	0.83	0.05	0.02	0.04	0.03	0.03
MMR_IM	0.14	-	-	-	0.10	0.00	0.35	0.01	0.06	0.11	0.11	0.12
MYS_IM	0.14	0.01	-	0.01	-	0.01	0.12	0.05	0.04	0.10	0.10	0.44
PHL_IM	0.06	-	-	0.00	0.06	-	0.06	0.06	0.04	0.10	0.06	0.56
THA_IM	0.05	0.01	0.01	0.01	0.04	0.02	-	0.04	0.02	0.12	0.13	0.55
VNM_IM	0.03	0.02	0.01	0.00	0.04	0.01	0.05	-	0.04	0.07	0.24	0.51

Note: RoSEA stands for the rest of Southeast Asia, which is for aggregate other Southeast Asian countries that are not individually listed; RoA stands for the rest of Asia excluding Southeast Asia and China; and RoW stands for rest of the world. Because the data for KHM and LAO in BACI is missing for 2017, 2012-2106 average is used instead.

Source: Authors' calculation using data from BACI (2020)

Table 12c: Share of bilateral trade in total trade 2013-2017 (Central Asia, a country's total exports or imports = 1.00)

	In total exports							
	KAZ	KGZ	TJK	UZB	RoCA	CHN	RoA	RoW
KAZ_EX	-	0.09	0.10	0.18	0.02	0.05	0.22	0.34
KGZ_EX	0.29	-	0.02	0.01	0.00	0.08	0.07	0.53
TJK_EX	0.24	0.02				0.04	0.06	0.64
UZB_EX	0.34	0.01				0.31	0.10	0.23
	In total imports							
	KAZ	KGZ	TJK	UZB	RoCA	CHN	RoA	RoW
KAZ_IM	-	0.02	0.01	0.10	0.00	0.05	0.05	0.78
KGZ_IM	0.30	-	0.00	0.02	0.00	0.13	0.03	0.52
TJK_IM	0.49	0.01				0.03	0.04	0.44
UZB_IM	0.40	0.00				0.05	0.07	0.48

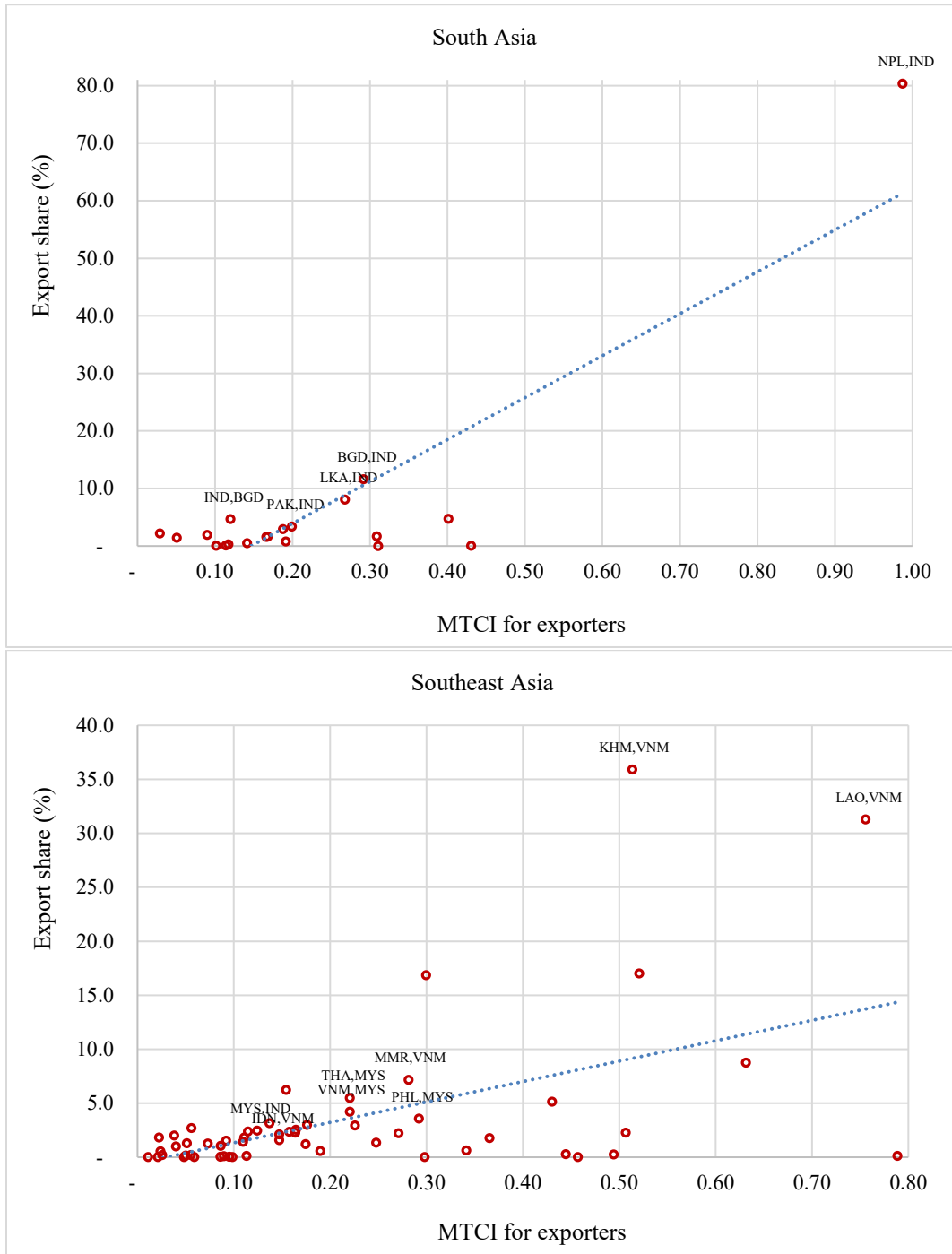
Notes: RoCA stands for the rest of Central Asia, which is for aggregate other Central Asian countries that are not individually listed; RoA stands for the rest of Asia excluding Central Asia and China; and RoW stands for rest of the world.

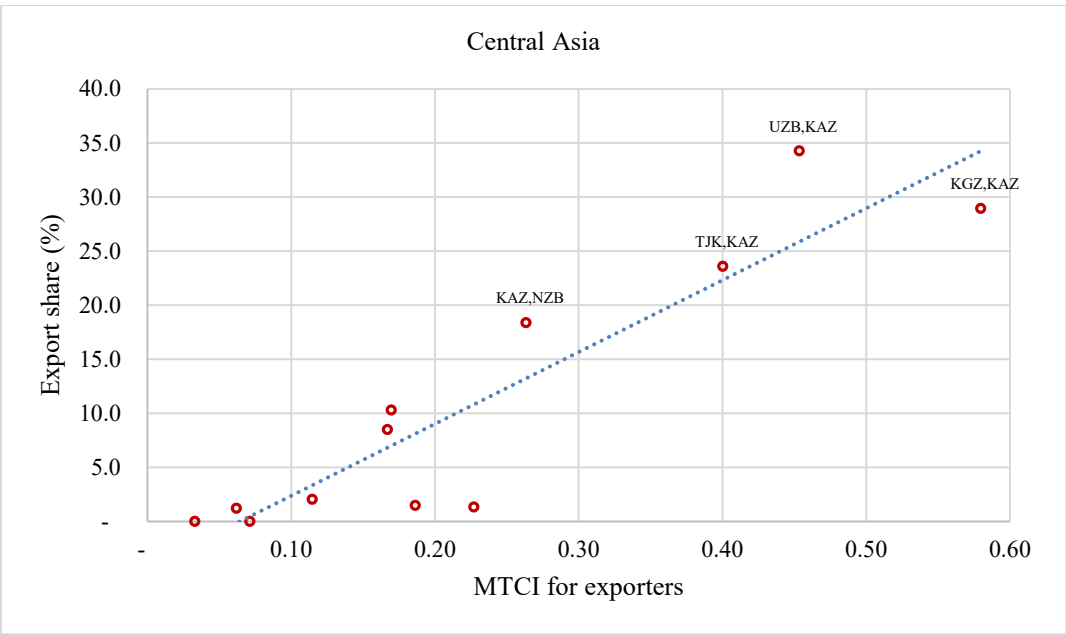
Source: Authors' calculation using data from BACI (2020)

Despite the generally positive relationship between trade complementarity and actual bilateral trade within a sub-region as shown in Figure 3, we find that higher trade complementarity does not always correspond to more bilateral trade flows. For example, Nepal's exports are more compatible with Pakistan's imports than with Bangladesh's as measured by MTCI, but trade data suggests that the share of Nepal's exports to Bangladesh is a lot larger than those to Pakistan during 2013-2017 (Table 10a and Table 12a). The discrepancy between the trade complementarity index and actual trade flows may be attributed to a variety of trade barriers including tariffs, trade logistics, and geopolitics, among others.⁸ Nevertheless, high trade complementarity combined with a disproportionately low level of bilateral trade can be an indicator of potential opportunities for more bilateral trade between two countries.

⁸ High tariffs on agri-food product imports and poor trade logistics raise trade costs and can therefore curb agri-food trade as measured by the World Bank's LPI score (e.g., Nepal and most landlocked Central Asian countries) tend to trade mostly with a small number (usually one or two) of the large and geographically proximate neighbors. Geopolitics also plays a more complex role in shaping trade patterns (for example the relationship among Japan, ASEAN countries, China and India).

Figure 3: Relationship between MTCI for exporters and export shares for each sub-region





Note: Each dot in the figure corresponds to the value of MTCI for an exporter and its export share to the same sub-regional partner. The first country in the label is the exporter and the second one is the importer. The figure only labels those dots where the partner country has the largest value of MTCI for a home country who is exporter and the same home country with highest export share to the same sub-regional partner. Correlation values between the two variables in Figure 3 is 0.657 for all 17 countries and is 0.550 excluding the data point for NPL,IND.

Sources: Shares for bilateral trade and MTCI for exporters are calculated from BACI (2020).

6. CONCLUSION

Agri-food trade is important to many Asian countries and growth in agri-food exports is more rapid than total exports in eight out of 17 countries studied, implying that agri-food trade can be an important driver of economic growth. Moreover, per capita income growth is accompanied by dietary transformation and the demand for nutritious food and processed foods is expected to grow more rapidly than for traditional staples as incomes grow. Many Asian countries have comparative advantages in exports of nutritious foods including fish, meat, vegetables, fruits, and vegetable oils, particularly in recent years.

By investigating changing patterns of agri-food trade among 17 Asian countries in the two periods, 1998-2002 and 2013-2017, this paper finds that for most Asian developing countries, Asian markets are more important than the markets outside of Asia both for their total agri-food exports and exports of nutritious foods, and the importance of Asian markets increases over time. While net exporters and importers co-exist in each sub-region, with a few exceptions, sub-regional trade is often less important, and many small countries trade only with one or two large neighbors and less so with each other.

We find diverse impacts of the dietary transformation on trade across Asian countries. Income growth leads to increased domestic demand for nutritious foods and seems to lead to more imports of these foods. While many South and Southeast Asian countries have a comparative advantage in the export of some nutritious food products, growth in these exports can be negatively affected by rising domestic demand. Although nutritious food exports continue to play important roles in most of these countries' total agri-food exports, export growth of nutritious food is often slower than overall growth of agri-food exports.

Many Asian countries rely on imports of processed foods, which often accounts for a large component of total agri-food imports. The dietary transformation seems to lead to increases in import demand for these foods. On the other hand, processed foods generally account for a small portion of agri-food exports. However, there are a few countries where processed food export growth is rapid such as Nepal and Thailand. For the countries with rapid growth in processed food exports, the sub-regional market is expanding, but with few exceptions, it is still less important than trade with countries outside the sub-region.

The paper also finds that agri-food exports and imports are highly concentrated within a small group of 10 commodities. Many of these dominant export or import commodities are same over time. While this small group of commodities are important both for a country's total exports and sub-regional exports, the main markets for these commodities are not in the sub-regions. There is little alignment between the dominant commodities a country exports and the dominant commodities imported by other countries in the same sub-region. The mismatch between demand and supply of agri-food trade within sub-region is an obviously natural barrier for promoting regional trade.

The modified trade complementary index developed in this paper is based on Michaely (1996) and shows that trade complementarity measures are positively correlated with actual bilateral trade. Small countries tend to enjoy higher levels of complementarity with one or two large trading partners than with other small countries in the same sub-region. This implies that small countries could be better off from bilateral trade arrangements with large partners compared to a regional trade agreement within the sub-region. Because the sub-regional market is oftentimes not large enough to meet large countries' import demand or consume their export supply, regional trade agreements within sub-regions may be less likely to serve their needs for trade expansion than negotiating with large trading partners outside the sub-regions. While many Asian developing countries' governments have been pushing for trade diversification and want to reduce export dependencies concentrated on one or two large trading partners, this paper shows the challenges to achieve this policy goal. For small countries, focusing on bilateral trade arrangements with their dominant trading partners seems to be a more practical and effective strategy than regional trade agreements within sub-regions. Long-term trade arrangements, consistent trade policies, and various preferential trade arrangements should be pursued by small countries with their larger trading partners to promote agri-food exports.

REFERENCES

- BACI: International trade database at the product-level. 2020. http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=37. Last accessed in February 2020.
- Balassa, Bela. 1965. *Trade Liberalisation and 'Revealed' Comparative Advantage*. The Manchester School 3(2): 99-123.
- Bernatonyte, Dalia. 2009. *Intra-Industry Trade and Export Specialization: Lithuanian Case*. Economics & Management 14 (2009): 668-675.
- Bhagwati, Jagdish and Arvind Panagariya. 1996. *Preferential Trading Areas and Multilateralism – Strangers, Friends, or Foes?* in Bhagwati and Panagariya (eds.) *The Economics of Preferential Trade Agreements*. Washington D.C.: AEI Press.
- Gaulier, G. and Zignago, S. 2009. BACI: International trade database at the product-level. The 1994–2007 version. mimeo CEPII.
- Hernandez, R. A., B. Belton, T. Reardon, C. Hu, X. Zhang, and A. Ahmed. 2017. *Te 'Quiet Revolution' in the Aquaculture Value Chain in Bangladesh*. In *Aquaculture* 493: 456–468. <http://dx.doi.org/10.1016/j.aquaculture.2017.06.006>
- Hoang, Viet. 2018. *Assessing the Agricultural Trade Complementarity of the Association of Southeast Asian Nations Countries*. *Agric. Econ. – Czech* 64: 464–475.
- Krishna, Pravin. 2003. *Are Regional Trading Partners 'Natural'?* *Journal of Political Economy* 111 (1): 202–226.
- Krugman, Paul. 1991. *The Move to Free Trade Zones*, in *Policy Implications of Trade and Currency Zones*. Proceedings of a Symposium organized by Federal Reserve Bank of Kansas City, 7–41. Kansas City: Federal Reserve Bank of Kansas City.
- Laursen, Keld. 1998. *Revealed Comparative Advantage and the Alternatives as Measures of International Specialization*, Working Paper 30, Danish Research Unit for Industrial Dynamics.
- Lipsey, Richard G. 1960. *The Theory of Customs Unions: A General Survey*. *Economic Journal*, 70, 496-513.
- Michaely, Michael. 1996. *Trade Preferential Agreement in LAC*. World Bank Policy Research Working Paper No. 1583.
- Muyanga, Milu, David Tschirley, Tom Reardon, T.S. Jayne, Ferdi Meyer, S. Liverpool-Tasie, and Tracy Davids. 2019. *Rural and Agrifood Systems in Transforming Economies in Africa and Asia*. Feed the Future Innovation Lab for Food Security Policy Synthesis Report III. Michigan State University. https://www.canr.msu.edu/fsp/Synthesis-Reports/FSP_Synthesis_Report_III.pdf
- Panagariya, Arvind. 1997. *Preferential Trading and the Myth of Natural Trading Partners*. *Japan and the World Economy* 9(4): 471–489.
- Popkin, Barry (2017). *Relationship between shifts in food system dynamics and acceleration of the global nutrition transition.* *Nutrition Reviews* 75 (2): 73–82.
- Reardon, T., R. Echeverría, J. Berdegúe, B. Minten, L. S. O. Liverpool-Tasie, D. Tschirley, and D. Zilberman. 2019. *Rapid Transformation of Food Systems in Developing Regions: Highlighting the Role of Agricultural Research and Innovations*. *Agricultural Systems* 172 (June): 47–59.
- Schiff, Maurice. 2001. *Will the Real 'Natural Trading Partner' Please Stand Up?* *Journal of Economic Integration* 16(2): 245–261.
- Summers, Lawrence. 1991. *Regionalism and the World Trading System*, in *Policy Implications of Trade and Currency Zones*. Proceedings of a Symposium organized by Federal Reserve Bank of Kansas City, 295–301. Kansas City: Federal Reserve Bank of Kansas City.
- Wonnacott, Paul and Mark Lutz. 1989. *Is There a Case for Free Trade Areas*. in Jeffery Schott (eds.) *Free Trade Areas and US Trade Policy*, pp. 59–84, Institute for International Economics, Washington D.C.
- Yamazawa, Ipppei, 1970. *Intensity Analysis of World Trade Flow*, *Hitotsubashi Journal of Economics*, vol. 10(2), pp. 61-90.

APPENDIX

Table A1: The list of top 10 agri-food export commodities in 2013-2017, Bangladesh

Rank in 2013-17	HS 4-digit code	Description
1	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
2	5303	Jute and other textile bast fibers (not flax, true hemp and ramie), raw or processed but not spun; tow and waste of these fibers, including yarn waste and garneted stock
3	2401	Tobacco, unmanufactured; tobacco refuse
4	0802	Nuts (excluding coconuts, Brazils and cashew nuts); fresh or dried, whether or not shelled or peeled
5	0303	Fish; frozen (excluding fish fillets and other fish meat of heading no. 0304)
6	1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved
7	0709	Vegetables, n.e.s. in chapter 07; fresh or chilled
8	0301	Fish; live
9	1905	Bread, pastry, cakes, biscuits, other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets suitable for pharmaceutical use, sealing wafers, rice paper and similar products
10	1207	Oil seeds and oleaginous fruits, others n.e.s. in chapter 12; whether or not broken

Source: BACI (2020)

Table A2: The list of top 10 agri-food export commodities in 2013-2017, India

Rank in 2013-17	HS 4-digit code	Description
1	1006	Rice
2	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
3	0202	Meat of bovine animals; frozen
4	5201	Cotton; not carded or combed
5	1302	Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products
6	2304	Oilcake and other solid residues; whether or not ground or in the form of pellets, resulting from the extraction of soya-bean oil
7	1701	Cane or beet sugar and chemically pure sucrose, in solid form
8	0801	Nuts, edible; coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled
9	1515	Fixed vegetable fats and oils (including jojoba oil) and their fractions, whether or not refined; but not chemically modified
10	2401	Tobacco, unmanufactured; tobacco refuse

Source: BACI (2020)

Table A3: The list of top 10 agri-food export commodities in 2013-2017, Nepal

Rank in 2013-17	HS 4-digit code	Description
1	2202	Waters, including mineral and aerated waters, containing added sugar or sweetening matter, flavored; other non-alcoholic beverages, not including fruit or vegetable juices of heading no. 2009
2	2009	Fruit juices (including grape must) and vegetable juices, unfermented, not containing added spirit; whether or not containing added sugar or other sweetening matter
3	0908	Nutmeg, mace and cardamoms
4	0902	Tea
5	0713	Vegetables, dried leguminous; shelled, whether or not skinned or split
6	0802	Nuts (excluding coconuts, Brazils and cashew nuts); fresh or dried, whether or not shelled or peeled
7	2306	Oilcake and other solid residues; whether or not ground or in the form of pellets, resulting from the extraction of vegetable fats or oils other than those of heading no. 2304 or 2305
8	1211	Plants and parts of plants (including seeds and fruits), used primarily in perfumery, pharmacy; for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not crushed or powdered
9	2403	Manufactured tobacco and manufactured tobacco substitutes; n.e.s., "homogenized" or "reconstituted" tobacco; tobacco extracts, essences
10	1902	Pasta; whether or not cooked or stuffed with meat or other substance, or otherwise prepared, e.g. spaghetti, macaroni, noodles, lasagna, gnocchi, ravioli, cannelloni; couscous, whether or not prepared

Source: BACI (2020)

Table A4: The list of top 10 agri-food export commodities in 2013-2017, Pakistan

Rank in 2013-17	HS 4-digit code	Description
1	1006	Rice
2	1701	Cane or beet sugar and chemically pure sucrose, in solid form
3	0805	Citrus fruit; fresh or dried
4	0303	Fish; frozen (excluding fish fillets and other fish meat of heading no. 0304)
5	1101	Wheat or meslin flour
6	0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteens; fresh or dried
7	0201	Meat of bovine animals; fresh or chilled
8	5201	Cotton; not carded or combed
9	0701	Potatoes; fresh or chilled
10	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine

Source: BACI (2020)

Table A5: The list of top 10 agri-food export commodities in 2013-2017, Sri Lanka

Rank in 2013-17	HS 4-digit code	Description
1	0902	Tea
2	0906	Cinnamon and cinnamon-tree flowers
3	0801	Nuts, edible; coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled
4	0904	Pepper of the genus piper; dried or crushed or ground fruits of the genus capsicum or of the genus pimento
5	5305	Coconut, abaca (manila hemp or musa textiles), ramie and other vegetable textile fibers n.e.s., raw or processed but not spun; tow and waste of these fibers (including yarn waste and garneted stock)
6	1513	Coconut (copra), palm kernel or babassu oil and their fractions; whether or not refined but not chemically modified
7	0302	Fish; fresh or chilled (excluding fish fillets and other fish meat of heading no. 0304)
8	0304	Fish fillets and other fish meat (whether or not minced); fresh, chilled or frozen
9	0303	Fish; frozen (excluding fish fillets and other fish meat of heading no. 0304)
10	1404	Vegetable products not elsewhere specified or included

Source: BACI (2020)

Table A6: The list of top 10 agri-food export commodities in 2013-2017, Indonesia

Rank in 2013-17	HS 4-digit code	Description
1	1511	Palm oil and its fractions; whether or not refined, but not chemically modified
2	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
3	1513	Coconut (copra), palm kernel or babassu oil and their fractions; whether or not refined but not chemically modified
4	3823	Industrial monocarboxylic fatty acids; acid oils from refining; industrial fatty alcohols
5	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
6	0901	Coffee, whether or not roasted or decaffeinated; husks and skins; coffee substitutes containing coffee in any proportion
7	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
8	1605	Crustaceans, mollusks and other aquatic invertebrates, prepared or preserved
9	1804	Cocoa; butter, fat and oil
10	1516	Animal or vegetable fats and oils and their fractions; partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared

Source: BACI (2020)

Table A7: The list of top 10 agri-food export commodities in 2013-2017, Cambodia

Rank in 2013-17	HS 4-digit code	Description
1	1006	Rice
2	0714	Manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and similar roots and tubers with high starch or inulin content; fresh, chilled, frozen or dried, whether or not sliced or in the form of pellets; sago pith
3	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
4	0801	Nuts, edible; coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled
5	1701	Cane or beet sugar and chemically pure sucrose, in solid form
6	2309	Preparations of a kind used in animal feeding
7	1201	Soya beans; whether or not broken
8	1511	Palm oil and its fractions; whether or not refined, but not chemically modified
9	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
10	2401	Tobacco, unmanufactured; tobacco refuse

Source: BACI (2020)

Table A8: The list of top 10 agri-food export commodities in 2013-2017, Lao, PDR

Rank in 2013-17	HS 4-digit code	Description
1	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
2	0901	Coffee, whether or not roasted or decaffeinated; husks and skins; coffee substitutes containing coffee in any proportion
3	2202	Waters, including mineral and aerated waters, containing added sugar or sweetening matter, flavored; other non-alcoholic beverages, not including fruit or vegetable juices of heading no. 2009
4	0803	Bananas, including plantains; fresh or dried
5	1005	Maize (corn)
6	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
7	1701	Cane or beet sugar and chemically pure sucrose, in solid form
8	0714	Manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and similar roots and tubers with high starch or inulin content; fresh, chilled, frozen or dried, whether or not sliced or in the form of pellets; sago pith
9	1006	Rice
10	1212	Locust beans, seaweeds and other algae, sugar beet, sugar cane, fresh, chilled, frozen or dried, whether or not ground; fruit stones, kernels and other vegetable products (including unroasted chicory roots) used primarily for human consumption, n.e.s.

Source: BACI (2020)

Table A9: The list of top 10 agri-food export commodities in 2013-2017, Myanmar

Rank in 2013-17	HS 4-digit code	Description
1	0713	Vegetables, dried leguminous; shelled, whether or not skinned or split
2	1701	Cane or beet sugar and chemically pure sucrose, in solid form
3	1006	Rice
4	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
5	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
6	0302	Fish; fresh or chilled (excluding fish fillets and other fish meat of heading no. 0304)
7	0303	Fish; frozen (excluding fish fillets and other fish meat of heading no. 0304)
8	1005	Maize (corn)
9	1202	Groundnuts; not roasted or otherwise cooked, whether or not shelled or broken
10	1207	Oil seeds and oleaginous fruits, others n.e.s. in chapter 12; whether or not broken

Source: BACI (2020)

Table A10: The list of top 10 agri-food export commodities in 2013-2017, Malaysia

Rank in 2013-17	HS 4-digit code	Description
1	1511	Palm oil and its fractions; whether or not refined, but not chemically modified
2	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
3	3823	Industrial monocarboxylic fatty acids; acid oils from refining; industrial fatty alcohols
4	1513	Coconut (copra), palm kernel or babassu oil and their fractions; whether or not refined but not chemically modified
5	1516	Animal or vegetable fats and oils and their fractions; partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared
6	1905	Bread, pastry, cakes, biscuits, other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets suitable for pharmaceutical use, sealing wafers, rice paper and similar products
7	2106	Food preparations not elsewhere specified or included
8	1804	Cocoa; butter, fat and oil
9	1901	Malt extract; flour, meal, starch or malt extract products, no cocoa powder or less than 50% cocoa powder by weight, n.e.s.; products of goods of heading no. 0401-0404 containing less than 10% cocoa
10	2101	Extracts, essences, concentrates of coffee, tea or mate; preparations with a basis of these products or with a basis of coffee, tea or mate; roasted chicory and other roasted coffee substitutes and extracts, essences and concentrates thereof

Source: BACI (2020)

Table A11: The list of top 10 agri-food export commodities in 2013-2017, Philippines

Rank in 2013-17	HS 4-digit code	Description
1	0803	Bananas, including plantains; fresh or dried
2	1513	Coconut (copra), palm kernel or babassu oil and their fractions; whether or not refined but not chemically modified
3	2008	Fruit, nuts and other edible parts of plants; prepared or preserved in ways n.e.s., whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included
4	0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteens; fresh or dried
5	1604	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs
6	0801	Nuts, edible; coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled
7	1302	Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products
8	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
9	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
10	0304	Fish fillets and other fish meat (whether or not minced); fresh, chilled or frozen

Source: BACI (2020)

Table A12: The list of top 10 agri-food export commodities in 2013-2017, Thailand

Rank in 2013-17	HS 4-digit code	Description
1	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
2	1006	Rice
3	1604	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs
4	1701	Cane or beet sugar and chemically pure sucrose, in solid form
5	1602	Prepared or preserved meat, meat offal or blood
6	0714	Manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and similar roots and tubers with high starch or inulin content; fresh, chilled, frozen or dried, whether or not sliced or in the form of pellets; sago pith
7	2309	Preparations of a kind used in animal feeding
8	1605	Crustaceans, mollusks and other aquatic invertebrates, prepared or preserved
9	2008	Fruit, nuts and other edible parts of plants; prepared or preserved in ways n.e.s., whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included
10	0810	Fruit, fresh; n.e.s. in chapter 8

Source: BACI (2020)

Table A13: The list of top 10 agri-food export commodities in 2013-2017, Vietnam

Rank in 2013-17	HS 4-digit code	Description
1	0901	Coffee, whether or not roasted or decaffeinated; husks and skins; coffee substitutes containing coffee in any proportion
2	0801	Nuts, edible; coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled
3	1006	Rice
4	0304	Fish fillets and other fish meat (whether or not minced); fresh, chilled or frozen
5	0306	Crustaceans, in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling in water, chilled or not, frozen, dried, salted or in brine
6	4001	Natural rubber, balata, gutta-percha, guayule, chicle and similar gums; in primary forms or in plates, sheets or strip
7	1605	Crustaceans, mollusks and other aquatic invertebrates, prepared or preserved
8	0904	Pepper of the genus piper; dried or crushed or ground fruits of the genus capsicum or of the genus pimenta
9	0810	Fruit, fresh; n.e.s. in chapter 8
10	1604	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs

Source: BACI (2020)

Table A14: The list of top 10 agri-food export commodities in 2013-2017, Kazakhstan

Rank in 2013-17	HS 4-digit code	Description
1	1001	Wheat and meslin
2	1101	Wheat or meslin flour
3	1204	Oil seeds; linseed, whether or not broken
4	1003	Barley
5	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
6	5201	Cotton; not carded or combed
7	0304	Fish fillets and other fish meat (whether or not minced); fresh, chilled or frozen
8	1206	Sunflower seeds; whether or not broken
9	1205	Rape or colza seeds; whether or not broken
10	1512	Sunflower seed, safflower or cotton-seed oil and their fractions; whether or not refined, but not chemically modified

Source: BACI (2020)

Table A15: The list of top 10 agri-food export commodities in 2013-2017, Kyrgyz Republic

Rank in 2013-17	HS 4-digit code	Description
1	0713	Vegetables, dried leguminous; shelled, whether or not skinned or split
2	5201	Cotton; not carded or combed
3	2402	Cigars, cheroots, cigarillos and cigarettes; of tobacco or of tobacco substitutes
4	2401	Tobacco, unmanufactured; tobacco refuse
5	0809	Apricots, cherries, peaches (including nectarines), plums and sloes, fresh
6	0802	Nuts (excluding coconuts, Brazils and cashew nuts); fresh or dried, whether or not shelled or peeled
7	0813	Fruit, dried, other than that of heading no. 0801 to 0806; mixtures of nuts or dried fruits of this chapter
8	0401	Milk and cream; not concentrated nor containing added sugar or other sweetening matter
9	0405	Butter and other fats and oils derived from milk; dairy spreads
10	0808	Apples, pears and quinces; fresh

Source: BACI (2020)

Table A16: The list of top 10 agri-food export commodities in 2013-2017, Tajikistan

Rank in 2013-17	HS 4-digit code	Description
1	5201	Cotton; not carded or combed
2	0813	Fruit, dried, other than that of heading no. 0801 to 0806; mixtures of nuts or dried fruits of this chapter
3	0304	Fish fillets and other fish meat (whether or not minced); fresh, chilled or frozen
4	0703	Onions, shallots, garlic, leeks and other alliaceous vegetables; fresh or chilled
5	0802	Nuts (excluding coconuts, Brazils and cashew nuts); fresh or dried, whether or not shelled or peeled
6	1006	Rice
7	0806	Grapes; fresh or dried
8	0809	Apricots, cherries, peaches (including nectarines), plums and sloes, fresh
9	1212	Locust beans, seaweeds and other algae, sugar beet, sugar cane, fresh, chilled, frozen or dried, whether or not ground; fruit stones, kernels and other vegetable products (including unroasted chicory roots) used primarily for human consumption, n.e.s.
10	0207	Meat and edible offal of poultry; of the poultry of heading no. 0105, (i.e. fowls of the species gallus domesticus), fresh, chilled or frozen

Source: BACI (2020)

Table A17: The list of top 10 agri-food export commodities in 2013-2017, Tajikistan

Rank in 2013-17	HS 4-digit code	Description
1	5201	Cotton; not carded or combed
2	0806	Grapes; fresh or dried
3	0809	Apricots, cherries, peaches (including nectarines), plums and sloes, fresh
4	0713	Vegetables, dried leguminous; shelled, whether or not skinned or split
5	0709	Vegetables, n.e.s. in chapter 07; fresh or chilled
6	0810	Fruit, fresh; n.e.s. in chapter 8
7		Fruit, dried, other than that of heading no. 0801 to 0806; mixtures of nuts or dried fruits
	0813	of this chapter
8		Nuts (excluding coconuts, Brazils and cashew nuts); fresh or dried, whether or not
	0802	shelled or peeled
9	0702	Tomatoes; fresh or chilled
10		Plants and parts of plants (including seeds and fruits), used primarily in perfumery,
	1211	pharmacy; for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not
		crushed or powdered

Source: BACI (2020)

ALL IFPRI DISCUSSION PAPERS

All discussion papers are available [here](#)

They can be downloaded free of charge

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

www.ifpri.org

IFPRI HEADQUARTERS

1201 Eye Street, NW

Washington, DC 20005 USA

Tel.: +1-202-862-5600

Fax: +1-202-862-5606

Email: ifpri@cgiar.org