Vietnam J. Agri. Sci. 2016, Vol. 14, No. 10: 1597 -1607 Tạp chí KH Nông nghiệp Việt Nam 2016, tập 14, số 10: 1597 - 1607
www.vnua.edu.vn

INTERNATIONAL TRADE AND AGRICULTURAL PRODUCTIVITY: EVIDENCES FROM LEAST DEVELOPED COUNTRIES

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Received date: 18.07.2016 Accepted date: 08.10.2016

ABSTRACT

From many perspectives, agricultural production is essential to the economic growth of the least developed countries (LDCs). While international trade is considered one of the main sources of growth, the fact that LDCs rely heavily on primary commodities export and may not benefit significantly from trade raises concerns about the impact of trade on the economic development of LDCs. In this paper, the instrumental variable method was employed to ensure consistency and unbiasedness of the estimates of the impact of trade on agricultural productivity. The resource rents was used as an instrumental variable in determining the export and import indexes, especially in the case of LDCs. The semi-elasticity showed that a one percentage point increase in the terms of trade reduced agricultural productivity growth by approximately 0.23% on average, holding other factors constant. This estimate was statistically significant, and implied that expansion in trade does not improve agricultural productivity in LDCs.

Keywords: Agricultural productivity, instrumental variable, least developed countries, trade.

Thương mại quốc tế và năng suất nông nghiệp: Bằng chứng từ các nước kém phát triển

TÓM TẮT

Xét trên nhiều góc độ, sản xuất nông nghiệp là cần thiết cho sự tăng trưởng kinh tế của các nước kém phát triển (LDCs). Trong khi thương mại quốc tế được xem như là một trong những yếu tố chính cho sự tăng trưởng, thực tế việc dựa nhiều vào xuất khẩu các sản phẩm thô và có thể không được hưởng lợi nhiều từ thương mại có thể làm tăng các mối lo ngại về tác động của thương mại đối với sự phát triển kinh tế ở các nước kém phát triển. Trong bài báo này, phương pháp hồi quy với biến công cụ được sử dụng để đảm bảo rằng ước lượng ảnh hưởng của thương mại đến năng suất nông nghiệp là đáng tin cậy và không bị chệch. Các biến công cụ, ở đây là các tô tài nguyên (resource rents), là một yếu tố quan trọng trong việc xác định các chỉ số xuất nhập khẩu, đặc biệt trong trường hợp các nước kém phát triển. Kết quả độ bán co dãn chỉ ra rằng nếu thương mại tăng 1% thì tốc độ tăng trưởng năng suất nông nghiệp sẽ giảm khoảng 0,23% trong điều kiện các yếu tố khác không thay đổi. Kết quả ước lượng này có ý nghĩa về mặt thống kê và chỉ ra rằng việc mở rộng thương mại không giúp cải thiện năng suất nông nghiệp ở các nước kém phát triển.

Từ khóa: Biến công cụ, các nước kém phát triển, năng suất nông nghiệp, thương mại.

1. INTRODUCTION

From many perspectives, agricultural production is essential to the economic growth of the least developed countries (LDCs). Agriculture contributes a large share (varying from 30% to 60%) of gross domestic product (GDP), employs more labour than any other sector (frequently as much as 70%), represents the most important source of foreign exchange, ensures national food security targets and provides livelihoods to more than half of the

population in most LDCs (FAO, 2007). Since agriculture is the main source of employment in LDCs, agricultural productivity is a significant factor in determining the incomes of the majority of the labour force. Low productivity in agriculture leads to a high prevalence and persistence of poverty, creating a vicious cycle of rural poverty, food insecurity and low productivity (UNCTAD, 2015). Hence, agricultural productivity is a significant factor in determining growth in agriculture.

Although international trade has long been regarded as the 'engine of growth' (Robertson, 1940), the fact that low-income countries have participated only weakly in global trade raises the issue of whether trade can improve living standards and economic growth for the poor. In addition, low-income countries' exports rely heavily on primary commodities, which are highly vulnerable to instability in demand (FAO, 2002), as world demand for primary products is generally income-inelastic. It is also important to note that in most LDCs, especially those in Sub-Saharan Africa, agriculture is often neglected as a driver of economic growth; rather, primary industries such as mining, petroleum and timber are regarded as the major economic stimulants.

Thus, this paper aimed to assess the impacts of international trade on agricultural productivity for the case of the 48 LDCs designated by the United Nations. Significant problems that make it difficult to identify the effects of trade on agricultural productivity were anticipated, such as omitted variable bias, reverse causality and endogeneity. This paper employed panel data regression analysis, and proposed a valid instrumental variable, namely resource rents, which allowed us to address the problem of endogeneity in the regressor.

2. LITERATURE REVIEW AND METHODOLOGY

2.1. Literature review

As identified by Timmer (1988), there are four development stages of agricultural transformation, starting from an increase in output yield per unit area or farmer. The surplus of food, labour and financial savings resulting from the first stage can be employed during the second stage, in industry and non-agricultural services. The third stage concerns the integration of the agriculture sector into the broader economy through infrastructure and markets, while in the fourth stage, agriculture is no longer different from any other industry. However, while these four stages are generally accepted there are different views of how to speed up the process of agricultural transformation in the developing world.

In the developed countries, the key factor contributing to agricultural transformation is endogenous change in agricultural productivity through technical change. There are several reasons why this might not also be the case for developing countries, including more abundant labour (and hence, labour-intensive production), the high cost of technology adaptation and low levels of agricultural research and development. In addition, agricultural productivity growth has not been regarded as important for LDCs, especially since the extra food needed for urban consumption is able to be purchased cheaply from abroad (FAO, 2011). Thus, despite the potential for expanding agricultural production, LDCs have become more food-import dependent in recent times (FAO, 2007).

Recent literature has identified the terms of trade as one of the key drivers of agricultural productivity (Sheng et al., 2010; O'Donnell, 2010). In fact, similar patterns were found in agricultural productivity growth and terms of trade for LDCs from 2000 to 2014 (Figure 1) by extracting data source from World Bank (2016). In general, during the first period (2000–2004), agricultural productivity and terms of trade decreased slightly before returning to the levels found in 2000. This was followed by a significantly increasing trend in the second period (2004 - 2008). World food prices surged in 2008, which had a negative impact on low-incomes countries, especially LDCs, as most of them were net-food importers - this might explain the fluctuating trends in the third

period. More importantly, for most of the time during the period it has been shown that the trends of terms of trade and agricultural productivity have negative relationships.

O'Donnell (2010) pointed out that changes in terms of trade can be used to explain changes in production patterns, and hence, productivity growth. Sheng et al. (2010) examined the effects of multiple factors, such as climate, real investment in agricultural research and development, farmer education and the agricultural terms of trade, on the slowdown in Australian agricultural productivity growth, using historical data from 1953 to 2008. The authors suggested that changes in the terms of trade and farmer education contributed to structural change associated with weaker growth in Australian agricultural productivity.

2.2. Data and models

The data used in this paper were drawn from World Bank datasets (World Development Indicators) from 2000 to 2014 for LDCs only. The dependent variable was the natural logarithm of agricultural productivity, derived from agricultural value added per worker measured in constant 2005 US dollars. The main explanatory variable, terms of trade (or net barter terms of trade index), was calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year (2000). It should be noted that by using datasets sourced from World Bank, our data have been deflated to different relative base years. However, the results are not affected because variation in terms of trade is measured in percentage change.

When applying econometric models to issues such as the one at hand, significant problems may arise, such as omitted variable bias, reverse causality and endogeneity,which would affect the estimates of trade on agricultural productivity. For example, Frankel and Romer (1999) pointed out that estimates of the effect of trade on income might be inconsistent and biased, because countries with higher incomes for reasons other than trade may trade more than lower-income countries. The same issue was present here, since the impact of trade on agricultural productivity may be due to factors other than trade, which cannot be captured in the model. The solution is to propose at least one good instrumental variable for the endogenous variable (Frankel & Romer, 1999; Lin & Sim, 2013).

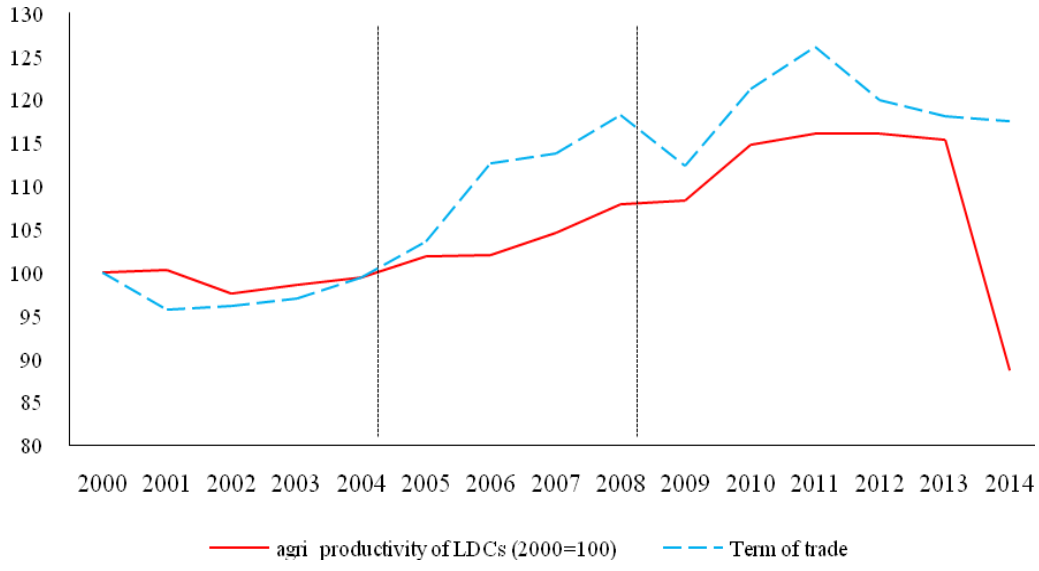

Figure 1. Agricultural productivity growth and terms of trade in LDCs (2000 - 2014)

Table 1. Summary statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Log (agri. productivity)	530	6.07	0.72	4.39	7.99
Terms of trade	530	105.27	29.42	21.39	235.39
Resource rents	467	11.17	10.61	0.042	61.67
Landlocked	530	0.39	0.49	0	1

The instrumental variable used here was total natural resource rents, which include the sum of oil rents, coal rents, mineral rents and forest rents, but excludes gas rents as they only account for a small proportion of LDCs' major exports (see Table A1 for the list of LDCs and their exports). The estimates of natural resources rents were calculated as a share of GDP, taking the difference between the world price of specific commodities and estimates of average unit costs of extraction or harvesting, then multiplying by the physical quantities extracted or harvested to determine the rents for each commodity.

According to the resource curse hypothesis, greater natural resource wealth leads to poor economic growth (Sachs & Warner, 1995). Also, the fact that most LDCs are natural resource-rich countries but experience low agricultural productivity indicates that the terms of trade might indirectly affect the growth of agricultural productivity through resource rents. The summary statistics for the main variables of interest are presented in Table 1.

Equation (1) represents the panel data regression model as:

$$\log(y_{i,t}) = c_0 + \beta * x_{i,t} + \delta * landlocked_{i,t} + \alpha_i + \alpha_t + u_{i,t} \quad (1)$$

Where $\log(y_{i,t})$ is the log of agricultural productivity for country i at year t, the main causal variable of interest $x_{i,t}$ is the net barter terms of trade (as a percentage), c_0 is a constant term, and landlockedi,t is a vector that represents a dummy variable that equals 1 if the country is landlocked or has no coastal line and 0 otherwise (see Table A2 for a list of landlocked LDCs). Other components include α_i, which represents a country's fixed effects (the unobserved individual heterogeneity that does not change across time for a specific country); α_t, which accounts for the time-varying macroeconomic shocks that affect all LDCs in the same way; and finally, $u_{i,t}$, which is the idiosyncratic error term clustered at the country level.

Similar models have been applied by Lin and Sim (2013) and Rose (2004) to capture country-specific differences by employing dummy variables, but these variables will be excluded from the model once we control for country fixed effects. The hypothesis we tested was that expansion in trade (terms of trade) leads to a decline in agricultural productivity in the case of LDCs. The landlocked dummy variable was included in the model due to the assumption that a country's landlocked status might affect trading in agricultural inputs and machines, and hence, reduce the chance for agricultural productivity growth.

This paper proposed resource rents as the instrumental variable for the endogenous variable terms of trade. As explained above, the terms of trade has indirect impacts on agricultural productivity through resource rents. The estimating equation that relates terms of trade to resources rents is given by:

$$x_{i,t} = c_1 + \gamma * r_{i,t} + \alpha_i + \alpha_t + w_{i,t} \quad (2)$$

where c_1 is a constant term and $w_{i,t}$ is the idiosyncratic error term clustered at the country level. Equation (1) was estimated using two-stage least squares, with Equation (2) as the first-stage regression.

3. RESULTS AND DISCUSSIONS

3.1. OLS estimates

Table 2 presents the ordinary least squares (OLS) results with robust standard errors (in parentheses) based on Equation (1). Column I reports the results from the simple linear regression of the dependent variable on the explanatory variable without additional controls. The coefficient showed that an increase in the terms of trade led to a decrease in agricultural productivity; however, the slope coefficient was insignificant and the adjusted R-squared was very small. This suggests that simple linear regression is not a good-enough fit to explain the changes in agricultural productivity due to changes in the terms of trade.

Using the landlocked dummy variable as a control variable reduced the degree of endogeneity; thus, this variable was included in the second OLS regression. As reported in Column II, the adjusted R-squared confirmed that the dummy variable improved the model somewhat; however, the slope coefficient was still insignificant. Column III shows the third regression results, which include the landlocked dummy variable and country fixed effects. As a result, when controlling for time-invariant factors across countries, the model's fit improved significantly (the adjusted R-squared increases to 0.9756). Column IV shows that when we control for year fixed effects, results were even stronger, as not only was the adjusted R-squared high but also the coefficient for terms of trade was significant at the 1% level.

More importantly, the results from the OLS regression suggested that terms of trade and agricultural productivity in LDCs had a negative relationship. The semi-elasticity in Column IV shows that when the terms of trade increase by one percentage point, agricultural productivity decreases by approximately $100*\beta\%$ (0.1098%). Moreover, the OLS estimates increased when the dummy variable, country and year fixed effects were included in successive steps, implying that the OLS estimates are downward-biased, due to measurement errors. If the measurement errors were classical in nature, the OLS regression would produce a biased and inconsistent estimator. Thus, we require a valid instrument for the main regressor (the terms of trade) to obtain consistent estimates.

3.2. Two-stage least squares estimates

Table 3 presents the two-stage least squares estimates of the impact of trade on agricultural productivity. The k-th lag of resource rents ($k = 1, 2$) was also included in Equation (1) to explore how quickly the effect of shocks on the log of trade decays.

Table 2. OLS regression results

	I	II	III	IV
Dependent variable: log(agri. productivity)				
Terms of trade	−0.00067^{ns}	0.00097^{ns}	−0.00036^{ns}	−0.00109***
	(0.00099)	(0.00085)	(0.00026)	(0.00029)
Landlocked dummy	No	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes
Year fixed effects	No	No	No	Yes
Number of countries	48	48	48	48
Number of observations	530	530	530	530
Adjusted R-squared	0.0008	0.0806	0.9756	0.9782

Note: Cluster robust standard errors are reported in parentheses.
*Statistical significance at 10%, 5% and 1% and no significant levels are indicated by *, **, *** and ^{ns}, respectively.*

Table 3. Two-stage least squares regression results

	I	II	III	IV
Dependent variable (second stage): log(agricultural productivity)				
Terms of trade	−0.00197*	−0.00252**	−0.00216*	−0.00226**
	(0.001095)	(0.00115)	(0.00122)	(0.00107)
Dependent variable (first stage): Terms of trade				
Resource rents	1.03459***			0.42246^{ns}
	(0.2001)			(0.2585)
Resource rents, first lag		0.91051***		−0.00737^{ns}
		(0.1915)		(0.29434)
Resource rents, second lag			0.78564***	0.72153***
			(0.18577)	(0.2293)
First-stage adjusted R-squared	0.6049	0.6551	0.7083	0.6860
First-stage F-Stat	77.83	88.59	89.58	90.11
Second-stage adjusted R-squared	0.9788	0.9792	0.9819	0.9837
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of countries	48	48	48	48
Number of observations	467	458	447	396

*Note: To instrument for trade, Column I uses the contemporaneous resource rents, Column II uses its first lag, Column III uses its second lag and Column IV uses all three lags. Cluster robust standard errors are reported in parentheses. Statistical significance at 10%, 5% and 1% and no significant levels are indicated by *, **, *** and ^{ns}, respectively.*

While columns I–III use resource rents (the first lag and second lag are used separately as a single instrumental variable), Column IV combines these variables to instrument for terms of trade. Following Lin and Sim (2013), the purpose of conducting these regressions is to determine whether the second-stage least squares is robust enough to substitute either current or lagged information about resource rents, or both, to instrument for the endogenous variable.

The first-stage results revealed that all the instrumental variables were strong and significant at the 1% level. Moreover, when there was one endogenous variable, the instrument strength was determined by a rule of thumb-if the first-stage F-statistic is greater than 10, the instrument is adequate. Thus, it can be confidently confirmed that resource rent is a strong determinant for terms of trade and they are positively associated.

The main findings, however, emphasise the relationship between terms of trade and agricultural productivity for LDCs. Table 3 shows that the results are consistent with those of table 2. The evidence from the second-stage least squares estimates revealed that a 1% increase in the terms of trade would reduce agricultural productivity by approximately 0.226% on average. The second-stage least squares estimates showed that the estimates from the OLS regression in Table 1 were downward-biased. While we have shown in Figure 1 that terms of trade and agricultural productivity were negatively associated for a sample of LDCs, the second-stage results also confirmed that trade is a strong, negative determinant of agricultural productivity.

Why have LDCs failed to increase agricultural productivity even while total trade has increased? In LDCs, the contribution of agricultural productivity growth has been limited and predominantly sourced from agricultural land expansion rather than improvements in farm labour productivity (FAO, 2014). Moreover, one common characteristic

found in most LDCs was that their agricultural sector consists mostly of a large number of small-holder farmers and small-scale agricultural enterprises (FAO, 2007).

From the viewpoint of international trade, there are issues relating to market access for LDCs, as the major export destinations for agricultural products are the developed world (primarily, Europe, Japan and North America). Aside from protectionism, that is, high agricultural tariff rates, complexity of non-tariff barriers, quotas, special safeguard provisions and agricultural subsidies (Japan for instance), this may be due to a limited response in developing countries to trade opportunities. There are exceptions - a few developing countries have succeeded in establishing a strong market position in selected agricultural export products (Binswanger and Lutz, 2003), for example, Kenya with fresh fruits and vegetables or Tanzania with cashew nuts. Therefore, LDCs should put in place policies and institutional reforms that enable them to benefit more from international trade opportunities.

So far, our analysis has taken both landlocked and non-landlocked LDCs into account. However, as trade might be affected by a country's landlocked status, a comparison between landlocked and non-landlocked LDCs should be performed. Table 4 reports the regression results based on the sample of landlocked LDCs only. Compared to previous estimates, the second stage of the regression in table 4 showed that the estimated semi-elasticity of agricultural productivity on trade was fairly consistent and double the same coefficients in table 3. The negative effect of trade on agricultural productivity was even stronger, suggesting that agricultural productivity of LDCs is influenced by the country's geographic characteristics (landlocked for instance). These results are not contradicted by our assumption that a country's landlocked status might affect trade in agricultural inputs and machines, hence reducing the chance for agricultural productivity growth.

Table 4. Two-stage least squares regression results for landlocked LDCs

	I	II	III	IV
Dependent variable (second stage): log(agricultural productivity)				
Terms of trade	−0.00534*	−0.00428**	−0.00575**	−0.00570***
	(0.00288)	(0.00197)	(0.0024)	(0.0020)
Dependent variable (first stage): Terms of trade				
Resource rents	1.179**			0.135^{ns}
	(0.464)			(0.559)
Resource rents, first lag		1.283***		0.379^{ns}
		(0.418)		(0.693)
Resource rents, second lag			1.004***	1.051**
			(0.370)	(0.531)
First-stage adjusted R-squared	0.5929	0.6590	0.7176	0.6789
First-stage F-Stat	38.50	39.87	60.82	35.47
Second-stage adjusted R-squared	0.9206	0.9366	0.9258	0.9323
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of countries	17	17	17	17
Number of observations	186	185	183	159

Note: The regression uses the sample of landlocked LDCs only. To instrument for trade, Column I uses the contemporaneous resource rents, Column II uses its first lag, Column III uses its second lag and Column IV uses all three lags. Cluster robust standard errors are reported in parentheses.
*Statistical significance at 10%, 5% and 1% and no significant levels are indicated by *, **, *** and ^{ns}, respectively.*

Table 5. Two-stage least squares regression results (Robustness check)

	I *k = 3*	II *k = 4*	III *K = 5*
Dependent variable (second stage): log(agricultural productivity)			
Terms of trade	−0.003252** (0.001589)	−0.004878* (0.002903)	−0.005824^{ns} (0.005403)
Dependent variable (first stage): Terms of trade			
Resource rents	0.64277*** (0.18975)	0.39812** (0.18284)	0.20829^{ns} (0.14471)
First-stage adjusted R-squared	0.7604	0.8151	0.8667
First-stage F-Stat	107.68	114.65	145.45
Second-stage adjusted R-squared	0.9820	0.9800	0.9801
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Number of countries	48	48	48
Number of observations	410	374	338

Note: Cluster robust standard errors are reported in parentheses.
*Statistical significance at 10%, 5% and 1% and no significant levels are indicated by *, **, *** and ^{ns}, respectively.*

3.3. Robustness checks

A robustness check was performed to explore the effects of shocks in trade of natural resources on agricultural productivity with further distant lags (k = 3, 4, 5) as the shocks possibly last for more than two years (Table 5). Only with k = 3 and k = 4 was the slope of the coefficient statistically significant; however, given that the sign of the estimates is still negative, this implies a negative relationship between terms of trade and agricultural productivity for LDCs.

4. CONCLUSIONS AND IMPLICATIONS

Improvement in agricultural productivity is very important for low-income countries, especially LDCs, since the main source of income in those countries derives from the agriculture sector. Thus, understanding the relationship between trade and agricultural productivity attracts interest from researchers, state governments and international development bodies.

This paper addresses the problem of endogeneity by focusing on the aspect of trade (terms of trade) that is responsible for contributing resources to a country's GDP (resource rents). The second-stage least squares estimates provide evidence that an increase in the terms of trade leads to a significant decrease in agricultural productivity. The estimated semi-elasticity shows that a one percentage point increase in the terms of trade reduces agricultural productivity growth by approximately 0.23% on average, holding other factors constant. The results from the second-stage least squares regression (Table 4) also indicate that LDCs with limited access to world trade due to geographic conditions (i.e.,being landlocked), suffer even more than other LDCs. Moreover, the OLS estimates are smaller by far than the second-stage least squares estimates, indicating that ignoring endogeneity in explanatory variables would cause the estimates to be biased and inconsistent.

From the development perspective, our paper raises the issue that expanding trade does not necessarily provide a favourable background for improvement in the agriculture sector in LDCs. Governments, therefore, should be aware of the impacts of trade negotiation by

not focusing only on trade values. It should also be noted that the high protectionism in the developed economies, such as Japan, USA and EU, can be harmful to the agricultural exports from LDCs.

Instead of subsidising LDCs through international aid programs, governments in developed countries should provide more incentives for LDCs by cutting their supports in agriculture, eliminating agricultural import tariffs and investing more in agricultural research and development, and other actions that would further support poor farmers in LDCs.

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APPENDIX TABLES

Table A1. List of 48 Least Developed Countries by regionand their exports

Countries	Major export products
1. Africa, 34 countries	
Angola	Crude oil, diamonds, refined petroleum products, coffee, sisal, fish and fish products, timber, cotton
Benin	Cotton, cashews, shea butter, textiles, palm products, seafood
Burkina Faso	Cotton, livestock, gold
Burundi	Coffee, tea, sugar, cotton, hides
Central African Republic	Diamonds, timber, cotton, coffee
Chad	Oil, livestock, cotton, sesame, gum arabic, shea butter
Comoros	Vanilla, ylang-ylang (perfume essence), cloves
Dem. Rep of the Congo	Petroleum, lumber, plywood, sugar, cocoa, coffee, diamonds
Djibouti	Re-exports, hides and skins, coffee (in transit), scrap metal
Equatorial Guinea	Petroleum products, timber
Eritrea	Gold and other minerals, livestock, sorghum, textiles, food, small manufactures

Ethiopia	Coffee, oilseeds, edible vegetables including khat, gold,flowers, live animals, raw leather products, meat products
Gambia	Peanut products, fish, cotton lint, palm kernels
Guinea	Bauxite, gold, diamonds, coffee, fish, agricultural products
Guinea-Bissau	Fish, shrimp, cashews, peanuts, palm kernels, raw and sawn lumber
Lesotho	Manufactures (clothing, footwear), wool and mohair, food and live animals, electricity, water, diamonds
Liberia	Rubber, timber, iron, diamonds, cocoa, coffee
Madagascar	Coffee, vanilla, shellfish, sugar, cotton cloth, clothing, chromite, petroleum products
Malawi	Tobacco 53%, tea, sugar, cotton, coffee, peanuts, wood products, apparel
Mali	Cotton, gold, livestock
Mauritania	Iron ore, fish and fish products, gold, copper, petroleum
Mozambique	Aluminium, prawns, cashews, cotton, sugar, citrus, timber, bulk electricity
Niger	Uranium ore, livestock, cowpeas, onions
Rwanda	Coffee, tea, hides, tin ore
Sao Tome and Principe	Cocoa, copra, coffee, palm oil
Senegal	Fish, groundnuts (peanuts), petroleum products, phosphates, cotton
Sierra Leone	Diamonds, rutile, cocoa, coffee, fish
Somalia	Livestock, bananas, hides, fish, charcoal, scrap metal
South Sudan *	
Sudan	Gold, oil and petroleum products, cotton, sesame, livestock, peanuts, gum arabic, sugar
Togo	Re-exports, cotton, phosphates, coffee, cocoa
Uganda	Coffee, fish and fish products, tea, cotton, flowers, horticultural products, gold
United Rep. of Tanzania	Gold, coffee, cashew nuts, manufactures, cotton
Zambia	Copper/cobalt, cobalt, electricity; tobacco, flowers, cotton
2. Asia and Oceania, 13 countries	
Afghanistan	Opium, fruits and nuts, hand-woven carpets, wool, cotton, hides and pelts, precious and semi-precious gems
Bangladesh	Garments, knitwear, agricultural products, frozen food (fish and seafood), jute and jute goods, leather
Bhutan	Electricity (to India), ferrosilicon, cement, calcium carbide, copper wire, manganese, vegetable oil
Cambodia	Clothing, timber, rubber, rice, fish, tobacco, footwear
Kiribati	Fish, coconut products
Laos People's Dem. Rep.	Wood products, coffee, electricity, tin, copper, gold, cassava
Myanmar	Natural gas, wood products, pulses and beans, fish, rice, clothing, minerals, including jade and gems
Nepal	Petroleum products, machinery and equipment, gold, electrical goods, medicine
Solomon Islands	Timber, fish, copra, palm oil, cocoa
Timor-Leste	Oil, coffee, sandalwood, marble
Tuvalu	Copra, fish
Vanuatu	Copra, beef, cocoa, timber, kava, coffee
Yemen	Crude oil, coffee, dried and salted fish, liquefied natural gas
3. Americas and the Caribbean, 1 country	
Haiti	Apparel, manufactures, oils, cocoa, mangoes, coffee

Note: The list of LDCs is obtained from the UN website (As of May, 2016) http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_list.pdf, andthe export commodities are sourced from the CIA World Factbook https://www.cia.gov/library/publications/the-world-factbook/.
** Information about export commodities from South Sudan is not available.*

Table A2. List of 17 landlocked least developed countries

Africa, 13 countries	
Burkina Faso	Malawi
Burundi	Mali
Central African Republic	Niger
Chad	Rwanda
Ethiopia	South Sudan
Lesotho	Uganda
	Zambia
Asia, 4 countries	
Afghanistan	Laos People's Dem. Rep.
Bhutan	Nepal

Note: The list of landlocked least developing countries is taken from the UNCTAD website
Source: http://unctad.org/en/pages/aldc/Landlocked_Developing_Countries/List-of-land-locked-developing-countries.aspx.