



ECONOMIC DIVERSIFICATION

**IN ASIAN LANDLOCKED
DEVELOPING COUNTRIES:
PROSPECTS AND CHALLENGES**



The shaded areas of the map indicate ESCAP members and associate members.

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United Nations publication
Sales No. E.15.II.F.3
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Printed in Bangkok
ISBN: 978-92-1-120683-8
e-ISBN: 978-92-1-057118-0
ST/ESCAP/2702

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FOREWORD



Economic Diversification of Asian Landlocked Developing Countries: Challenges and Prospects, is a contribution by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) to the deliberations of the Second United Nations Conference on Landlocked Developing Countries, to be held in Vienna from 3 to 5 November 2014. It offers concrete proposals and ideas to advance the 2013 Vientiane Consensus, adopted as the outcome of the Asia-Pacific final regional review of the Almaty Programme of Action: Addressing the Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries.

The report offers empirical evidence, both at the regional and country levels, of high product concentration on a few primary products, including hydrocarbons and mineral resources. This product concentration has often stifled economic growth and job creation, exposing economies to commodity price volatility.

In view of these issues, the report recommends that Asian landlocked developing countries (LLDCs) should launch concerted and coherent action to more strategically advance economic diversification, identifying the many significant challenges facing LLDCs in doing so.

Diversification is critically important for the LLDCs to reduce economic vulnerability, raise GDP, and secure competitive advantages within product niches, subject to developing newer capabilities and the easing of structural bottlenecks. Enhancing product sophistication and differentiation, as well as effectively tapping export potential, will assist countries to embark on more sustainable growth and development paths.

Acknowledging that countries pursue different, sometimes competing, pathways to diversification, ESCAP's analysis underscores the importance of careful and strategic planning in choosing the optimum path, consistent with their success in evolving newer required capabilities and available market opportunities, as well as taking specific account of different national circumstances.

This report contains fresh data, new perspectives and approaches, as well as policy guidance for Asian LLDCs in changing their economic structures. A key, concrete contribution of the report is the identification of potential new sectors, products and markets for successful diversification

in each of the twelve Asian LLDCs. Such targeted analysis is the result of cutting-edge research, using large sets of trade data, combined with macroeconomic modelling simulations. ESCAP's analysis reveals that, if left to market forces alone, diversification in these countries, if it occurred, would likely perpetuate low productive capacities – hence the need for a more calibrated roadmap for new product market potential, which can only emerge if backed by a strong mix of appropriate leadership and policies.

For each of the twelve Asian LLDCs, therefore, the report lists a range of potential new sectors for diversification, with increased export and import-substitution opportunities. Based on policy simulations, the report has identified potential new products, with varying degrees of sophistication, ranging from 38 for Bhutan to 285 for Armenia. It is hoped that this will inspire private sector investment in appropriate new activities, as well as the strategic promotion of new sectors by the respective Governments.

Most product diversification opportunities for Asian LLDCs exist in five industries, based on supply strengths: base metals, chemicals, machinery and electrical equipment, plastic and rubber, as well as textiles. In most of these products, countries seem to have good export opportunities as well. The most promising appear to be opportunities for product differentiation and sophistication in base metals and textiles. In addition to export opportunities, the potential of new products for import substitution, based on domestic demand, would also facilitate economic diversification.

Wider Asia-Pacific regional success depends on the success of our countries with special needs – and the future prosperity of the Asian LLDCs is one of the most important aspects of future regional prosperity. There is no “one-size-fits-all” set of policies that could address the specific binding constraints that hinder private sector investments in new economic activities in each of the twelve Asian LLDCs. Successful diversification requires, however, a combination of a stable, investment-friendly and competitive macroeconomic policy frameworks, as well as targeted industrial, infrastructure, trade and investment policies.

This publication therefore makes a practical and necessary contribution to the policy debate at the Second United Nations Conference on Landlocked Developing Countries, and will help to shape policymaking in these countries and throughout the region.



Shamshad Akhtar
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Commission for Asia and the Pacific

EXECUTIVE SUMMARY

Advances in technology and logistics have helped boost economies around the world, but have not removed the main challenge faced by the 12 landlocked developing countries (LLDCs) in Asia, namely Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, the Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan. With no access to the sea, these countries must conduct their trade through neighbouring countries, which results in added costs.

These 12 LLDCs share a characteristic pattern of trade dependency on a few primary commodities or low value added products that leaves them vulnerable to the volatility of global demand and prices. The incentives are to produce more when demand levels cause prices to rise, as they have in the past decade. When prices decline, the production base with its limited capacities has few alternatives to offer. The conventional solution is to promote economic diversification to reduce volatility of economic and export growth.

Beyond the standard conditions that call for diversification, however, are the compelling results of new research at ESCAP and elsewhere. Global trade data show rewarding returns for countries that succeed in diversifying their economies: the more diversified the economy,

- (a) The higher is its GDP;
- (b) The lower is the competition for its products that it faces in global markets; and
- (c) The more pronounced is the tendency for its diversification to flourish along specific pathways, from the existing production base to new sectors.

Apart from reducing vulnerability to the vicissitudes of international trade, economic diversification is strongly associated with higher output from expansion in the range of goods and services. Trade data also reveal that diversification is associated with a reduction in the average numbers of competitors for export products in the global trade arena, an advantage that increases the potential for private firms to grow their market share and profits.

Underlying these associations is the evidence that diversification happens when new economic initiatives follow specific pathways in expanding a country's production base. Diversification appears to be a path-dependent process that leads to self-reinforcing development when it proceeds in the right direction.

What a country produces today influences what sectors can emerge in the immediate future. What new investment chooses to produce can determine the impacts in related sectors of the economy. Some pathways can lead to new products, further diversification and improvement in a country's productive capacity. Other paths spin off relatively fewer opportunities, providing less potential for economic growth and diversification.

Mapping the connections among sectors and understanding the differences that spell success or senescence could help support policymaking for growth in economic diversification. Such “product space maps” have been generated, and ESCAP presents one of its own in this publication, as well as a discussion of the technical aspects in an annex. ESCAP seeks to use the concept in charting paths to diversification for LLDC economies.

ESCAP research shows how diversification tends to move in short steps rather than jumps. New production possibilities emerge in sectors with required productive capacities close to current production. Empirical evidence suggests that potential suitability for growing diversification may be identified by the level of “complexity” associated with each product.

A product's complexity depends on the level of productive capacities that are engaged in its manufacture. ESCAP has gauged product complexity indirectly through trade data that captures the country's export activity.

Products with high complexity are produced by fewer and more diversified economies, generally speaking. Less complex products are produced by many countries with low levels of diversification. The larger a country's economy, the higher is the share of its products with high complexity.

The question for policymakers in Asian LLDCs is how to foster the emergence of new and diversified economic activities, given:

- The technological level of their current production base;
- The challenges of their geographic isolation from global markets; and
- The incentives not to diversify because of global demand for their primary goods.

In the present report, an attempt is made to show policymakers how to identify appropriate paths to diversification. The map of products of each of the 12 Asian LLDCs suggests sets of potential new products for consideration.

The addition of the concept of product complexity in the analysis of products with the potential to promote diversification should enhance policy analysis leading to fruitful ends. Regarding the demand side, this report uses estimates of import substitution as well as export opportunities to identify potential new sectors with demand levels that could increase chances for success in diversification.

This ESCAP publication offers a methodology for identifying diversification opportunities that uses a new ESCAP data set of products disaggregated by price range and based on empirical trade data sets available from international sources. The resulting list of potential new products is a public good that is available through the ESCAP website at www.unescap.org/resources/lldc-diversification. The intention is to reduce the cost of uncovering the potential of new economic ventures.

The present report also identifies the top export markets for potential new products from Asian LLDCs. Trade links with European and North American markets continue to appear advantageous. Asian and Pacific markets, at the same time, offer about one quarter of the export opportunities for those potential new sectors. Hence, intraregional integration and cooperation in the Asia-Pacific region remain critical in fostering diversification among Asian LLDCs.

ESCAP research in this area is especially designed to help generate export opportunities for Asian LLDCs, the domestic markets of which may not be broad or powerful enough to encourage growth in production capacities. New economic activities in LLDC settings would likely lead to below-average product complexity that would simply perpetuate their capacity constraints. With strategic incentives for appropriate investments, policymakers can nudge investors towards economic activities that will increase productive capacities.

Asian LLDCs face three main challenges to their economic diversification. First, many of those countries depend on primary commodities whose current prices in global markets are high and thus favour the industrial status quo. Second, historically high commodity prices have driven increases in terms of trade, which tend to over-appreciate the real exchange rate based on costs of market goods. Results of ESCAP macroeconomic modelling show how diversification is reduced steadily to half of its potential with single-digit appreciations of the exchange rate. Third, the high costs of trade and transport faced by Asian LLDCs also drag diversification below its potential.

Some general recommendations follow this discussion to foster diversification, through:

- (a) Stable investment-friendly and competitive macroeconomic policy framework. Exchange rates are key in promoting the emergence of new economic sectors. The main set of policies here would be aimed at maintaining a competitive exchange rate and neutralizing tendencies towards appreciation. Other monetary policies also support an increase in productive investments in new sectors. Macroeconomic stability, including moderate and stable inflation, and sustainable domestic and external imbalances also create an environment conducive to private sector investment in diversifying the economy;
- (b) Industrial policy. Implementing strategic diversification requires an industrial policy – the selective promotion of particular economic activities over others. Here, new economic activities should be promoted that would encourage greater levels of product complexity and allow for further diversification in the future. Active public intervention is required that is aimed at supporting infant industries and creating the necessary complementary productive infrastructure, including industrial estates and economic zones. Intervention would also be aimed at encouraging marketing and export market development, together with other promotional measures under industrial policy; and
- (c) Domestic resource mobilization. A third imperative for Asian LLDCs is to provide access to a variety of financial services and products that support private investment in new economic activities. A diversified, well-regulated and inclusive financial system should promote savings and channel them into productive investments. On the revenue side, policies need to be focused on broadening the tax base and introducing direct taxes.

ACKNOWLEDGEMENTS

This report was prepared under the general direction and guidance of Shamshad Akhtar, Under-Secretary-General of the United Nations and Executive Secretary of the Economic and Social Commission for Asia and the Pacific (ESCAP), and under the substantive direction of Aynul Hasan, Officer-in-Charge, a.i., and Syed Nuruzzaman, Chief of Countries with Special Needs Section, of the Macroeconomic Policy and Development Division. The report was prepared by Clovis Freire, Economic Affairs Officer, Macroeconomic Policy and Development Division. Other contributions from the Division came from Zheng Jian, who provided substantive inputs, and Alberto Isgut, Daniel Jeongdae Lee, Marin Yari, Naylin Oo, Oliver Paddison, Shuvojit Banerjee, Steve Gui-Diby, Sudip Basu and Vatcharin Sirimaneetham, who provided valuable advice and comments. Achara Jantarasaengaram, Pannipa Ongwisedpaiboon, Patchara Arunsuwannakorn, and Sutinee Yeamkitpibul provided research assistance. Arpaporn Chomcherngpat undertook all administrative processing necessary for the issuance of the publication. The manuscript was edited by Kim Atkinson.

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ABBREVIATIONS

APoA	Almaty Programme of Action
COMTRADE	United Nations Commodity Trade Statistics Database
CSN	countries with special needs
ESCAP	United Nations, Economic and Social Commission for Asia and the Pacific
FDI	foreign direct investment
GDP	gross domestic product
HS	Harmonized System
LDCs	least developed countries
LLDCs	landlocked developing countries
LNG	liquefied natural gas
PPP	purchasing price parity
SITC	Standard International Trade Classification
SPAID	State Program of Accelerated Industrial-Innovative Development
UNCTAD	United Nations Conference on Trade and Development
WDI	World Development Indicators of the World Bank
\$	United States dollars, unless otherwise noted



Farmers tend their crops in the Dalit communities of Baitadi and Dhanusha, Nepal. Credit: UNICEF



1. INTRODUCTION

The socioeconomic development of 12 Asian countries is constrained by lack of territorial access to the sea and their remoteness and isolation from world markets. The resulting increase in transport costs limits their potential exports and reduces their competitiveness and profitability. The countries which comprise the group of Asian landlocked developing countries are Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, the Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan.

One of the main United Nations mandates to assist LLDCs is embodied in the Almaty Programme of Action: Addressing the Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries (APoA). It is designed to address the special needs of those countries through: (a) establishing a new global framework for developing efficient transit transport systems in landlocked and transit developing countries, taking into account the interests of both landlocked and transit developing countries; and (b) promoting trade for development.

In addition to transport and trade facilitation, the need for diversifying Asian LLDC production and export structures was identified as another priority for further development effort at United Nations preparatory meetings for the development of the successor to APoA, which is to be agreed at the Second United Nations Conference on Landlocked Developing Countries in Vienna from 3 to 5 November 2014. In particular, the LLDC orientation to low-value, high-bulk commodities should be shifted to high-value, low-bulk products to enable them to benefit fully from the multilateral trading system and enhance their export competitiveness.

With the latter approach, development is essentially a process of economic transformation, as labour shifts from low- to high-productivity activities¹ and the scope and variety of economic activities expand.² In developing countries, economic diversification is usually associated with the innovative process of

absorbing technologies to emulate more productive industries that were the result of previous innovation in more developed countries.³ However, diversification is a path-dependent process. Possibilities for emulation are not equally available at any given time.⁴ Path dependence exists because new economic activities tend to exploit the technologies that were previously developed for other activities.⁵ Therefore, the activities that are more likely to be emulated are those that require a set of technologies that largely overlaps with the set required by the existing economic activities in the economy. On the other hand, the incentives for creation and combination of technologies are shaped by economic institutions and the expected demand for the new products.⁶

In the case of Asian LLDCs, the question for policymakers is how to foster the emergence of more productive economic activities, given the technological level of their current production base, the challenges posed by geographical constraints in linking to the global markets, and the incentives away from diversification created by global demand for their primary commodities.

The objective of this report is to present the prospects and challenges for economic diversification of the 12 Asian LLDCs. The reports presents: (a) patterns that show the role of economic diversification on growth and structural transformation; (b) sectors/markets that present greater opportunities for successful diversification of Asian LLDCs; (c) strategies that these countries could consider to foster diversification; (d) implications for diversification of Asian LLDCs of their high dependence on primary and/or low-value added products and the high trade costs that they face; and (e) policy recommendations for LLDCs to foster economic diversification.

The report is based on several knowledge products of ESCAP that are part of the results of its research programme on economic diversification and productive capacity of countries with special needs in Asia and the Pacific. The analysis follows a multisectoral macroeconomic evolutionary growth model⁷ along structuralist lines⁸ that present:

(a) the basic principles of heterogeneity of economic activities; (b) the existence of a mechanism for generation of novelty in the economy; and (c) selection based on the economic environment (for example, economic institutions and demand). It also incorporates the concept of economic complexity as proposed by Hidalgo and Hausmann (2009).⁹

The report makes use of trade data as a proxy for production data, given the scarcity of internationally comparable disaggregated production data related to the Asian LLDCs. There are many advantages to that approach but also challenges related to data quality, which are duly recognized up front but do not change the main conclusions and key recommendations of the report.

In section 2, this report briefly presents the basic macroeconomic information on Asian LLDCs and their main structural impediments. Following that is a discussion of the role of economic diversification on total output, the association between diversification and competition in international markets, and the path dependence that characterizes the diversification process. The report uses a methodology to identify opportunities for economic diversification in Asian LLDCs. The result of that analysis is a tailored list of sectors/markets that present greater opportunities for successful diversification of those countries. A discussion follows on the role of markets and Governments in creating the incentives for entrepreneurs to find those good opportunities for diversification; that is followed by an analysis of the combination of laissez-faire and strategic diversification that would be more likely to foster successful diversification among Asian LLDCs. Three challenges are faced by Asian LLDCs in pursuing diversification: (a) demand incentives to specialize in primary commodities; (b) the tendency of exchange rate appreciation; and (c) high costs of trade. The report also provides a set of policy recommendations to facilitate country-level efforts to foster diversification by improving the business environment and supporting entrepreneurship, and to nudge the private sector towards new economic activities.

2. ASIAN LANDLOCKED DEVELOPING COUNTRIES

The Asian LLDCs form a heterogeneous group of countries in terms of economic size and stage of socioeconomic development. The group comprises less populous countries, such as Bhutan with 754,000 people, and those with mid-sized populations, such as Afghanistan (30 million), Nepal (27 million) and Uzbekistan (29 million) (see table 1). The size of the economies also varies remarkably within the group, from \$1.8 billion in Bhutan to \$202 billion in Kazakhstan. Afghanistan, Kyrgyzstan, the Lao People's Democratic Republic, Nepal and Tajikistan have lower income per capita, below \$3,000 in PPP terms, while Armenia (\$7,374), Azerbaijan (\$8,860) and Kazakhstan (\$12,360) are middle-income countries. More than half the populations of those three countries and Mongolia live in urban areas. The other eight countries have a larger share of rural population, varying from 63% in Bhutan and the Lao People's Democratic Republic to 76% in Afghanistan. Life expectancy at birth exceeds 60 years of age for all Asian LLDCs, ranging from 61 years in Afghanistan to 75 years in Armenia. The adult literacy rate is high, more than 99% of the population aged 15 and older for all countries for which data are available, except in Nepal (54.7%). Health indicators, however, are more heterogeneous, as indicated by the under-5 mortality rate measured by the number of deaths of such young children per 1,000 live births, which varies from 98 in Afghanistan to 16 in Armenia.

In terms of subregional location, 7 of the 12 Asian LLDCs are Central Asian or South Caucasus countries, namely Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan; three are in South and South-West Asia, namely Afghanistan, Bhutan and Nepal; one is in South-East Asia, that is, the Lao People's Democratic Republic; and the other, Mongolia, is in North-East Asia.

Despite those differences, Asian LLDCs share a common challenge, remoteness and isolation from international markets. The defining characteristic of the group of LLDCs is their geographic situation without direct access to trade by sea, which increases their trade costs substantially. That is illustrated in

A Mongolian woman sits sewing outside a traditional home.
Credit: Marie Ange Sylvain-Holmgren

Table 1 Demographic and socioeconomic indicators, Asian landlocked developing countries, 2013

Countries	Population size (1 000)	GDP in current prices (million \$)	GDP per capita (\$ 2005 PPP)	Urban population (% total)	Life expectancy at birth (years)	Adult literacy rate (% of population aged 15 and above)	Under-5 mortality rate (deaths per 1 000 live births)
Afghanistan	30 552	20 364	1 367	24	61		98
Armenia	2 977	9 950	7 374	64	75	99.6	16
Azerbaijan	9 413	68 727	8 860	54	71	99.8	35
Bhutan	754	1 861	5 774	37	68		45
Kazakhstan	16 441	202 656	12 360	53	67	99.7	19
Kyrgyzstan	5 548	6 475	2 118	36	68	99.2	27
Lao People's Democratic Republic	6 770	9 100	2 522	37	68		72
Mongolia	2 839	10 271	4 708	70	68	97.4	28
Nepal	27 797	18 029	1 276	18	68	57.4	42
Tajikistan	8 208	7 633	1 920	27	67	99.7	58
Turkmenistan	5 240	33 466	9 121	49	66	99.6	53
Uzbekistan	28 934	51 414	3 229	36	68	99.4	40

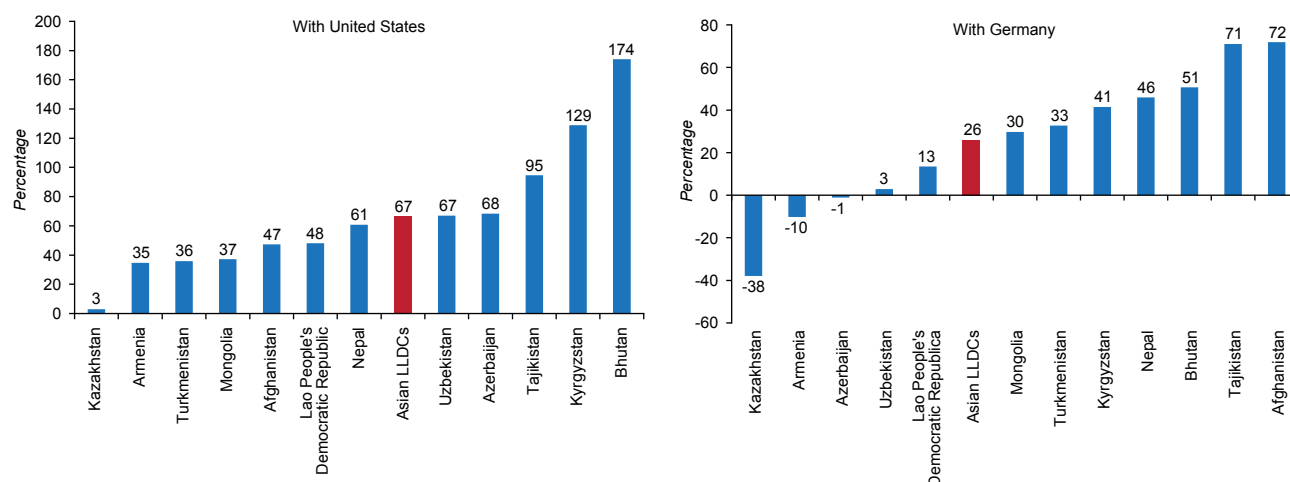
Source: ESCAP Online Statistical Database.

figure 1, which shows the trade costs excluding tariff costs between Asian LLDCs and Germany and the United States of America as compared with the average trade costs of non-LLDCs.

Costs of trade of the majority of the Asian LLDCs are in general remarkably higher than the average

for non-LLDCs in the world. For example, Bhutan faces trade costs, excluding tariffs, that are 174% higher than those faced by non-LLDCs when trading with the United States, and Kyrgyzstan and Tajikistan face costs 129% and 95% higher, respectively. On average, trade with the United States is 67% more costly for Asian LLDCs than for the average non-

Figure 1 Additional trade costs paid by Asian landlocked developing countries in trading with the United States and Germany, as percentages of trade costs paid by non-landlocked developing countries, 2013



Source: ESCAP based on ESCAP-World Bank Trade Cost Database.

LLDC country in the world. Similarly, trade with Germany is more costly for Asian LLDCs, 26% higher than for non-LLDCs. Relatively lower costs are faced by Armenia (-10%), Azerbaijan (-1%) and Kazakhstan (-38%), but the other Asian LLDCs face higher costs, up to more than 70% in Afghanistan and Tajikistan.

The higher trade costs, shown in figure 1, reduce the competitiveness of the Asian LLDCs and hinder their ability to harness trade to promote their economic growth and structural transformation. In countries endowed with natural resources, high trade costs also create incentives for specialization in high bulk primary commodities with relative inelastic demand to the trade costs. In fact, the production and trade structure of most of Asian LLDCs is characterized by product baskets that are highly dominated by primary commodities. Many of these countries have become more exposed to commodity-related risks compared with a decade ago making their economies more vulnerable to decline in commodity prices in the global market,¹⁰ thus indicating the need for creating a more diversified production base in these countries.

The high reliance of many Asian LLDCs on a few primary commodities is shown in table 2, which lists the top three exports of Asian LLDCs in 2013 in terms of share of total exports. For example, the top three exports of Azerbaijan, Bhutan, Kazakhstan, Mongolia, Tajikistan and Turkmenistan are oil and minerals; they account for between 64.2% and 92.9% of the total exports. Given such high shares, any volatility in the prices of those top three commodities has a commensurate impact of the exports of these countries. The other LLDCs also have primary products as part of their top three exports, accounting for sizable shares. The exception is Nepal, which has as its top three exports manufactured products non-alcoholic beverages, carpets and articles made of plastic.

The concentration of exports of many Asian LLDCs is also illustrated in figure 2, which shows an index of concentration that captures how both

exports and imports of countries are concentrated on a few products or divided more equally among many products. The index ranges from 0, indicating homogenous division, to 1, which indicates total concentration. The higher concentration among the Asian LLDCs is in Afghanistan, Kazakhstan, Tajikistan and Turkmenistan. Most of the other countries have exports and imports more concentrated than the global average and the average for developing economies.

Figure 2 also presents a diversification indicator based on the number of categories of products exported. The figure shows that diversification of Asian LLDCs is generally well below the global average and the average for developing countries. Kazakhstan is the most diversified of the group based on that measure, and, using the SITC 3-digit trade classification, it exported 213 products, or 86% of the global average (260 products) in 2013. Bhutan and Mongolia, the least diversified of the group, exported 75 and 91 categories of products respectively, which represent less than 35% of the global average.

The low diversification of Asian LLDCs and the high reliance on a few primary commodities or low value added manufacturing goods makes these countries very vulnerable to exogenous shocks, such as the volatility of commodity prices or sudden changes in demand. In fact, LLDCs in the Asia-Pacific region have witnessed significant fluctuations in export performance in recent years emanating mainly from the global financial crisis and the knock-on effects of sluggish growth in advanced countries (table 3). The GDP weighted-average variance of export growth in the period 2004-2013 was three times higher for Asian LLDCs when compared with non-LLDCs. Therefore, there is a need to foster the economic diversification of these countries to reduce their vulnerability to external shocks.

Moreover, in addition to reducing the volatility of economic and export growth, economic diversification has also been associated with higher economic output and lower average number of competitors

Table 2 The top three exports of each Asian landlocked developing country, 2013

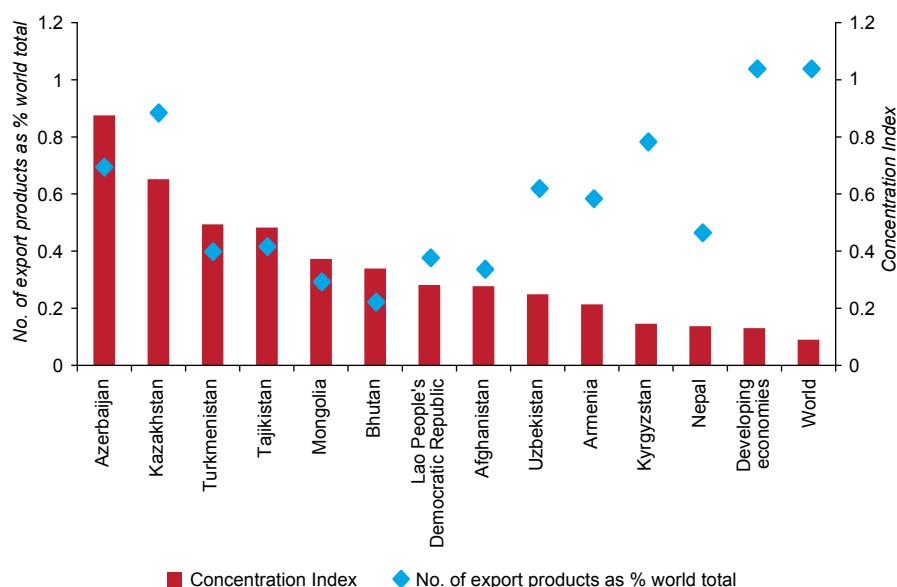
Country	Share of top 3 exports in total exports (percentages)	Description and share in percentages
Afghanistan	40.4	Cotton, not carded/combed (20.5); figs, fresh/dried (10.8); coal other than anthracite and bituminous, whether or not pulverized (9.0).
Armenia	33.7	Spirits obtained by distilling grape wine/grape marc (16.5); copper ores and concentrates (9.0); aluminium foil, whether or not printed, not backed, of a thickness not less than 0.2 mm (8.2).
Azerbaijan	92.9	Petroleum oils and oils obtained from bituminous minerals, crude (90.3); petroleum oils and oils obtained from bituminous minerals (excl. crude) and preps. (1.6); petroleum oils and oils obtained from bituminous minerals, crude (1.0).
Bhutan	80.7	Ferro-silicon, containing by weight less than 55% silicon, in granular/powder form (65.9); carbides, of calcium, whether or not chemically defined (8.6); carbides, of silicon, whether or not chemically defined (6.2).
Kazakhstan	67.8	Petroleum oils and oils obtained from bituminous minerals, crude (48.3); petroleum oils and oils obtained from bituminous minerals, crude (15.5); natural uranium and its comps.; alloys, dispersions, ceramic (4.0).
Kyrgyzstan	12.6	Copper waste and scrap (4.8); natural uranium and its comps.; alloys, dispersions, ceramic (4.7); float glass and surface ground/polished glass, non-wired (excl. of 7005.10) (3.1).
Lao People's Democratic Republic	53.6	Cathodes and sections of cathodes, of refined copper, unwrought (21.3); electrical energy (optional heading) (19.3); copper ores and concentrates (13.0).
Mongolia	71.2	Bituminous coal, whether or not pulverized but not agglomerated (30.4); copper ores and concentrates (24.7); iron ores and concentrates (excl. roasted iron pyrites), non-agglomerated (16.1).
Nepal	23.3	Non-alcoholic beverages other than water of 2202.10 (not including fruit/vegetable) (10.0); carpets and other textile floor coverings, knotted, whether or not made up (7.8); articles of plastic and of other materials of 39.01-39.14, n.e.s. in Ch.39 (5.6).
Tajikistan	64.2	Aluminium, not alloyed, unwrought (44.9); cotton, not carded/combed (11.5); lead ores and concentrates (7.7).
Turkmenistan	90.1	Natural gas, in gaseous state (79.3); petroleum oils and oils obtained from bituminous minerals (excl. crude) (8.3); cotton, not carded/combed (2.4).
Uzbekistan	36.0	Natural gas, in gaseous state (19.1); cotton, not carded/combed (9.6); cathodes and sections of cathodes, of refined copper, unwrought (7.3).

Source: ESCAP based on data from UN COMTRADE Database.

in the global market, as suggested by the results of recent empirical literature presented in section 3. Thus, Asian LLDCs could benefit from these

potential stability- and growth-gains of diversification to take full potential global trade and enhance the competitiveness of their exports.

Figure 2 Diversification indices of merchandise exports and imports, Asian landlocked developing countries, 2013



Source: ESCAP based on UNCTADstat database.

Note: Number of products is based on trade data classified using Standard International Trade Classification (SITC) revision 3 at the 3-digit level.

Table 3 Export growth in Asian landlocked developing countries, 2013

(Percentage)

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Variance
Afghanistan	112	26	8	9	19	-25	-4	-3	14	20	0.13
Armenia	5	35	1	17	-8	-33	42	30	9	4	0.05
Azerbaijan	39	112	70	63	44	-31	25	30	-6	-2	0.17
Bhutan	38	41	60	63	-23	-5	29	5	-18	-8	0.10
Kazakhstan	55	39	37	25	49	-39	39	41	3	-5	0.09
Kyrgyzstan	24	-7	33	48	40	-10	5	13	-4	-5	0.05
Lao People's Democratic Republic	8	52	59	5	18	-4	66	25	4	0	0.07
Mongolia	41	22	45	22	34	-25	52	66	-9	-3	0.08
Nepal	17	12	-3	4	8	-12	4	7	-1	-3	0.01
Tajikistan	15	-1	54	5	-4	-28	18	5	8	-14	0.05
Turkmenistan	7	28	45	25	34	-58	30	100	27	9	0.15
Uzbekistan	34	11	18	43	28	4	9	13	-15	13	0.03
Asian LLDC											0.09
World non-LLDCs											0.03

Source: ESCAP.

The image shows a busy port in Azerbaijan. In the foreground, two large oil rigs are mounted on ships. The ship on the left is red and white, with the name 'ƏLİ ƏMİROV' and IMO number '7502027' visible on its hull. The ship on the right is also red and white. Behind the ships, there are several large orange and blue cranes. In the background, a city skyline is visible across a body of water. A semi-transparent text box is overlaid on the left side of the image, containing the title '3. PATTERNS OF ECONOMIC DIVERSIFICATION¹¹' in yellow text.

3. PATTERNS OF ECONOMIC DIVERSIFICATION¹¹

Boats sit at the quayside of a port in Azerbaijan.
Credit: ESCAP Photo

In this section, three empirical patterns associated with diversification are presented: (a) the direct association between diversification and output, both in per capita and total terms; (b) the inverse association between diversification of an economy and the competition faced in exporting its product mix; and (c) path dependency in the process of diversification illustrated by the higher likelihood of particular pairs of products being exported jointly.

DIVERSIFICATION AND OUTPUT

Empirical evidence shows that higher economic output is associated with a larger set of products produced and exported. Economic growth is thus accompanied by a process of expansion in the range of goods and services in the economy, not simply producing more of the same products.¹² Such a pattern is valid for a fairly high level of income per capita, above which specialization seems to become the norm. That result suggests that, for most of their development path, countries diversify their production base and do not follow the pattern of permanent specialization in the same set of products based on an earlier comparative advantage.¹³

A related empirical regularity between diversification and income was discussed in the *Economic and Social Survey of Asia and the Pacific 2011*, which was focused on building productive capacities of the least developed countries.¹⁴ In fact, the association is very strong between diversification and total GDP when considering diversification as the number of categories of products produced further disaggregated by price. The idea is to differentiate these products, not by the broad industry to which they belong, such as textiles or tourism, but by the specificities of their production methods which are assumed to reflect different qualities and prices. For example, a \$2.00 T-shirt is a different product from a \$10.00 T-shirt. Each of them requires a specific combination of “productive capacities” to be produced, which are methods, processes, devices and infrastructure required for the production.

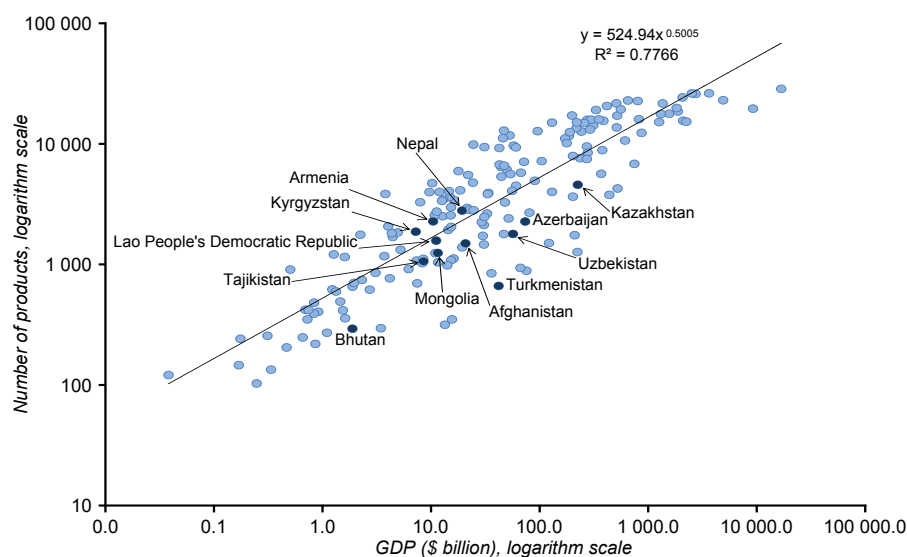
Figure 3 illustrates this pattern regarding the association between GDP and diversification. The figure shows more diversified countries associated with higher levels of GDP. These results also suggest that richer economies do not stop diversifying; rather they diversify through differentiating their production, which is usually not captured by more aggregated production and trade classifications. For example, when countries such as Japan, the Republic of Korea and Singapore were catching up, their firms in the garment industry did not simply reduce their production of low-unit value products that they used to make; they started to focus on different markets – diversifying into medium- and high-unit value products. Mass production tends then to gradually move to poorer countries, while differentiated production takes root in the areas of higher economic activity.¹⁵

DIVERSIFICATION AND COMPETITION

Another pattern presented in ESCAP (2011) is that economies that are more diversified tend to export products that are less ubiquitous, meaning that they are not produced by many other countries (figure 4). This result remains robust to changes in trade classification and the methodology used to classify into different price ranges the goods that are within the same product category.¹⁶ This fact suggests that, as countries diversify their exports, they face lower competition, thus improving their chances for increasing gains.

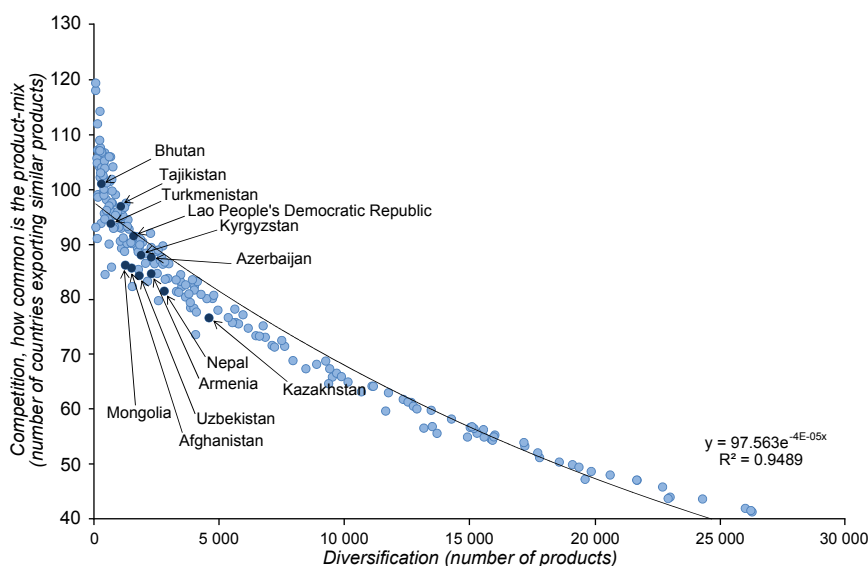
The Economic and Social Survey of Asia and the Pacific 2011 shows that the world's average diversification has increased over time, doubling in the past 25 years.¹⁷ Countries, therefore, should continue to diversify even if to just keep up. If economies in poorer countries do not diversify, they do not remain in the same position related to the other countries, they fall further behind.

Figure 5 shows how diversification and the competition faced by the Asian LLDCs have changed over the years. These countries face greater-than-average competition for their exports. Since 2005,

Figure 3 Higher output in association with diversification: diversification and GDP, 2013

Source: ESCAP based on data from UN COMTRADE and WDI.

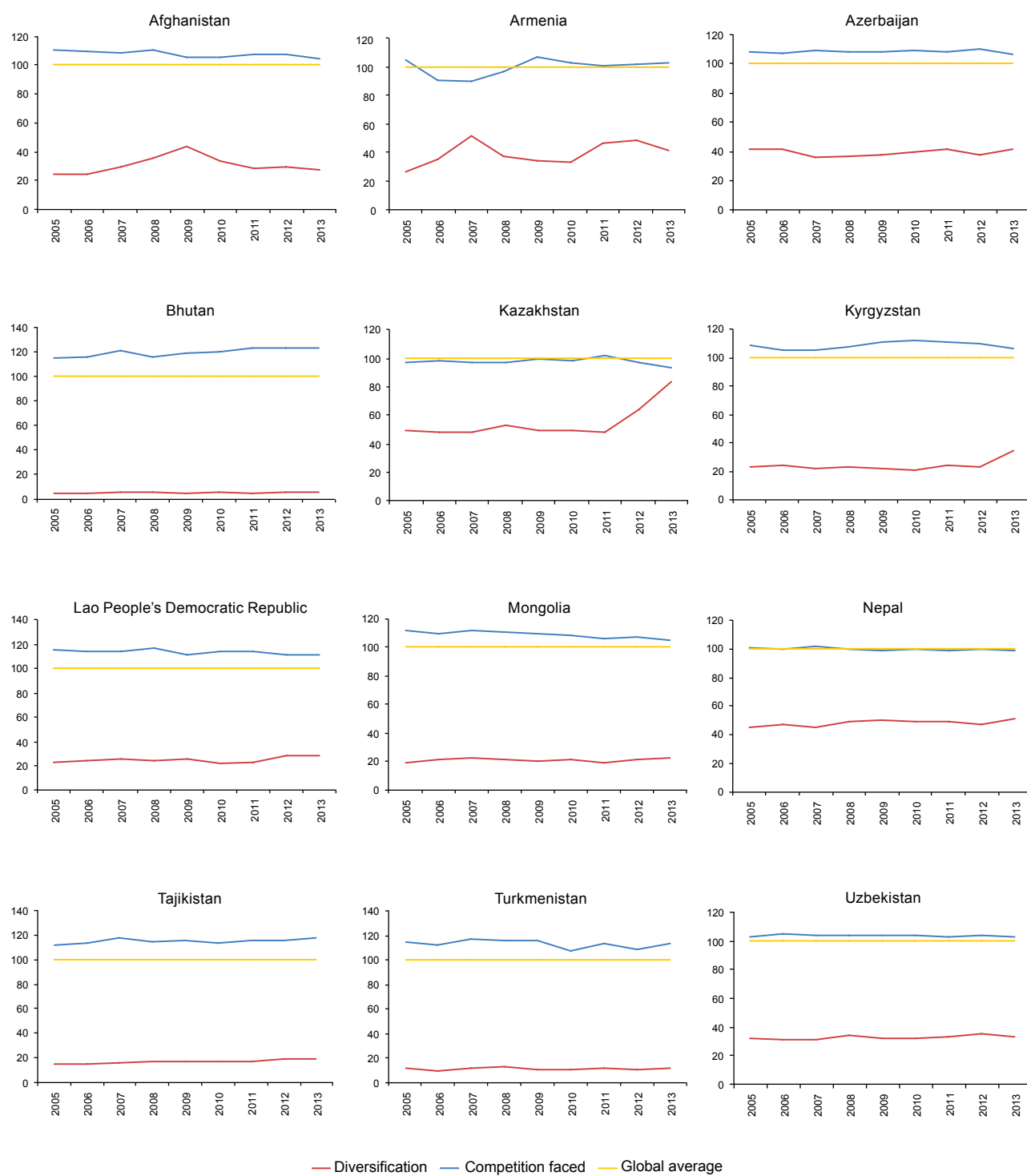
Notes: Products were originally classified using six-digit HS 2002 classifications. Products under the same six-digit classification were further differentiated based on their unit value (see annex for details).

Figure 4 Diversifying rewarded with reduced competition in trade: association between diversification and number of countries exporting similar products, 2013

Source: ESCAP based on ESCAP (2011) and data from UN COMTRADE and WDI.

Notes: Products were originally classified using six-digit HS 2002 classifications. Products under the same six-digit classification were further differentiated based on their unit value (see annex for details).

Figure 5 Diversification and competition faced by Asian landlocked developing countries, 2005-2013 (index, 100=global average)



Source: ESCAP based on ESCAP (2011) and data from UN COMTRADE.

the competition faced by Bhutan and Tajikistan has increased, but that of Afghanistan, Kazakhstan, Mongolia and Nepal has declined. The competition faced by others has remained relatively constant. The level of diversification has also in general remained constant and below global average levels. The noticeable exception is the remarkable increase in the diversification of Kazakhstan since 2011. Much of the progress may have been achieved through the 2010-2014 State Program of Accelerated Industrial-Innovative Development (SPAIID), which set specific targets for industrial and export diversification, labour productivity and energy efficiency improvement, innovation and decreased transportation costs.

Product complexity

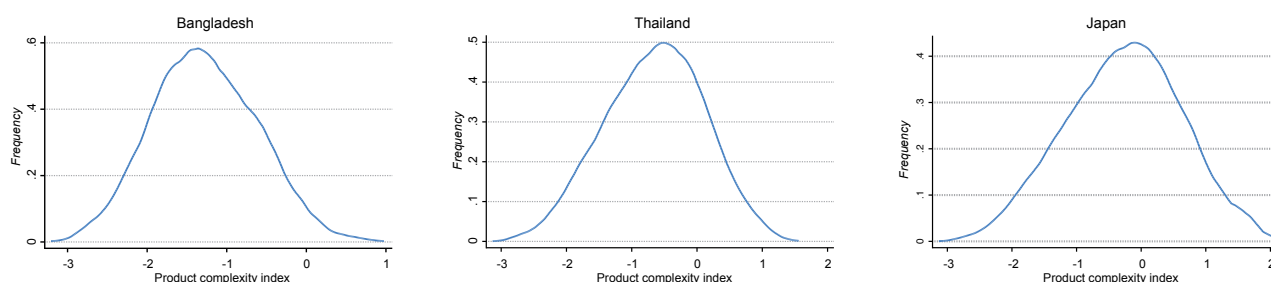
The *Economic and Social Survey of Asia and the Pacific 2011* combined these two types of measures – diversification and competition faced by the countries – to create a measure of the “complexity” of each product. The rationale here is that a larger set of productive capacities is required in producing more “complex” products, which are consequently produced by fewer and more diversified economies. The *Survey* for 2012 showed that rich countries produce within a wide range of complexity, from low to high complexity products, but poorer countries’ production is limited to low complexity products. Other studies have found that the major exporters of more complex

products are high-income countries, and the major exporters of less complex products are low-income countries. In addition, export shares of the more complex products increase with income.¹⁸

The range of complexity of products produced by countries is illustrated in figure 6, which shows the distribution of complexity of the products produced in Bangladesh, Thailand and Japan. In the figure, zero indicates the average product complexity considering all products in the world, and one indicates the standard deviation of the global distribution. The figure shows that as is the case in Bangladesh, Thailand produces goods with below average complexity, represented by the distribution below zero in the horizontal axis. However, unlike Bangladesh, a significant share of Thailand’s product mix is characterized by above average complexity. The distribution of product complexity in Japan is even more skewed to the right, that is, towards more complex products.

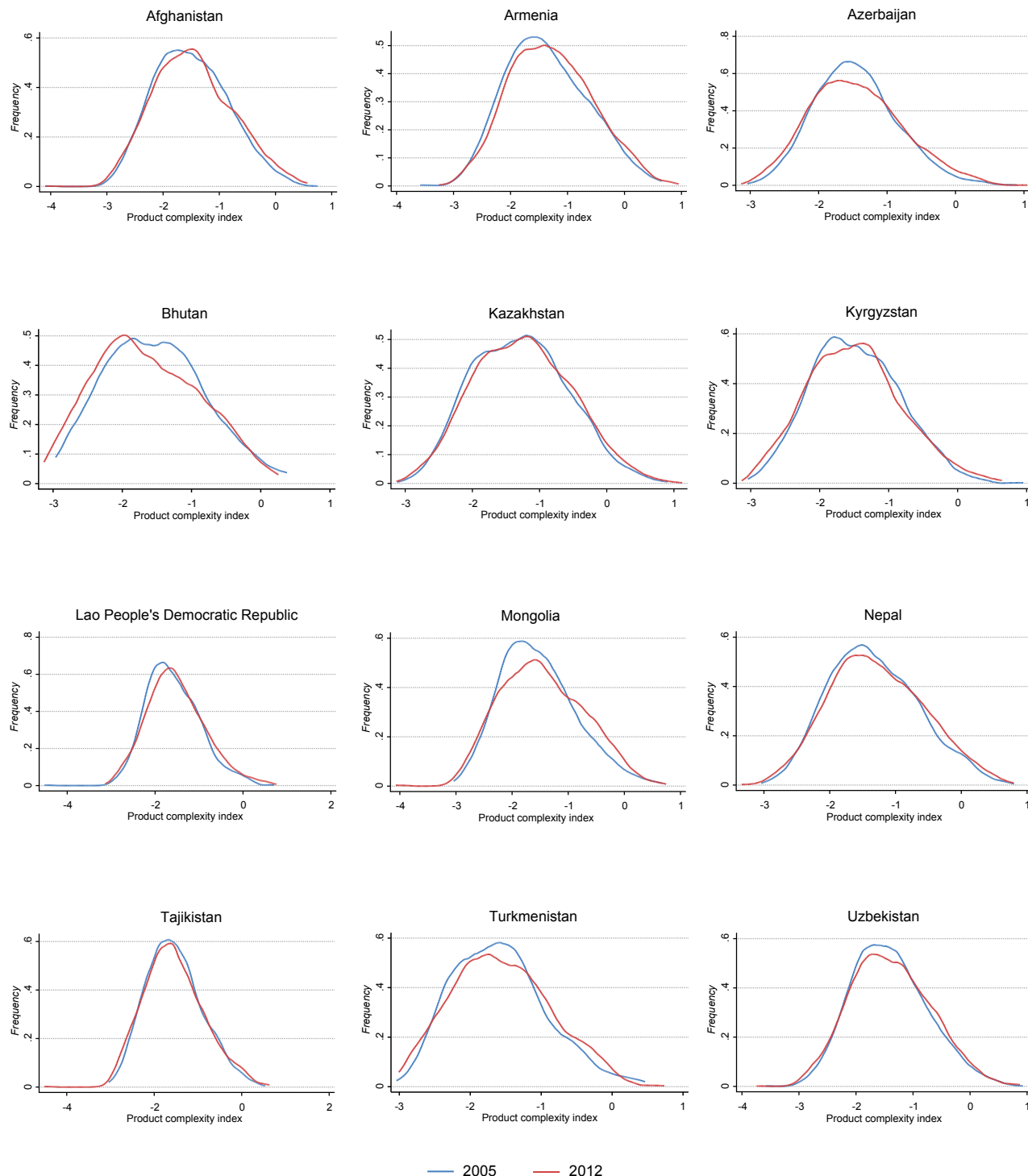
Figure 7 shows the distribution of product complexity of the Asian LLDCs in 2005 and 2012. The figure shows that all these countries produce products within a wide range of product complexities, but usually the share of products with complexity above the global average is small, meaning that they produce products that are generally produced by other less diversified countries. Figure 7 also shows that in many of the Asian LLDCs there has been a slow

Figure 6 The more developed the country, the greater the complexity of its product range: distribution of product complexity of selected Asian countries, 2013



Source: ESCAP based on ESCAP (2011) and data from UN COMTRADE.

Notes: Graphs are normalized so that products with average complexity are measured as zero complexity and the standard deviation from the average is one. See annex for details of the calculation of the product complexity.

Figure 7 Little change in product complexity among Asian landlocked developing countries from 2005 to 2012

Source: ESCAP based on ESCAP (2011) and data from UN COMTRADE.

Notes: Graphs are normalized so that products with average complexity are measured as zero complexity, and the standard deviation from the average is one. See annex for details of the calculation of the product complexity.

shift of the distributions towards the right side of the graphs, thus the product mix of these has become only slightly more complex over that period.

DIVERSIFICATION PATHS

Another pattern related to diversification is that the existing product mix of a country affects the potential new products that could emerge in the economy. Diversification, therefore, seems to be path dependent. That empirical regularity is illustrated by “product space” maps, the graphical representation of the likelihood that pairs of products are jointly exported.¹⁹ The type of question answered when constructing those maps is “what is the probability that, in a country, firms could produce cell phones given that firms in that country produce garments?” The idea is to answer that type of question for all pairs of products and considering all products produced in the world.²⁰

Figure 8 illustrates that fact using HS six-digit trade classification further disaggregated by price range. Each small circle in the figure represents a product and the links between products represent the likelihood that the pair of products is jointly produced. The figure shows only the pairs that are produced with higher than 85% probability. The figure suggests that, given a set of products produced in a country, the potential new products that could emerge through diversification with higher probability are those that are directly connected to the existing products in the product space.

An empirical regularity revealed in figure 8 by the product space map is that some products are connected to many others, thus their production increases the likelihood of further diversification. On the other hand, the production of a product that belongs to a pair that is isolated in the product space map gives fewer opportunities for diversification towards new products.

A result of the path dependency of the diversification process is that it seems difficult for countries to “leapfrog”, moving directly from the production of

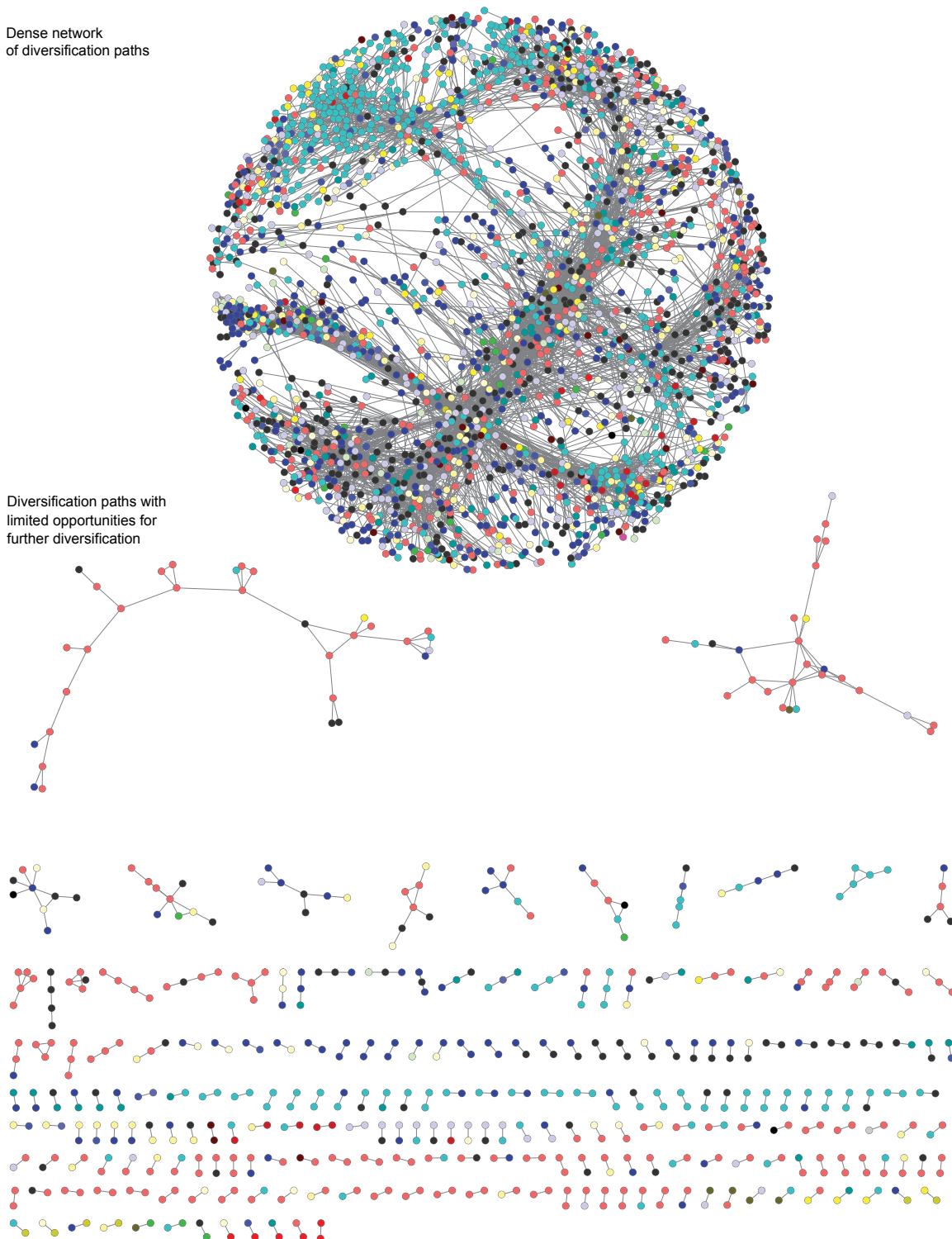
one product to another that is far away in the product space. For example, if a country has its production base concentrated in primary products and they are far from, say, mobile phones, then the probability of a country diversifying in the short term towards the latter is reduced.

Another way to illustrate that empirical regularity is to consider how products of a certain complexity are connected to other products, as illustrated in figure 9. The figure shows in the horizontal axis the complexity of all products produced in 2013 classified at six-digit level HS 2002 and further disaggregated by unit value. The scale is normalized in such a way that the average global complexity is zero and the standard deviation of the distribution of product complexity is one. In the vertical axis, the graph shows the complexity of potential new products. Therefore, each dot in the graph represents a pair composed by an existing and a potential new product. The colour of the dots indicates the proximity of the existing and new products in the product space.

The graph shows that up to the level of complexity at the global average, the complexity of potential new products is close to the complexity of existing products (i.e. half a standard deviation above and below), while for products with above-average complexity, the distribution is more diffused with opportunities one standard deviation above and below. That result suggests that, for most of the products produced in developing countries, the potential new products that could emerge with high probability are those very close in terms of productive capacities required to be produced.

An optimum path of diversification of economic activities may exist, consisting of the continuous move to selected activities that are more complex and that are closely related to the existing productive capacities of the country. The literature on developmental states suggests that the approach of selecting economic activities is a prime role for the State.²¹ The main instrument for that is industrial policy, which usually has been associated

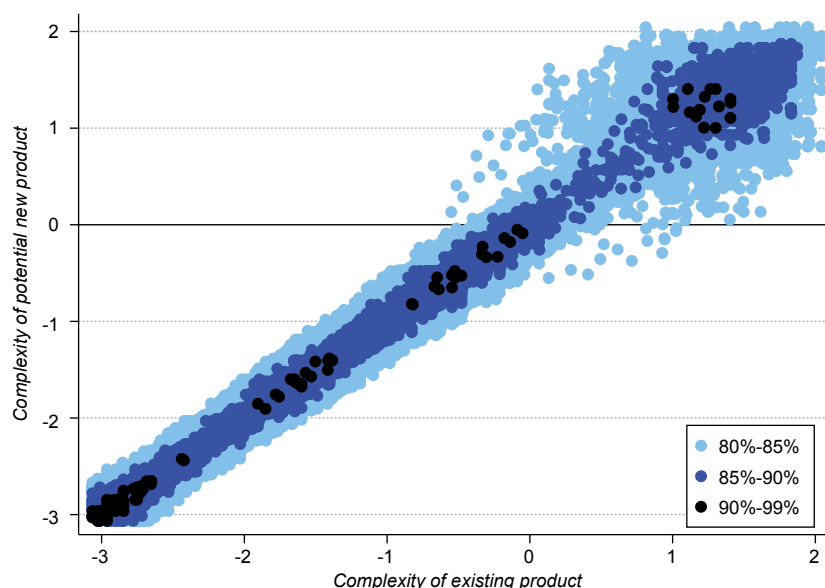
Figure 8 The global “product space” map of 2013 and the path-dependent process of diversification: some paths lead to many potential new products, others yield fewer options



Source: ESCAP, based on Hidalgo and others (2007) and on trade data from UN COMTRADE.

Notes: This map indicates products and the links between products. The overall shapes they form are arbitrary. The map was produced using the open-source software platform Cytoscape, which is available from www.cytoscape.org/.

Figure 9 Diversification in short steps rather than leaps: map of potential new products for diversification by proximity to the existing product mix



Source: ESCAP based on data from UN COMTRADE.

Notes: The scale is normalized: the average global complexity is zero, and the standard deviation of the distribution of product complexity is one (see annex for details of the calculation of product complexity).

with targeted governmental interventions that foster specific manufacturing sectors and is aimed at accelerating structural transformation by promoting industrialization.²² On the other hand, under the rent-seeking view of the selection process it is argued that the Government cannot and should not pick winners because the process of economic activity identification and promotion is full of self-fulfilling incompetence and corruption.²³

A factor that may have contributed to the failure of some industrial policies in the past is the inability of Governments to identify the appropriate industries to target based on the country's endowment structure and level of development.²⁴ In section 4, this report uses the product space to find potential products for diversification for each of the 12 Asian LLDCs that are likely to require a set of capacities similar to those existing in each country.



4. SECTORS AND MARKETS WITH HIGH POTENTIAL FOR ECONOMIC DIVERSIFICATION

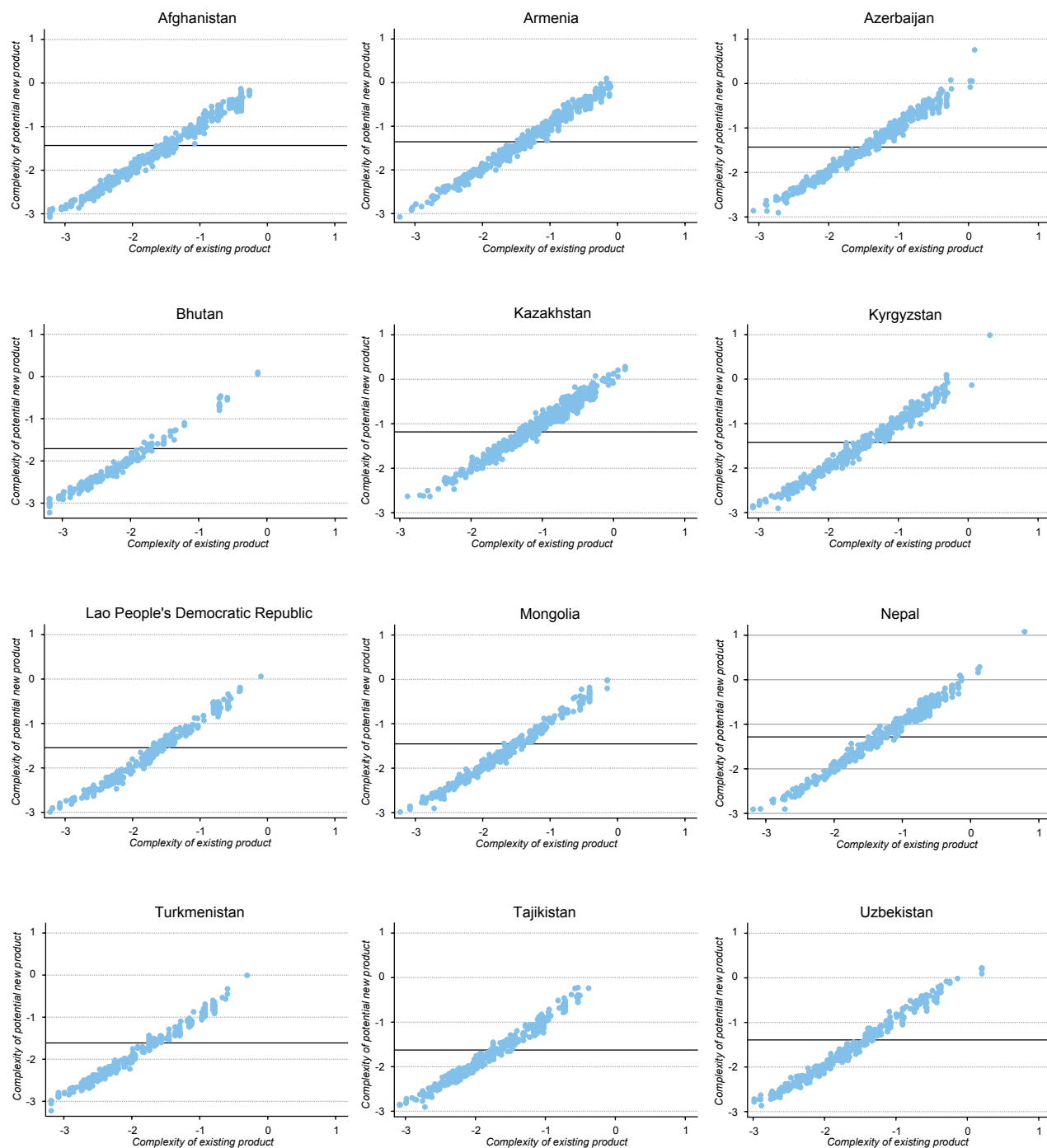
A man sits selling ropes in Afghanistan.
Credit: ESCAP Photo

As discussed in the previous section, the opportunities for LLDCs in the Asia-Pacific region to diversify their economies are in products that are more complex (i.e. those that are more sophisticated and differentiated) and that are nearby in the product space to the existing product mix (i.e. those that require a set of capabilities that is similar to that required in the current product niches).

Figure 10 illustrates the map of potential new exports in the case of Asian LLDCs. In the graph for each country, the horizontal line marks the average complexity of the country's product mix, thus, new products with complexity above that level would contribute in pushing the distribution of complexity of the country's product mix towards more complex products.

Based on the analysis of the data to construct the maps in figure 10, table 4 presents the number of potential new products that are above the country's average complexity classified by industry using HS 2002 classification by section. The table shows that for every Asian LLDC there are opportunities for diversification in almost all industries, except in the two sectors missing, live animals (HS Section I) and precious stones and metals (HS Section XIV).

Figure 11 displays data from table 4 on the top five industries in each Asian LLDC with highest shares in the percentages of potential new products. For Afghanistan, the top five industries with potential new products with above-average complexity are base metals and articles made from base metals (18%); textiles and textile articles (18%); plastic and rubber and articles thereof (16%); machinery and electrical equipment (14%);²⁵ and chemicals (11%).

Figure 10 Map of potential new products for diversification, Asian landlocked developing countries, 2013

Source: ESCAP based on data from UN COMTRADE.

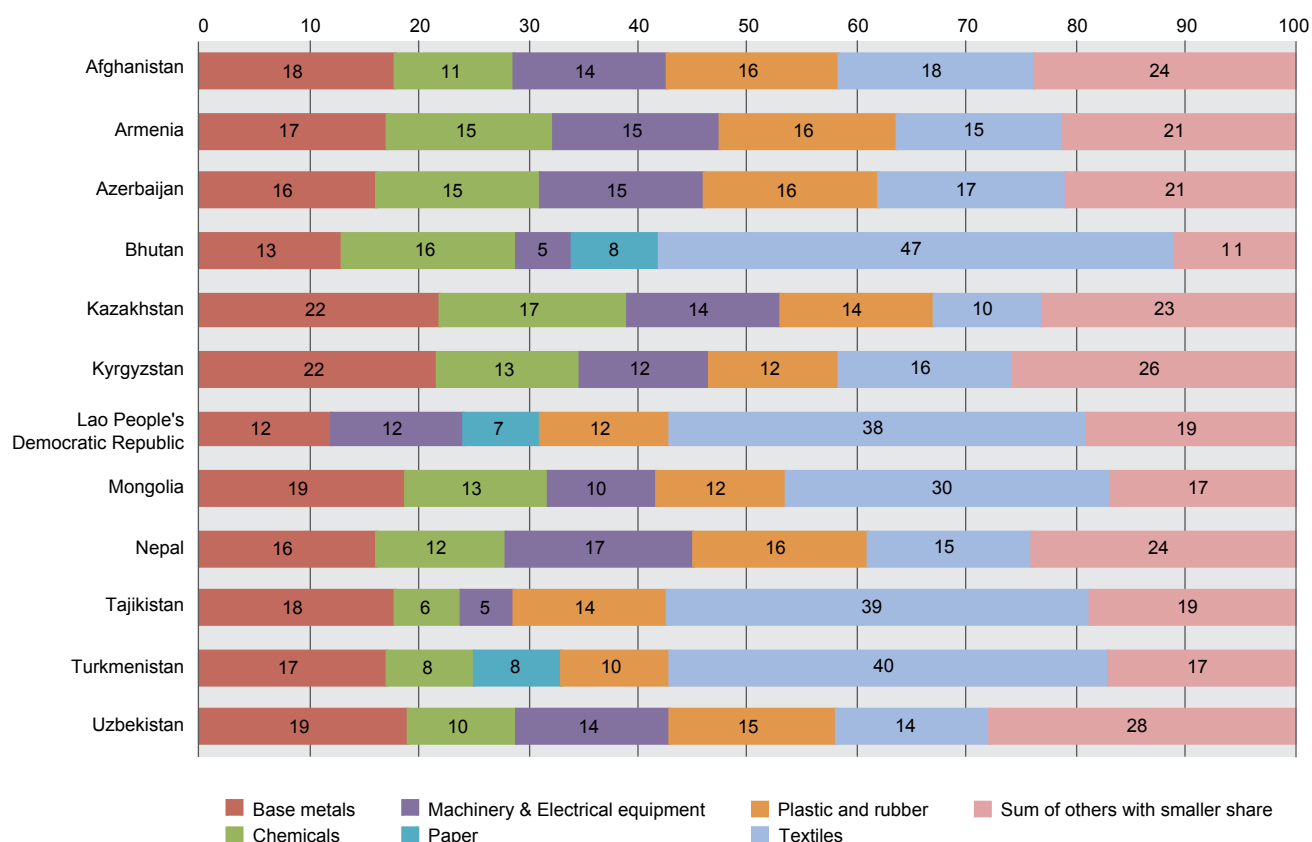
Notes: The scale is normalized: the average global complexity is zero, and the standard deviation of the distribution of product complexity is one (see annex for details of the calculation of product complexity).

Table 4 Number of potential new products of above-average complexity for each Asian landlocked developing country, by industry (HS 2002 classification), 2013

Industry (HS classification section number)	Afghanistan	Armenia	Azerbaijan	Bhutan	Kazakhstan	Kyrgyzstan	Lao People's Democratic Republic	Mongolia	Nepal	Tajikistan	Turkmenistan	Uzbekistan
ANIMAL and VEGETABLE OILS (Section III)					1	2	1					1
ARMS and AMMUNITION (Section XIX)		1										
BASE METALS (Section XV)	39	49	39	5	89	66	16	25	39	27	20	27
CHEMICALS (Section VI)	24	42	38	6	70	39	8	17	29	9	9	14
FOOD and BEVERAGES (Section IV)	6	4	8		3	12	3	5	7	1	3	7
FOOTWEAR (Section XII)		1			3		1	1	3	1		
LEATHER (Section VIII)							1	1		1	1	1
MACHINERY and ELECTRICAL EQUIP. (Section XVI)	30	44	37	2	58	35	16	13	43	8	8	19
MINERALS (Section V)					2	2			1			
MISCELLANEOUS MANUFACTURING (Section XX)	8	10	4	1	6	7	4	1	7	4	2	1
OPTICAL, PHOTO, WATCHES, MUSICAL INSTR. (Section XVIII)	7	5	8		15	7	2	2	8	3	2	4
PAPER (Section X)	13	16	13	3	23	19	9	4	11	7	9	12
PLASTIC and RUBBER (Section VII)	36	47	41	1	56	37	15	16	39	21	12	21
STONE, CERAMIC, GLASS (Section XIII)	13	17	11	1	27	20	4	3	12	8	4	8
TEXTILES (Section XI)	39	42	43	18	41	48	49	40	38	59	47	20
VEGETABLES (Section II)	1		2	1	1	2			3	2		1
VEHICLES, AIRCRAFT, VESSELS (Section XVII)	2	3	2		3	3	1		4	2		1
WOOD (Section IX)	2	4	5		10	5		6	3			3
TOTAL	220	285	251	38	408	304	130	134	247	153	117	140

Source: ESCAP based on data from UN COMTRADE.

Figure 11 Top five industries with highest percentages of potential new products, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.

Those same five industries compose the top five in almost all Asian LLDCs. The concentration of opportunities within a few industries is a common result among the Asian LLDCs, with five industries accounting for 72% or more of the potential new products that are above a country's average complexity. In particular, textiles and textile articles, such as apparel, account for a high share of potential new opportunities in Bhutan (47%), the Lao People's Democratic Republic (38%), Mongolia (30%), Tajikistan (39%), and Turkmenistan (40%).

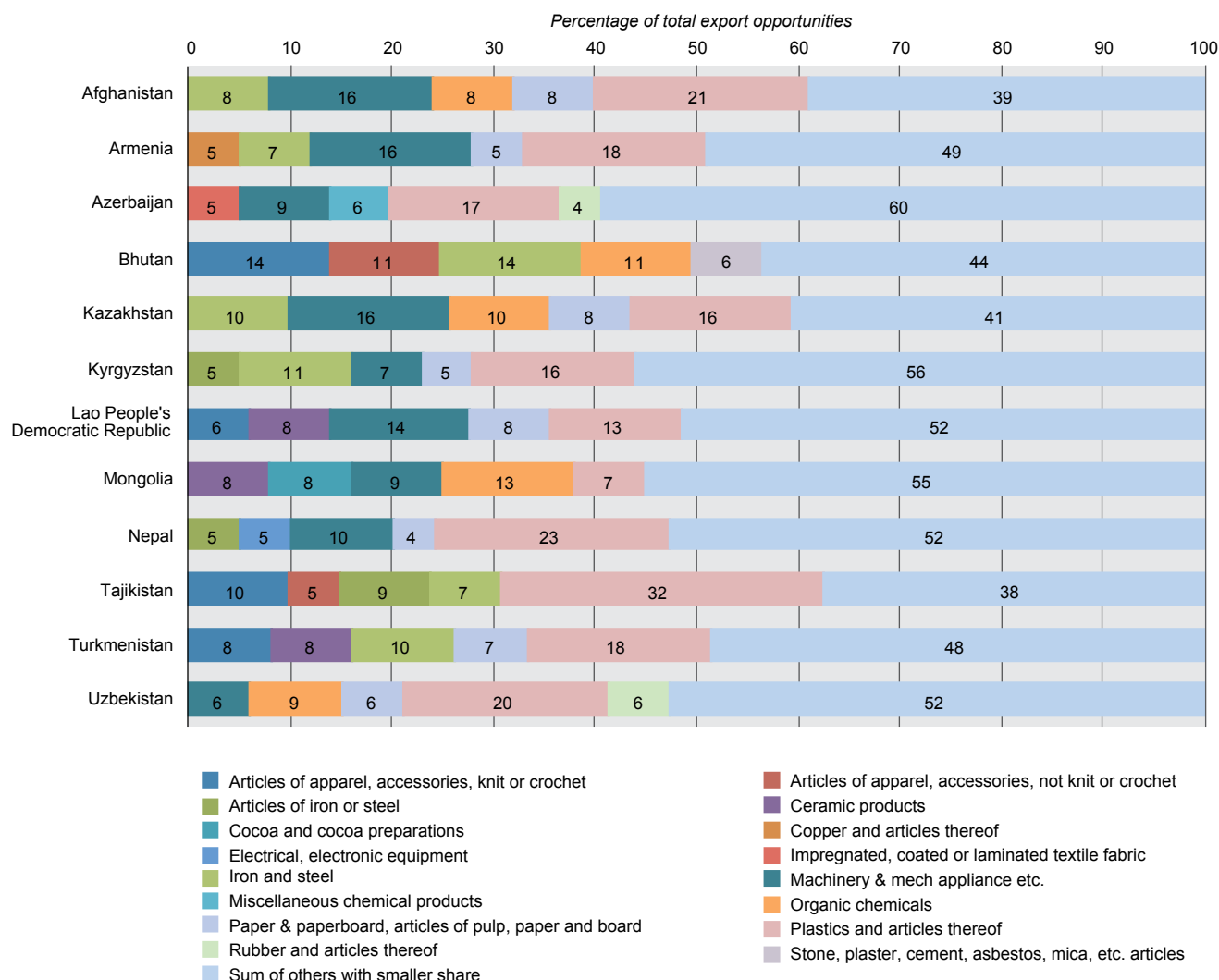
The analysis of opportunities for diversification by industry as presented in figure 11 shed some light on the potential target areas for diversification. However, in addition to the identification of promising areas, it is important to identify the factors that could facilitate or prevent the process of discovery of these new economic activities by the business sector.

EXPORT OPPORTUNITY

It seems reasonable to assume that products that are in high demand are more likely to attract entrepreneurs, and that entrepreneurs that take the risk in these sectors in high demand are also more likely to succeed. This report presents the result of the analysis of the potential new sectors for diversification that have both higher product complexity and better export opportunity. To estimate the export opportunity, the analysis considers the increase in global imports of each sector in the period 2012-2013. The export opportunity is presented as the monetized annual increase in imports (see annex).

Figure 12 shows the potential new sectors for diversification with higher share of export opportunities for each of the Asian LLDCs. In

Figure 12 Potential new sectors for diversification with higher share of export opportunities, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.

Afghanistan, with more than 60% of export opportunities, the top new sectors are plastic and articles made of plastic; machinery and mechanical appliances; organic chemicals; paper and paperboard, and articles made of pulp, paper and board; and iron and steel. The first two account for more than 35% of the new opportunities.

The sectors of plastic and articles made of plastic, and of machinery and mechanical appliances also offer the higher export opportunities for potential new products in Armenia, the other top sectors being iron and steel; paper and paperboard, and articles

made of pulp, paper and board; and copper and articles made of copper.

Similarly, in Azerbaijan, plastic and articles made of plastic, and of machinery and mechanical appliances are the top two potential new sectors in terms of export opportunities. However, the set of potential sectors is less concentrated and the top five sectors, which include miscellaneous chemical products; impregnated, coated or laminated textile fabric; and rubber and articles made of rubber, account for just over 40% of total export opportunities.

In Bhutan, articles of apparel and accessories account for a quarter of the export opportunities. Other sectors with higher potential are iron and steel; organic chemicals; and stone, plaster, cement, asbestos, mica and similar articles.

In the case of Kazakhstan, plastic and articles made of plastic, and of machinery and mechanical appliances account for more than 30% of the export opportunities, followed by the sectors of iron and steel and organic chemicals, both at 10%.

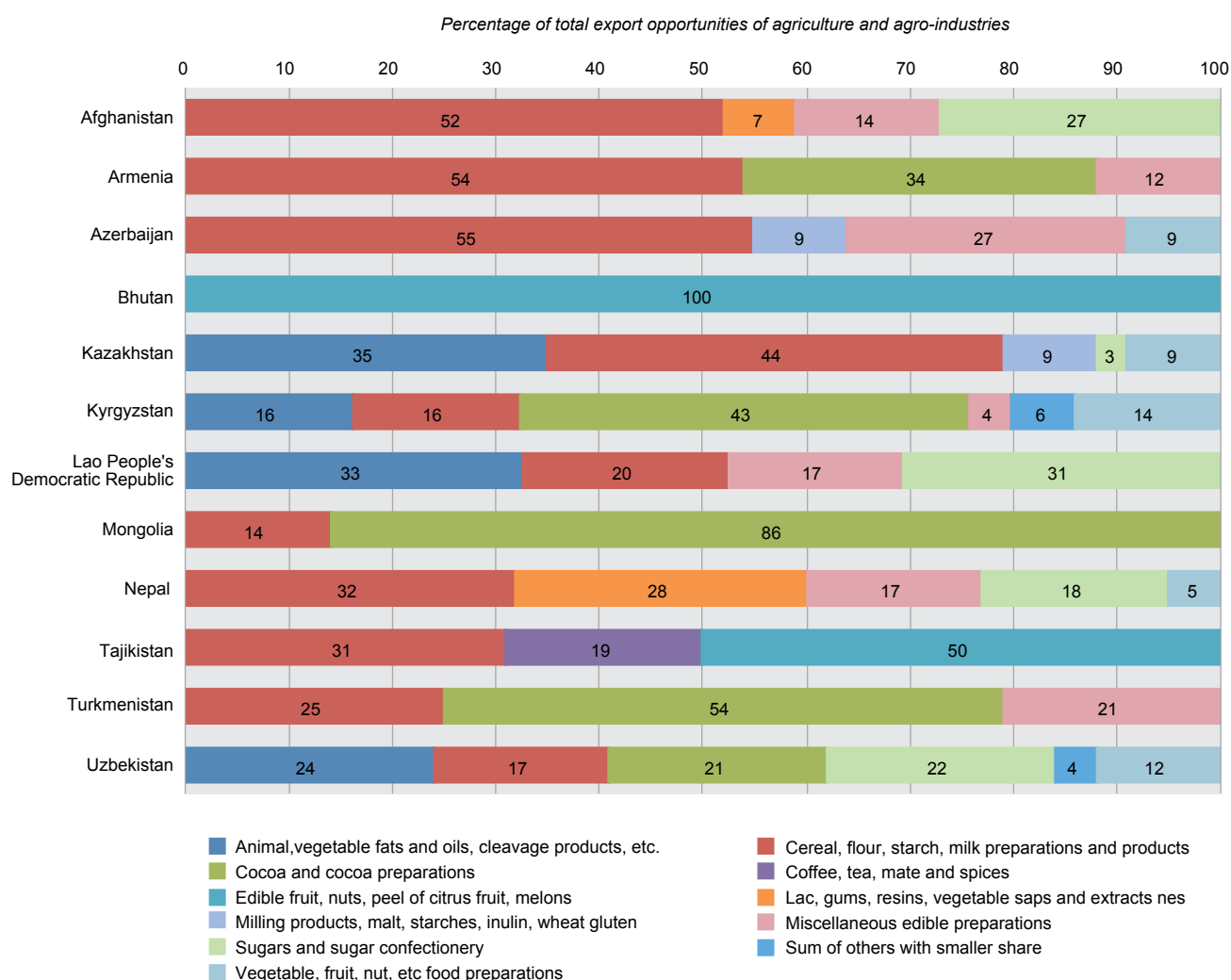
In Kyrgyzstan, the sectors that account for higher export opportunities are iron and steel and articles

made of iron and steel together with the sector of plastic and articles made of plastic.

Machinery and mechanical appliances, plastic and paper sectors also show among the top export opportunities of potential new sectors in the Lao People's Democratic Republic. Two new sectors also join the top five: stone and ceramic products and articles of apparel.

In Mongolia, the top five potential new sectors with higher export opportunities are: organic chemicals, machinery and mechanical appliances, ceramic products, cocoa and cocoa preparations and the

Figure 13 Potential new sectors for diversification in agriculture and agro-industries with higher share of export opportunities, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.

plastics sector. Nepal is the only Asian LLDC for which electrical and electronic equipment has made it into the top five potential new sectors, with 5%. Other sectors are plastics, machinery, articles of iron and steel, and paper. The top five in Tajikistan account for 62% of the export opportunities. The plastics sector offer higher opportunities with 32%, followed by articles of apparel and accessories (15%). In Turkmenistan, the top sectors are plastics, iron and steel, ceramic products, articles of apparel and accessories, and the paper sector; and in Uzbekistan: plastics, organic chemicals, paper, rubber and machinery and mechanical appliances.

The list in figure 12 does not include the agricultural and agro-industrial sectors among the top five potential new sectors with higher export opportunities. However, given the large share of agriculture in employment in many of the Asian LLDCs, it is important to consider the opportunities of diversification that have backward linkages with the existing agricultural sector in these countries. New agro-industries could increase the demand for agricultural produce and create incentives for increasing productivity in that sector. Figure 13 shows the result of the analysis of the top potential new sectors in agriculture and in agro-industries with higher export opportunities. These results

Table 5 Top 10 export markets for potential new products of Asian landlocked developing countries, 2013

Export market	Exporter (percentage of export opportunities of potential new products)											
	Afghanistan	Armenia	Azerbaijan	Bhutan	Kazakhstan	Kyrgyzstan	Lao People's Democratic Republic	Mongolia	Nepal	Tajikistan	Turkmenistan	Uzbekistan
Belgium		3			4	3				4	4	
Canada	4	4	6	6		8	6	6	5	4		7
China	4	8	6		7	5	7	3	7	8	6	5
Egypt				5								
Finland								3				4
France	6	7	7	6	5	6	10	10	6	5	5	7
Germany	13	10	11	12	10	9	7	11	11	11	9	12
Italy		3			5	3			4			
Japan				8			4		3	5	5	
Lebanon				4								
Malaysia	7	4	6		5	5	4	5	5	5	4	4
Mexico		4	6	7	4	5	8	5	6		5	8
Netherlands	4		3				4	4				3
Poland	4											
Republic of Korea				3	4							
Saudi Arabia											4	
Singapore				4								
Spain			3									
Turkey	4									5		
United Kingdom	4	4	4		4	3	4	4	5	4	6	3
United States	4	6	6	11	5	5	5	5	4	4	4	6

Source: ESCAP based on data from UN COMTRADE.

suggest that cereal, flour, starch, milk preparation and products account for the top opportunities in Afghanistan (52%), Armenia (54%), Azerbaijan (55%), Kazakhstan (44%), Nepal (32%) and Tajikistan (31%). That sector also makes it into the top five in Kyrgyzstan (16%), the Lao People's Democratic Republic (20%), Mongolia (14%), Turkmenistan (25%) and Uzbekistan (17%). Another potential new sector with high export opportunities is cocoa and cocoa preparations, which account for large shares in Armenia (34%), Kyrgyzstan (43%), Mongolia (86%), Turkmenistan (54%), and Uzbekistan (21%). Other potential new agricultural and agro-industrial sectors in Asian LLDCs include: animal, vegetable fats and oils, cleavage products; coffee, tea, mate and spices; edible fruit, nuts, peel of citrus fruit, melons; gums, resins, vegetable saps and extracts; milling products, malt, starches, inulin, wheat gluten; miscellaneous

edible preparations; sugars and sugar confectionery; and vegetable, fruit and nut food preparations.

The list of top export markets for the potential new products of the Asian LLDCs is summarized in table 5. The majority of these export opportunities are in Europe, particularly in Germany, but also in Belgium, France, the Netherlands and the United Kingdom of Great Britain and Northern Ireland. Many export opportunities also exist among emerging economies, particularly China and Malaysia.

Table 6 presents similar information but aggregated by region. The result suggests that trade links with the markets in Europe and North America remains very important. However, the Asia-Pacific region also offers about a quarter of the export opportunities for these potential new sectors. Therefore, intraregional

Table 6 Global (regional) export markets for potential new products of Asian landlocked developing countries, 2013

Export market (region)	Exporter (percentage of export opportunities of potential new products)											
	Afghanistan	Armenia	Azerbaijan	Bhutan	Kazakhstan	Kyrgyzstan	Lao People's Democratic Republic	Mongolia	Nepal	Tajikistan	Turkmenistan	Uzbekistan
Europe	50	45	46	34	46	43	45	51	45	52	43	49
United States, Canada and Mexico	11	13	17	24	13	18	19	16	15	9	12	20
Asia-Pacific region	25	28	24	23	28	24	26	22	26	25	27	22
East Asia	9	13	10	12	13	9	13	9	13	13	13	10
South-East Asia	11	10	10	7	10	10	9	7	9	8	8	8
South Asia	3	3	3	2	3	3	3	3	3	2	3	3
Commonwealth of Independent States (CIS Asia)	1	1	1	1	1	1	0	1	1	1	2	1
Pacific	1	1	0	1	1	1	1	2	0	1	1	0
Western Asia	6	5	3	8	4	5	3	3	5	7	7	2
Latin America	5	3	3	4	5	3	2	3	3	4	6	4
Commonwealth of Independent States (CIS Europe)	2	2	3	1	2	2	2	2	3	2	3	2
Northern Africa	1	1	1	5	1	1	0	1	1	1	2	1
Europe in transition	1	1	1	0	1	1	2	1	1	1	1	1

Source: ESCAP based on data from UN COMTRADE.

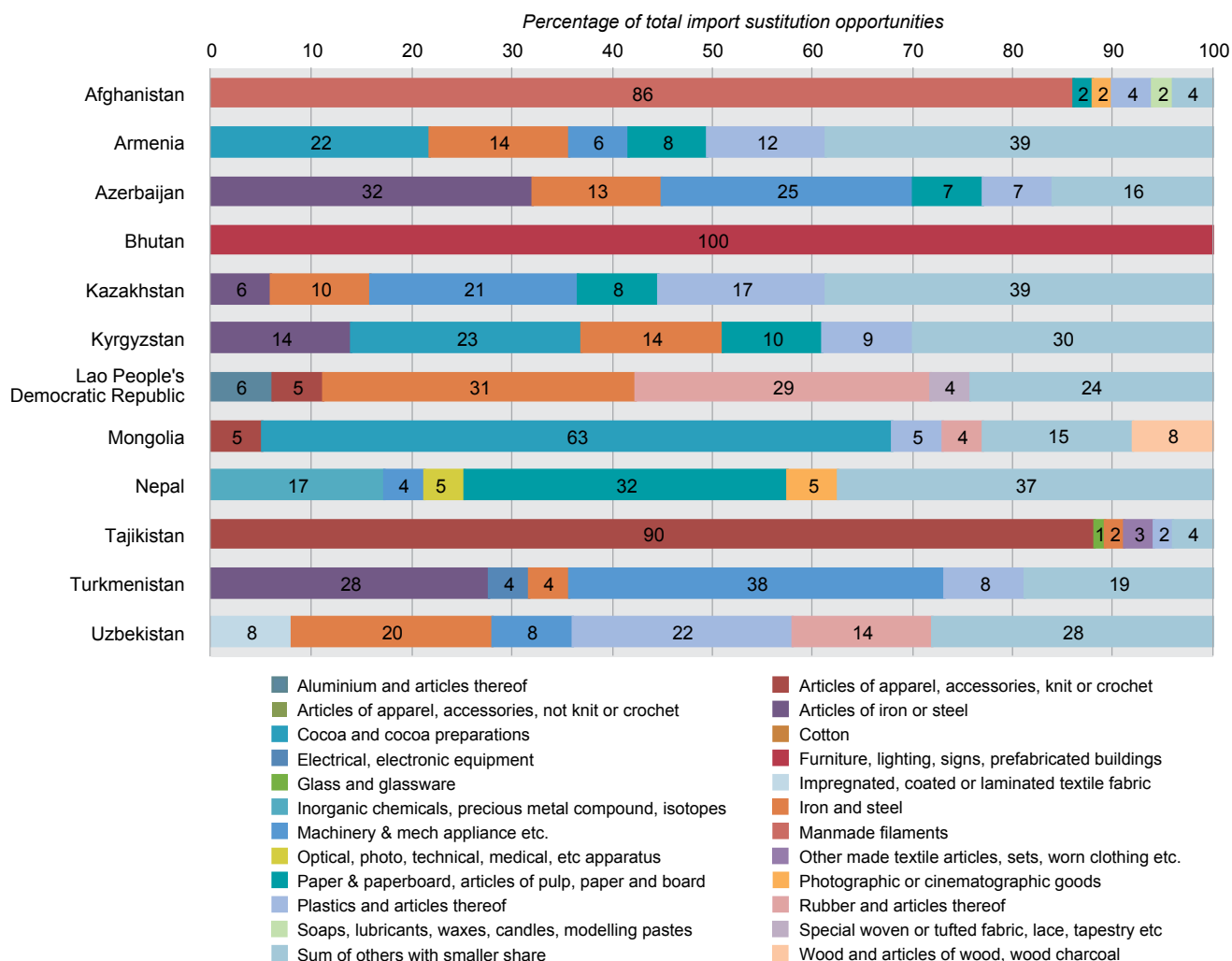
integration and cooperation in Asia and the Pacific is critical for fostering diversification in the Asian LLDCs.

IMPORT SUBSTITUTION OPPORTUNITY

In addition to export opportunities, the potential of new products for import substitution may also drive the investment decision of entrepreneurs and firms. This effect is more important in more populous countries with higher income per capita, such as Kazakhstan.

Figure 14 presents, for each Asian LLDC, the top five potential new sectors with opportunities for a higher share of import substitution opportunities. The list by country is very heterogeneous. Some sectors have remarkably high shares, such as man-made filaments in Afghanistan (86%); the sector of furniture, lighting, signs, prefabricated buildings in Bhutan (100%); cocoa and cocoa preparations in Mongolia (63%); and articles of apparel, accessories, knit or crochet in Tajikistan (90%). Other sectors that are part of the top five import substitution opportunities in many countries are plastics, paper, iron and steel, and machinery and mechanical appliances.

Figure 14 Potential new sectors for diversification with higher share of import substitution opportunities, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.



5. STRATEGIES FOR FOSTERING ECONOMIC DIVERSIFICATION²⁶

A broom seller at Samarkand market in Uzbekistan.
Credit: ESCAP Photo

Given the productive capacities of Asian LLDCs and existing demand incentives, this section contains a discussion on how Asian LLDCs could choose between laissez-faire strategies, those in which the market guides the identification of opportunities for diversification, and strategic diversification approaches that nudge the private sector towards targeted economic activities that are more likely to increase the productive capacities in the country.

Governments have an important role to play in facilitating the creation of new private sector activities that increase the productive capacity of the economy. That should entail the support of both the emulation and the product innovation strategies. However, the balance between them depends on the level of diversification and productive capacities in the country concerned. This is illustrated by the data in table 7, which lists for each Asian LLDC: the number of products that are currently produced; the total number of potential new products that would require to be produced the capabilities that are closely related to those already in existence; the percentage of those potential new products that have a level of complexity above the country's average; and the percentages of export and import substitution opportunities with complexity levels above the country's average.

Comparison of the number of existing and potential new products shows that countries with a less diversified product mix have many opportunities to diversify by emulating the production of more developed countries, moving towards products that already exist but are new in the context of the country's economy. For example, Bhutan has 293 products in its product mix but about the same number (240) of potential new products for emulation. On the other hand, as countries diversify, such a strategy results in gradually fewer potential new products; to continue to diversify, the country should start to combine emulation with innovation, the creation of new products. However, in the case of Asian LLDCs, emulation seems to be a very important strategy because even the most diversified country of the group, Kazakhstan, would be able to increase by 603 its product mix through emulation.

Table 7 Potential new products related to those already produced, Asian landlocked developing countries, 2013

Country	Number of existing products	Number of potential new products for emulation	Percentage of potential new products with above-average complexity	Percentage of export opportunities with above-average complexity	Percentage of import substitution opportunities with above-average complexity
Afghanistan	1 492	486	45	6	10
Armenia	2 280	511	56	22	33
Azerbaijan	2 271	453	55	20	36
Bhutan	293	240	16	2	1
Kazakhstan	4 583	603	68	49	59
Kyrgyzstan	1 870	565	54	17	34
Lao People's Democratic Republic	1 576	296	44	11	7
Mongolia	1 245	376	36	6	1
Nepal	2 799	411	60	12	3
Tajikistan	1 061	365	42	12	33
Turkmenistan	663	342	34	7	8
Uzbekistan	1 792	398	35	9	26

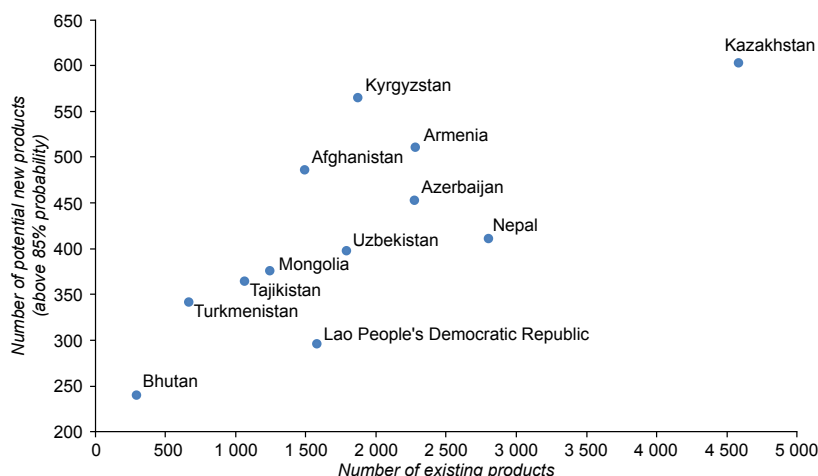
Source: ESCAP based on data from UN COMTRADE.

Note: Number of products exported is the number of the category of products exported classified using HS 2002 trade data disaggregated at the six-digit level and further disaggregated by unit price.

This relationship between number of existing and potential new products is illustrated in figure 15. It shows that, for very low levels of diversification, the number of potential new products increases with the number of existing products in the country's product mix, which, with the dataset used, was about 2,000 products. After that point, the number of potential new products does not increase with the increase of products in the product mix. For even higher levels of diversification the balance between emulation and innovation would start gradually to

shift towards the latter. Intuitively, this relationship could be related to the fact that there are many more "low hanging fruits" for low-diversified countries to pick. As economies become more diversified, the opportunities for emulation become fewer.

Table 7 also shows that five Asian LLDCs have more than 50% of potential new products with product complexity above the country's average, which would contribute to pushing the distribution of complexity of the country's product mix towards more complex products.

Figure 15 Association between number of existing and potential new products

Source: ESCAP based on data from UN COMTRADE.

Note: Number of products exported is the number of the category of products exported classified using HS 2002 trade data disaggregated at the six-digit level and further disaggregated by unit price.

This is illustrated in figure 16, which shows in the vertical axis the percentage of potential new products with complexity above the country's average and in the horizontal axis the number of existing products in the country's product mix. The figure suggests that the more diversified the economy is, the higher the likelihood that entrepreneurs and firms, when investing in new activities, would on average push the product mix of the country towards more complex products. It is important to note that, in the less diversified economies, exactly the ones that have the higher number of potential new sectors for diversification when compared with the size of their existing product mix, it is less likely that the private sector would find more complex sectors in which to invest.

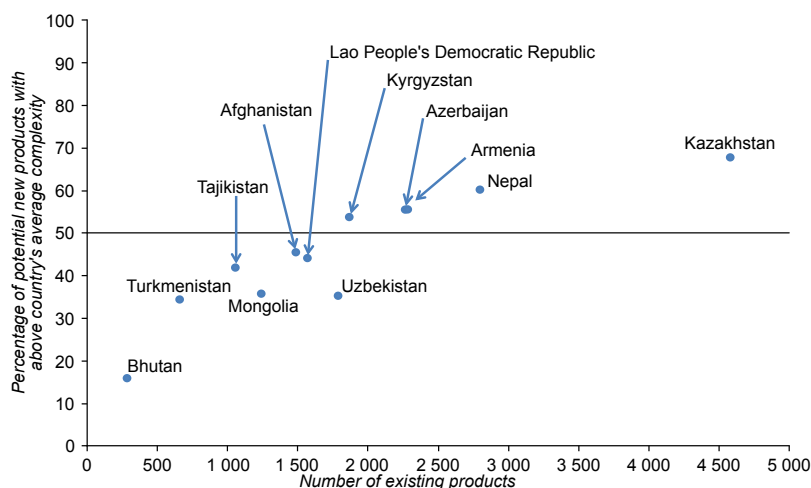
The percentages of export and import substitution opportunities with above complexity the country's average would add another layer to the analysis. Figure 17 shows the number of existing products in each country's product mix in the horizontal axis and the share in percentage of the export opportunities of potential new products with product complexity above the country's average in the vertical axis. For example, in the Lao People's Democratic Republic, the sum of export opportunities of potential new products with product complexity above the country's average represents 11% of the export opportunities of the whole set of potential new products given the existing product mix.

Assuming that entrepreneurs and firms take into consideration the potential demand of new products when deciding between potential new economic activities and also assuming that new exports that have a higher export opportunity have higher chances of success, a higher proportion of new economic activities might be expected to have below-average product complexity. Although this outcome makes perfect sense in the short term as the one that maximizes efficient use of limited economic resources, in the long run it perpetuates the relative lower level of productive capacities and opportunities of productive employment in the economy, reducing the chances of the country to catch up with developed economies.

Figure 17 shows that the effect of export opportunities on all Asian LLDCs is to reduce the likelihood of a positive outcome of a laissez-faire approach to the promotion of new exports. All these countries are more likely to lose than gain in the longer term if they let the market alone create the incentives for export diversification.

Similarly, opportunities for import substitution also create the incentives either for increasing or for reducing the average complexity of a country's product mix. Figure 18 illustrates this effect for the Asian LLDCs by showing the number of existing products in the countries' product mix in

Figure 16 Percentages of new products with above-average product complexity, Asian landlocked developing countries, 2013

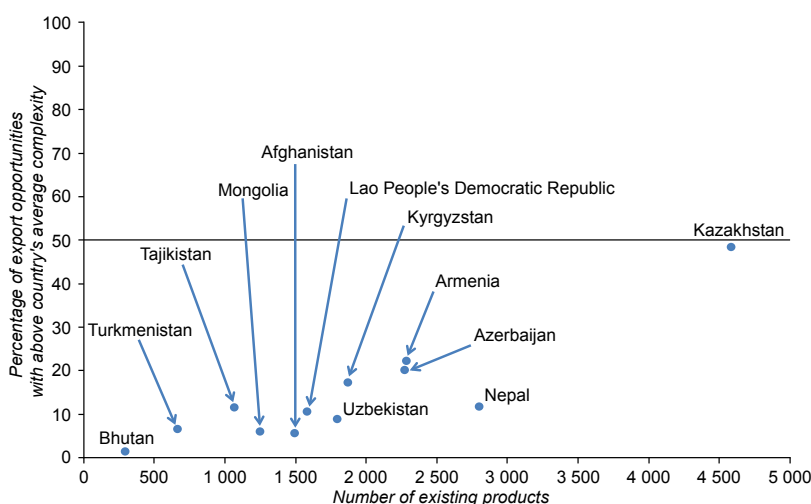


Source: ESCAP based on data from UN COMTRADE.

the horizontal axis and the share in percentage of the import substitution opportunities of potential new products with countries' above average product complexity in the vertical axis. The figure shows that only Kazakhstan is more likely to benefit from a laissez-faire approach to import substitution. The Governments of the other Asian LLDCs have to strategically create targeted incentives to nudge entrepreneurs in import substitution economic activities towards the potential new products with above average complexity.

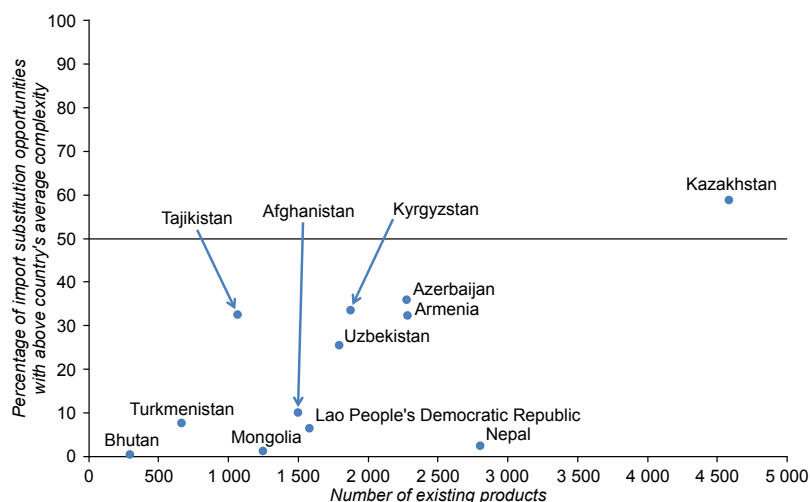
The joint analysis of export and import substitution incentives is illustrated in figure 19, which shows in the vertical axis the share in percentage of the import substitution opportunities of potential new products with above country's average product complexity and the share of export substitution in the horizontal axis. The graph is divided in four quadrants. In the first quadrant would be the countries that could adopt a laissez-faire approach to import substitution but should adopt a strategic diversification approach towards new export opportunities to facilitate the

Figure 17 Effect of export opportunities on the incentives for diversification towards products of above-average product complexity, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.

Figure 18 Effect of import substitution opportunities on incentives for diversification towards products of above-average product complexity, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.

private sector's discovery of new economic activities leading to the desirable social objective of increasing the economy's productive capacity. Kazakhstan is located in that quadrant with shares of export and import substitution opportunities of the potential new products with above country's average product complexity accounting for 49% and 59%, respectively.

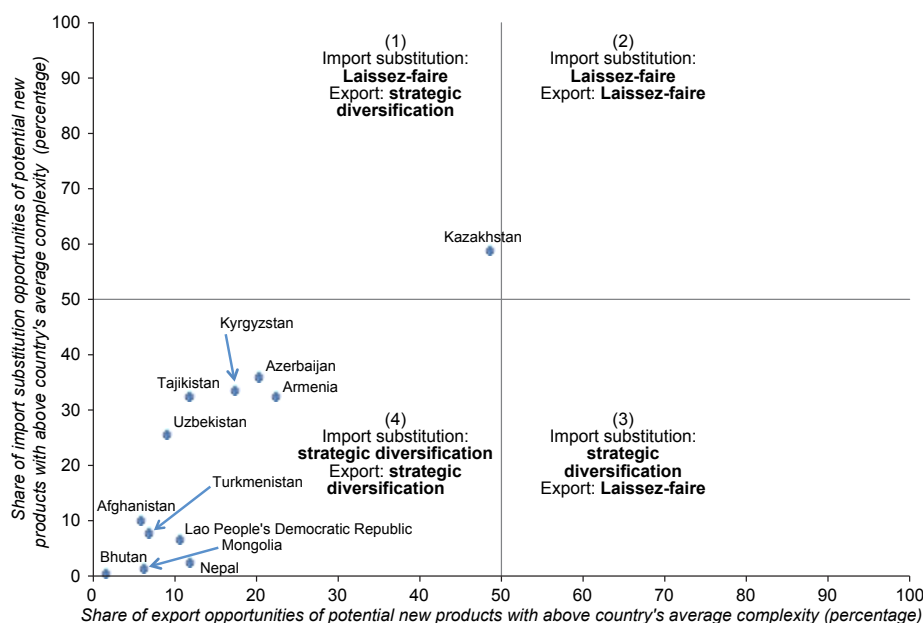
In the second quadrant would be the countries that could adopt a *laissez-faire* approach that focuses on facilitating the discovery process by providing an enabling environment for business that creates incentives for entrepreneurs to start new economic activities. While in the third quadrant would be the countries that could adopt a *laissez-faire* approach towards export diversification but would need a strategic approach towards import substitution. The analysis suggests that no Asian LLDC is located in neither of those two quadrants.

All the others are located in the fourth quadrant. They are in the difficult position of not being able to rely on the market incentives to drive the economy towards increasing productive capacities. If left to the market alone, the new economic activities, either exports or import substitution that emulate the production of more developed countries, are

more likely to have below the country's average product complexity. These countries have to adopt an approach based on strategic diversification to nudge the private sector and create incentives towards economic activities with higher complexity.

Governments can play a role in nudging the discovery process towards the new products that have higher complexity. Successful diversification towards these new products will generate the new capabilities that will increase the country's productive capacity. They will also facilitate the process of diversification towards other products with higher complexity. That process of increasing product complexity, and consequently increasing productive capacity, has the social benefit of facilitating future diversification. Such benefit is not quantifiable a priori and, thus, cannot be captured by the private entrepreneur. Society would benefit if a larger proportion of entrepreneurs take their chances in those products of higher complexity, but that benefit is not internalized by the entrepreneurs themselves, thus the diversification towards those products is likely to be below the optimum social level. Governments should, therefore, support and facilitate through selective policies, including industrial and trade policies and infrastructure development, the diversification towards those new products of above-average complexity and that have high demand.

Figure 19 Strategies for economic diversification, Asian landlocked developing countries, 2013



Source: ESCAP based on data from UN COMTRADE.



6. CHALLENGES FOR ECONOMIC DIVERSIFICATION IN ASIAN LANDLOCKED DEVELOPING COUNTRIES

Road reconstruction workers at an asphalt plant in Kazakhstan.
Credit: Kubat Sydykov / World Bank

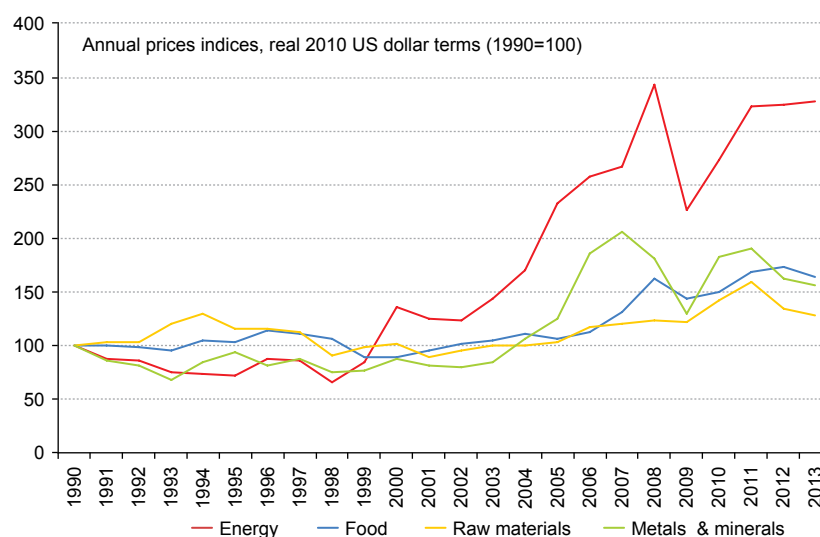
This section discusses three main challenges for economic diversification in Asian LLDCs: the incentives away from diversification given the high dependency on primary commodities with high price in global markets, the resulting tendency of overvaluation of the exchange rate, and the high costs of trade and transport faced by Asian LLDCs.

HIGH COMMODITY PRICES

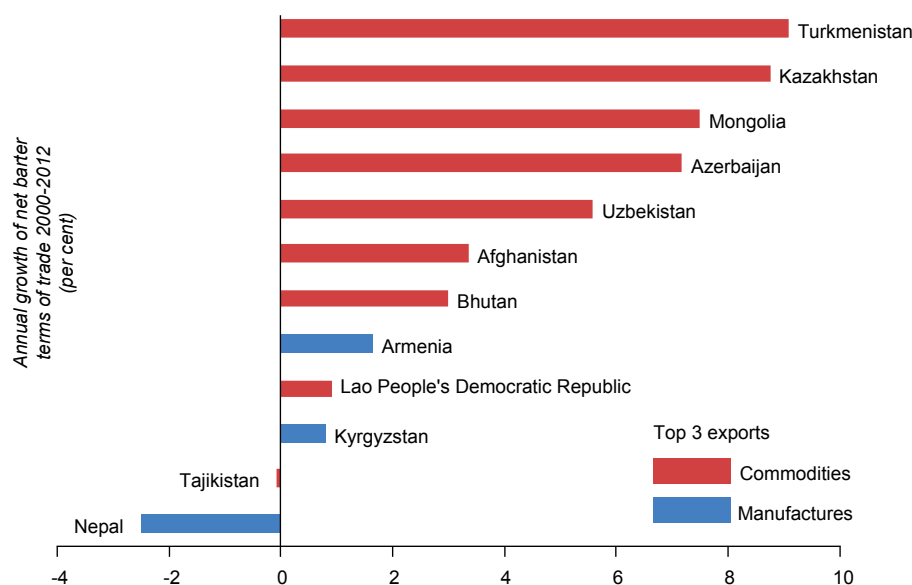
A key challenge for many Asian LLDCs to diversify their economies is to manage the long-term effects of the boom in commodity terms of trade. As discussed in the ESCAP *Survey* of 2012, breaking the historical downward trend in prices of commodities, from 2000 to 2010 the average annual price growth rates have ranged from 8.5% for raw materials to 17.4% for metals and minerals.²⁷ Prices have moderated in the past two years, but they are still much higher than a decade ago, as shown in figure 20.

The boom in commodities has ended a secular decline in commodity terms of trade. The countries that experienced the highest increase in their terms of trade in the past decade were major exporters of energy resources or minerals. On the other hand, during that period, the emergence of China and South-East Asian countries as manufacturing powerhouses has driven the price of manufactures down, reducing the terms of trade of countries that rely on low wage manufacturing production.

That is illustrated in figure 21, which shows the annual growth of net barter terms of trade of Asian LLDCs between 2000 and 2012. That measure indicates the increase in the price of their exports compared with the price of their imports. The figure shows that the majority of these countries, which are also commodity exporters, have increased their terms of trade as much as 9% annually in Turkmenistan and Kazakhstan. Faced with these

Figure 20 Historically high prices of commodities

Source: ESCAP, based on data from World Bank commodity markets, annual world prices of commodities and indices. Available from <http://go.worldbank.org/4ROCCIEQ50>.

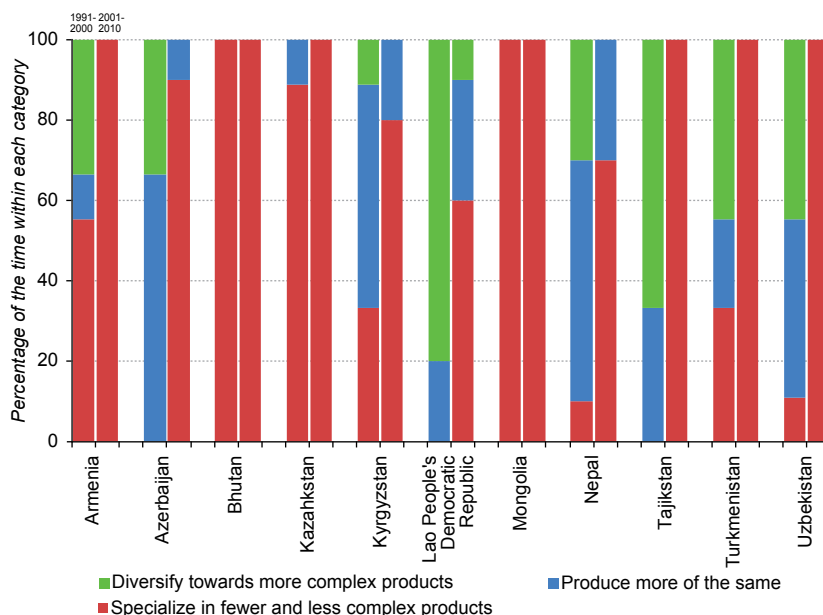
Figure 21 Increases in commodity terms of trade, Asian landlocked developing countries, 2000-2012

Source: ESCAP, based on data from WDI.

price changes, entrepreneurs and firms in these countries have the incentive to further specialize in producing primary products. That creates the long-term risks that the commodity-boom countries get trapped in specializing in fewer economic activities that are more volatile and prone to rent seeking, thus reducing the prospects for long-term growth.

Figure 22 illustrates how the shifts in prices of commodities and manufactures have created incentives towards or away from diversification. It shows the results of the analysis that compares the 1991-2000 and the 2001-2010 periods and estimates the percentage of the time that each country had the incentive to either specialize in

Figure 22 Price shifts for manufactures and commodities have created incentives away from diversification, Asian landlocked developing countries, 1991-2000 and 2001-2010



Source: ESCAP, based on data from WDI.

fewer and less complex products, produce more of the same, or diversify towards more complex products. The results suggest that all Asian LLDCs have faced incentives to specialize. Azerbaijan, the Lao People's Democratic Republic, Nepal, Tajikistan, Turkmenistan and Uzbekistan have experienced large shifts from diversification incentives in the 1990s to specialization in the 2000s. Other countries such as Bhutan, Kazakhstan, and Mongolia have face incentives to specialize in both periods.

As discussed, despite the recent moderation, the price of commodities are still at historically high levels and Asian LLDCs are expected to continue to face incentives to specialize in fewer and less complex products.

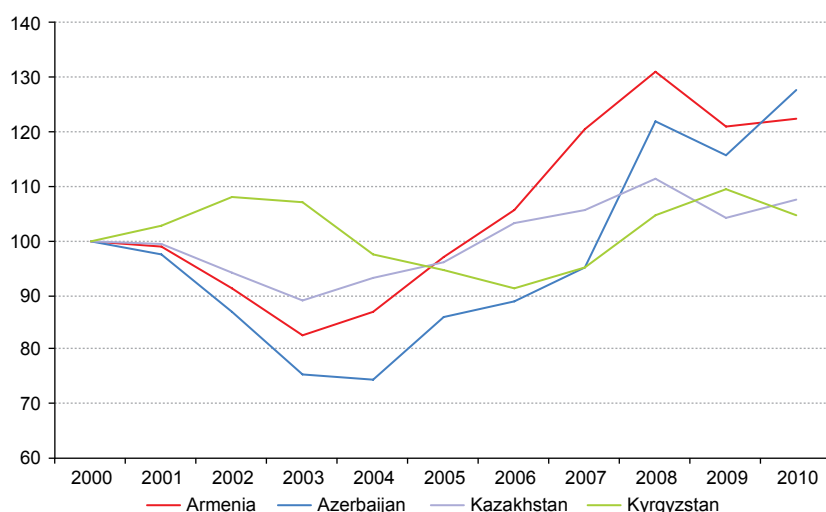
EXCHANGE RATE APPRECIATION

Increases in terms of trade, as that experienced by many Asian LLDCs in the past decade, tend to over appreciate the real exchange rate. The mechanism is known as the "Dutch Disease". The

high price of primary commodities drives resources to that sector and out of manufacturing. Increases in income create excess demand for non-tradable products and imports, driving up prices. That reduces profits in the domestic tradable sectors, which use non-tradables and imports as inputs but have to sell the output at international prices. The appreciation of the exchange rate is defined as the change in relative prices that favour non-tradable goods.

Figure 23 illustrates that appreciation in the 2000-2010 period. The increase has been moderated in Kazakhstan (7%) and Kyrgyzstan (4%), but the real effective exchange rate increased 27% in Azerbaijan and 22% in Armenia.

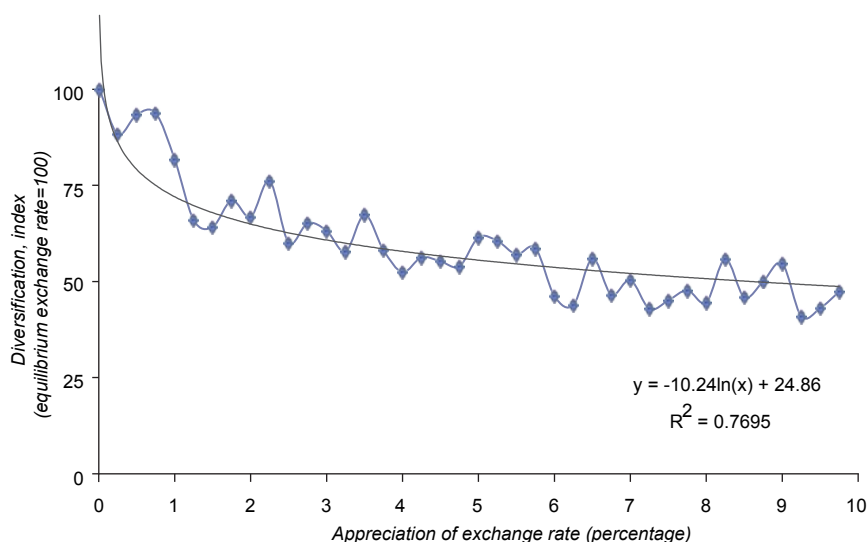
To illustrate the effect of exchange rate appreciation on diversification, this report presents the results of a macroeconomic modelling exercise.²⁸ The model assumes that countries trade with each other and that each individual economy is composed of a set of production sectors each making a specific and highly differentiated consumption good. The model

Figure 23 Real effective exchange rate, selected Asian landlocked developing countries (2000=100)

Source: ESCAP, based on data from IMF.

with 15 countries and up to 60 sectors that could emerge during the period of 100 time periods is simulated 1,200 times. Figure 24 shows the result of the analysis by presenting the effect of an increase in nominal exchange rate on the average

diversification of a country. The figure shows that diversification reduces steadily with appreciations of exchange rate. In the simulations, after a 6% appreciation only around 50% of the potential diversification emerges in the economy.

Figure 24 Simulation of the effect of exchange rate appreciation on diversification

Source: ESCAP.

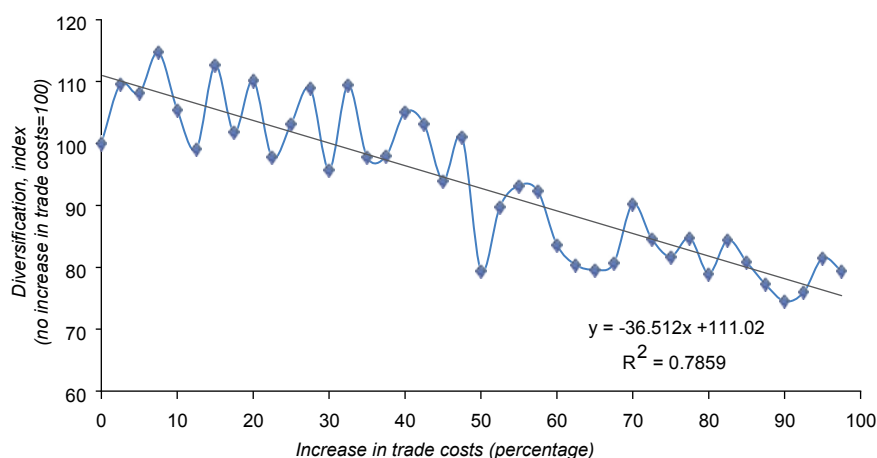
TRADE COSTS

As discussed, the defining challenge for any landlocked developing country is the high trade costs given the lack of direct access to trade by sea. Similar to the simulation analysis described above, a modelling and simulation exercise was carried out to illustrate the effect of high trade costs on diversification. The same macroeconomic model as described above with 15 countries and up to 60 sectors that could emerge during the period

of 100 time periods was simulated 1,200 times considering exogenous technological progress and change in consumption patterns. Figure 25 shows the result of the analysis. The figure shows that increases in trade costs are associated with reduction in diversification below potential.

Therefore, the reduction of trade costs faced by Asian LLDCs, through infrastructure development and trade and transport facilitation measures, could also foster economic diversification in these countries.

Figure 25 Simulation of the effect of an increase in trade costs on diversification



Source: ESCAP.

7. POLICY RECOMMENDATIONS²⁹



Fruits of the chilli harvest in Lao People's Democratic Republic.
Credit: ESCAP Photo

As discussed in the previous sections, economic diversification requires strategic policies by Asian LLDCs. The implementation of such strategic diversification involves the selective promotion of new economic activities over traditional ones through the use of targeted industrial, infrastructure, trade, investment and private sector development policies. The analysis of empirical evidence, as presented in this report, can be used in the process of identification of strategic direction of diversification. It could serve as a public good that could be made available to the private sector. It reduces the cost of discovery of potential successful new economic activities by informing entrepreneurs of the new products that require productive capacities similar to those already available in the country.

Also critical is an environment conducive to private sector activities that allows for an easier transition to a more diversified economy. In this process, it is essential to strengthen national institutions and good governance in order to provide a stable environment for the evolution of the economy, the curbing of cronyism and the promotion of development goals.

There is no “one-size-fits-all” set of policies that could address the specific binding constraints that hinder private sector investments in new economic activities in each of the 12 Asian LLDCs. Tailored policy advice for each of those countries would entail fact-based diagnosis and context-specific policy design, identifying reform priorities based on expected impacts as well as consideration of potentially adverse second-best interactions between different policy reforms, which are outside of the scope of this report.

However, some general recommendations are presented in this section to facilitate countries' efforts to foster diversification by improving the business environment and supporting entrepreneurship, and to nudge the private sector towards new economic activities producing more complex products.

A STABLE, INVESTMENT-FRIENDLY AND COMPETITIVE MACROECONOMIC POLICY FRAMEWORK

Overall, exchange rates play the critical role in promoting tradables and the emergence of new economic sectors. The main set of policies is to neutralize the tendency of appreciation and to maintain a competitive exchange rate. That strategy is compatible with a floating but managed exchange rate regime. Two basic instruments that are used by many countries, although not openly admitted, are: maintaining domestic interest rates at a low level, and buying international reserve currencies. Commodity-dependent countries that face the threat of “Dutch Disease” could levy tax on the export of primary commodities that cause appreciation of a currency, and the creation of an international fund (sovereign wealth fund) to neutralize the potential re-appreciation of the currency due to the inflow of tax revenue. In situations of extreme pressure on the exchange rate, countries could also consider imposing temporary controls on capital inflows.³⁰

Other monetary policies also play a supportive role in increasing productive investments in new sectors. Favourable credit conditions for productive sectors, and for the promotion of new economic activities in particular, are helpful for job creation and diversification. Macroeconomic stability, including moderate and stable inflation, and sustainable domestic and external imbalances, also create an environment conducive to private sector investment in diversifying the economy. In this connection, when facing domestic or external shocks, countries need to consider using the full scope of appropriate countercyclical policies to maintain economic and financial stability and to avoid sudden economic fluctuations.

INDUSTRIAL POLICY

A stable investment-friendly and competitive macroeconomic environment will facilitate economic

diversification, but it will not automatically result in the diversification towards the economic sectors that have the greatest potential in promoting development. To accomplish that, after setting the strategic direction for diversification with the identification of potential new sectors to promote, the Government should establish a process designed to find areas where policy actions are most likely to make a difference – a process whereby the Government and the private sector jointly come up with the required supportive policies, incentive structure and institutional arrangement to ensure the flow of private investment in the identified niche.³¹

The implementation of such strategic diversification requires, therefore, an industrial policy – the selective promotion of certain economic activities over others. In this case, the promotion of new economic activities/products that are more complex and that allow for further diversification. That policy has to be much sharper than most current policies that provide incentives for any new investment regardless of its potential to spawn new economic activities.

Active public intervention is required with the objective to support infant industry, create the necessary complementary productive infrastructure, including industrial estates and economic zones, and promote marketing and export market development and other promotional measures that are covered under industrial policy.

Infant industry

An important aspect of industrial policy is the infant industry protection provided to domestic industry in the early stages of development, which was extensively employed as a policy tool by most developed countries and newly industrialized countries in the early stages of their development.³² Asian LLDCs, as other developing countries, have every right to use infant industry protection to diversify their economies in new areas and provide fledgling productive capacities some space to grow. Productive capabilities are also acquired through the process of learning by doing and, therefore, it takes time for the

private sector to raise productivity of new economic activities to international levels. In such cases, new economic activities will need to be nurtured until firms are ready to compete with those in countries with higher productive capacity. Support is also needed to foster the growth of the scale and scope and the ability of infant industries to partner with global enterprises and with production networks.

As in any entrepreneurial venture, some of these new activities may fail due to lack of demand or higher than expected costs of production, and the resulting profits do not justify the investment. Ideally, there should be clear benchmarks for success so that there is a sunset timeframe for infant industry protection. Ultimately, markets are in a better position than the Government to establish such benchmarks. In that connection, a pragmatic measure of success is progress in foreign markets – the strategy followed by East Asian countries during their industrialization. In the case of import-substituting products, the Government needs a sunset plan for removal of protection. An important element is the timeframe for assessment of performance. Different economic activities require different periods to come to fruition. The greater the jump in complexity from existing to new products, the longer it will take the private sector to acquire the required capabilities.

Infrastructure development

Policies that relate to infrastructure have to be selective in terms of economic activities that they promote. When a new road is built it will inevitably benefit some activities and not others. Those that can use the new road will benefit while those that are not connected to it will not. Therefore, infrastructure policies should not be generic; they should focus on directly facilitating tradable production, in agriculture and industry, and in facilitating the shift of the country's product mix towards more complex economic activities.

In some Asian LLDCs, development of basic infrastructure of transport, telecommunications and energy is still required and should be provided

before and in support of more targeted infrastructure projects to promote the sectors selected for strategic diversification. However, in commodity rich countries with higher incomes, construction booms should be avoided.

Fiscal policy

Fiscal policy is an important instrument to promote diversification. Tax incentives for first movers into new targeted sectors create incentives for private sector investment. A Government's procurement expenditure can also contribute significantly towards achieving the goal of economic diversification. In many countries, Governments spend substantial amount on procurements. As emphasized in the ESCAP *Survey 2013*, government procurement expenses, because of their quantitative importance, have the potential to leverage the private sector towards socially beneficial sectors. By buying from companies that produce new and more complex products, Governments can support their expansion.

Foreign direct investment

Another way to facilitate strategic diversification is through attracting foreign investment while ensuring meaningful linkages and spillovers to the local economy and local enterprises.³³ Multinationals bring new productive capacities to a country, but that does not mean that these productive capacities will naturally spread throughout the economy. They may just stay within the limits of the multinational – with no spillover. If the company that comes to the country requires parts and components that the domestic economy is not able to provide – which require productive capacities that the country does not have available – the new plant will not create the opportunities for diversification. Countries should not seek FDI only for the sake of more investment but also to use FDI to promote diversification of the economy. Any FDI that comes to the country should have a clear strategy to use domestic production and to promote further diversification.

DOMESTIC RESOURCE MOBILIZATION

It is vital for the Asian LLDCs to create a financial architecture that provides access to a variety of financial services and products in support of private investment for new economic activities. This requires a diversified, well-regulated and inclusive financial system that promotes savings and channels them to productive investments. The domestic supply of long-term capital also needs to be increased by developing domestic capital markets, venture capital funds, term lending institutions and industrial development banks. It is important to facilitate the development of domestic finance sources to avoid the tendency of exchange appreciation due to an inflow of foreign savings.

On the revenue side, policies need to focus on broadening the tax base and introducing direct taxes. In commodity boom countries, that strategy will reduce excessive dependence on resource revenue.

Endnotes

- ¹ Kuznets (1979); Amsden (2001); McMillan and Rodrik (2011).
- ² Imbs and Wacziarg (2003); Saviotti and Pyka (2004).
- ³ Reinert (2007); Akamatsu (1962); Cimoli, Dosi and Stiglitz (2008).
- ⁴ Hausmann and Klinger (2007); Hausmann and Hidalgo (2010).
- ⁵ Arthur (2009).
- ⁶ Lall (1992); Acemoglu and Robinson (2012); Bresser-Pereira (2012).
- ⁷ Silverberg and Vespagen (2005).
- ⁸ Particularly the work of Luigi Pasinetti (1981; 1993).
- ⁹ Hidalgo and Hausmann (2009).
- ¹⁰ See ESCAP (2012).
- ¹¹ This section is based on chapter 4 of ESCAP (2011).
- ¹² A much-quoted work is the 2003 paper by Imbs and Wacziarg (2003), which shows that economies become more diversified as incomes increase. See also IMF (2014).
- ¹³ This empirical regularity is a robust feature of the data. It has been supported by subsequent work using disaggregated export data. See, for example, Klinger and Lederman (2004) and Cadot and others (2011).
- ¹⁴ ESCAP (2011).
- ¹⁵ Urban activist Jane Jacobs in 1969 noted the emergence of differentiated production of garments, based on much smaller production runs. "This method produces relatively modest amounts of each item as compared with mass production, yet is not craft manufacturing either... Thanks to this one can look at a crowd of thousands of persons in a large city park and be hard put to find two women or two children dressed in identical outfits." The richer countries have steadily adopted this differentiated production, leaving most of the mass production to poorer nations (Jacobs, 1969, pp. 236-238).
- ¹⁶ This empirical regularity is also presented and discussed in Hausmann and Hidalgo (2011) using different trade classifications.
- ¹⁷ ESCAP (2011).
- ¹⁸ Felipe and others (2012).
- ¹⁹ Hausmann and Klinger (2007); Hidalgo and others (2007).
- ²⁰ Trade data are used as a proxy for products; thus, in reality, the product space shows the likelihood of products being jointly exported.
- ²¹ Johnson (1982); Amsden (1989); Wade (2003).
- ²² Chang (2009); Shapiro (2007); Lall (2005).
- ²³ Krueger (2011); Noland and Pack (2003); Pack (2000).
- ²⁴ Lin and Monga (2011).
- ²⁵ Includes machinery and mechanical appliances, electrical equipment and parts, sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles.
- ²⁶ Based on Freire (2013).
- ²⁷ Based on data from World Bank Commodity Price Data. Available from <http://go.worldbank.org/4ROC CIEQ50> (accessed 7 October 2014). Values for other commodity indices are energy (15.1% and food 9.2%).
- ²⁸ The model is based on Pasinetti (1993) as described in annex.
- ²⁹ Based on ESCAP (2014) and ESCAP (2011).
- ³⁰ See Bresser-Pereira (2010).
- ³¹ Rodrik (2004); Hausmann and Rodrik (2006).
- ³² For examples, see Wade (2003); Chang (2002); and Reinert (2007).
- ³³ Shapiro (2007).

ANNEX

Technical notes

This report identifies the opportunities for diversification in Asian LLDCs following the methodology described in Freire (2011), by identifying products that are more complex and closer in the product space to the existing product mix in the respective countries.

Product complexity

To measure product complexity, this paper uses the method of reflections proposed by Hidalgo and Hausmann (2009). The method constructs a bipartite network of countries and products that they produce and iteratively calculate a generalized measure of diversification and ubiquity as follows:

$$K_{c,N} = \frac{1}{K_{c,0}} \sum_p M_{cp} K_{p,N-1} \quad (\text{Generalized measure of diversification})$$

$$K_{p,N} = \frac{1}{K_{p,0}} \sum_c M_{cp} K_{c,N-1} \quad (\text{Generalized measure of ubiquity})$$

where M_{cp} is 1 if country c makes product p and 0 otherwise, $K_{c,0}$ is the number of products produced by country c and $K_{p,0}$ is the number of countries that make product p .

The measure of product complexity ($PCOMP$) is taken as the normalized value of the K_p value of the 5th iteration of the method of reflections:

$$PCOMP = \frac{K_{p5} - \langle K_{p5} \rangle}{sd(K_{p5})}$$

where $\langle K_{p5} \rangle$ is the mean and $sd(K_{p5})$ is the standard deviation of the distribution of K_{p5} . The K_{p5} is used because such interactive analysis is carried out until no further information is obtainable from this method, which depends on the structure of the network and for the dataset used happens on the 5th interaction.

Product space map

The measure of proximity between products A and B (Φ_{AB}) in the product space is calculated using a method similarly to that proposed by Hidalgo and others (2007), as the minimum value between the conditional probability $P(A|B)$ of a country producing A given that it produces B and the conditional probability $P(B|A)$ of a country producing B given that it produces A:

$$\Phi_{AB} = \Phi_{BA} = \min(P(A|B), P(B|A))$$

The proximity between two products, therefore, ranges from 0 %, in the case in which no country produces both products, to 100 % in the case in which all countries that produce one good also produces the other. This report adopted the threshold of 85 % proximity to an existing product of a country's product mix to identify potential new products for diversification.

Export opportunity

The report also analyses the price incentives that entrepreneurs face in choosing between different potential new economic activities, by estimating the potential growth of exports of different products based on the

index proposed by Freire (2012). The index is calculated as follows:

$\sum_i G_{isd}^{t0,t1} \times M^{2013}$, where $G_{isd}^{t0,t1} = \frac{m_{id}^{t1}}{M^{t1}} - \frac{m_{id}^{t0}}{M^{t0}}$ if $\Phi_{ij} > 85\%$ for some product j in the country's existing product mix and $\frac{m_{id}^{t1}}{M^{t1}} > \frac{m_{id}^{t0}}{M^{t0}}$, and zero otherwise.

Where s is the source country, d is the destination country, $G_{isd}^{t0,t1}$ is the growth in the share of imports m of industry i in country d in between $t0$ (2012) and $t1$ (2013). M^{2013} is the total imports by all countries in all

products in year 2013, and $\frac{m_{id}^{t1}}{M^{t1}}$ is the share of imports of product i by country d in total world's imports of all products in the period $t1$.

The report uses, as a proxy for country's production, disaggregated trade data from COMTRADE using Harmonized System code (HS 2002) at six-digit level, further disaggregated by quantity unit code and by unit price range, covering 221 economies for the year 2013, following the methodology described in Freire (2013).

Model of trade and economic diversification

The model is based on work by Pasinetti (1993). An economy is composed by an ensemble of m production sectors that each make a specific and highly differentiated consumption good, which is produced by means of labour alone. One household sector provides labour to the production sectors and consumes the commodities that those sectors produce. These commodities could be either goods or services. Each individual in the population is engaged in the production of a single commodity, and obtain through exchange the commodities that she or he consumes. The unit of labour is remunerated by a wage rate. The labour productivity in each sector is given by a labour coefficient (l) and the consumption per capita of each commodity by a consumption coefficient (c).

The relation between labour and consumption coefficients, and prices and quantities are given by a production scheme according to Leontief's closed model (1973), consisting of two systems. The physical quantity system is given by:

$$\begin{bmatrix} 1 & 0 & \dots & 0 & -c_1 \\ 0 & 1 & \dots & 0 & -c_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & 1 & -c_m \\ -l_1 & -l_2 & \dots & -l_m & 1 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ \vdots \\ q_m \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \\ 0 \end{bmatrix} \quad (1)$$

While the price system is given by (2), setting the wage $w = 1$, which means that prices are represented in terms of wage rates:

$$\begin{bmatrix} 1 & 0 & \dots & 0 & -l_1 \\ 0 & 1 & \dots & 0 & -l_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & 1 & -l_m \\ -c_1 & -c_2 & \dots & -c_m & 1 \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \\ \vdots \\ p_m \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \\ 0 \end{bmatrix} \quad (2)$$

All magnitudes that appear in (1) and (2) are function of time, but the notation was suppressed for simplification.

The necessary condition that has to be satisfied in order that there are non-trivial solutions for (1) and (2) is that the determinant of coefficient matrix is zero. That condition is the same for both systems and is given by:

$$\sum_{i=1}^m c_i l_i = 1 \quad (3)$$

When the condition is fulfilled, the solution for the physical quantities is:

$$q_i(t) = c_i(t) \quad i=1,2,\dots,m, \quad (4)$$

$$Q_i(t) = c_i(t)N(t) \quad i=1,2,\dots,m, \quad (5)$$

The solution for the price systems, when making the wage explicit is:

$$p_i(t) = l_i(t)w(t) \quad i=1,2,\dots,m, \quad (6)$$

On the dynamic formulation of the model, the economy changes with: a) the exogenous change of consumption patterns, which also change the quantities of the commodities demanded; b) the exogenous change in labour productivity, which also change the prices of the commodities traded; and c) the emergence of new sectors.

A country x would import products from other countries if: (1) the consumption per capita coefficient for that product is positive, (2) the price of domestic production is higher than the importing price, which include trade costs. The model considers different trade costs for each bilateral trade in each sector.

New sectors emerge (diversification) when income reaches a level that triggers consumption of that product or when the country emulates the production that already exist in another country.

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14-01156

ISBN 978-92-1-120683-8

