



# The concept of economic diversification in the context of response measures

Technical paper



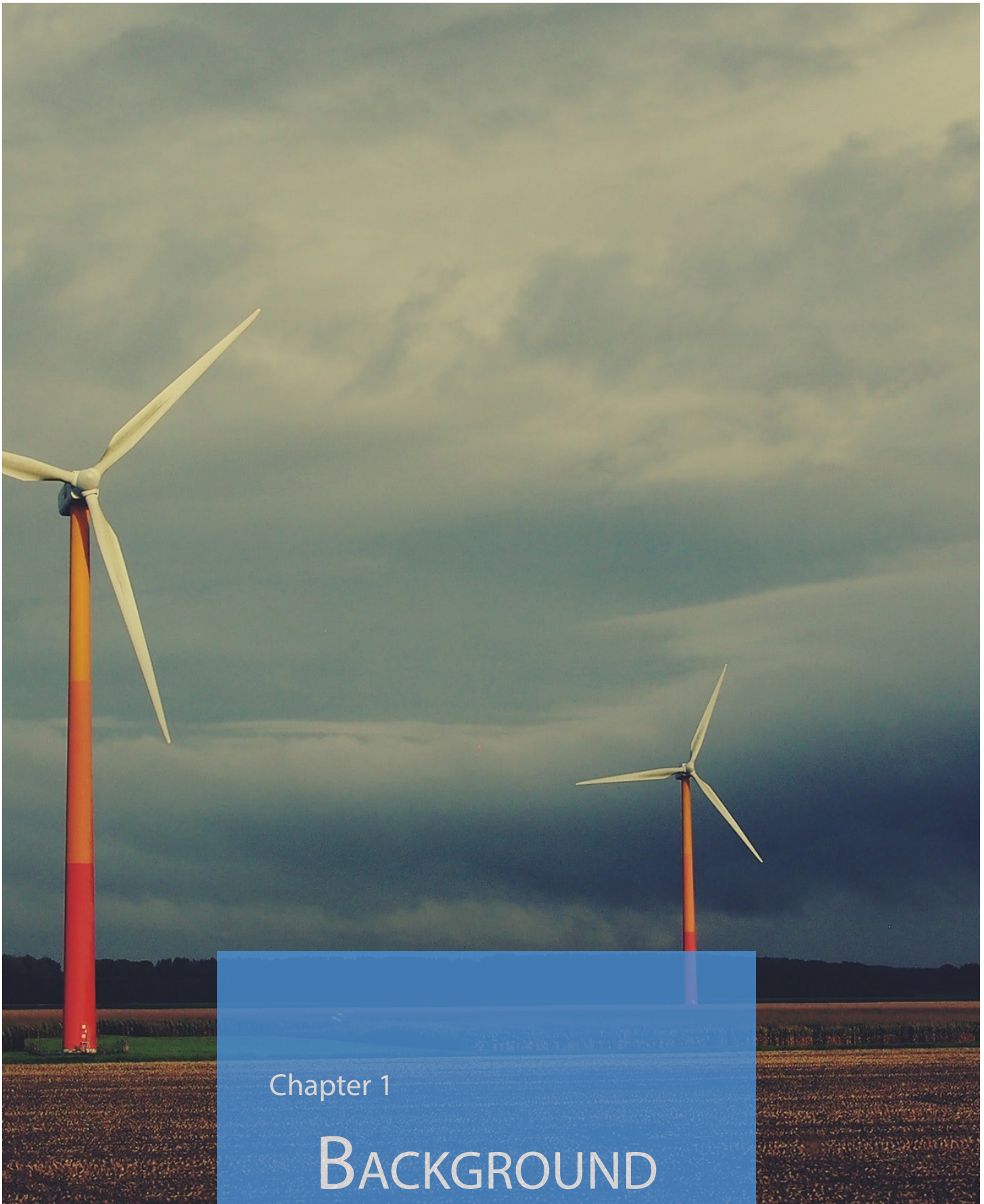
United Nations  
Framework Convention on  
Climate Change

## Summary

This technical paper is part of the technical materials prepared in response to the mandate from the Conference of the Parties (COP) to prepare technical materials to assist developing country Parties in their economic diversification initiatives. It provides an overview of the work undertaken under the Convention on economic diversification initiatives in the context of the impacts of the implementation of response measures, general concepts of economic diversification and guidance on how to approach economic diversification at the national level. It draws upon information from various sources, including research publications, technical inputs provided by experts and practitioners during discussions under the forum on the impact of the implementation of response measures, relevant submissions made and information reported by Parties and the work of the forum on the impact of the implementation of response measures. The Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation may wish to consider the information contained herein for the purpose of advancing their work on economic diversification under the improved forum on the impact of the implementation of response measures established at COP 21.

## Table of contents

Background	4
A. Mandate	5
B. Objective, scope and approach	5
C. Structure of the paper	5
D. Possible actions by the subsidiary bodies	6
Overview of work undertaken on economic diversification under the Convention	7
A. Work of the subsidiary bodies	8
B. Synthesis of information contained in Parties' reports	10
The concept of economic diversification	12
A. Objective of economic diversification	13
B. Drivers of economic diversification	14
C. Tools and methods for measuring economic diversification	19
Economic diversification as a means to address the adverse impacts of response measures	29
A. Sectoral vulnerability and economic diversification strategy	31
B. Policy options for accelerating economic diversification	37
The way forward	44
A. Key messages and concluding remarks	45
B. Possible elements of the work programme of the improved forum	48
References	50



Chapter 1

# BACKGROUND

## A. Mandate

01. The Conference of the Parties (COP), at its twenty-first session, requested the secretariat to prepare a guidance document to assist developing country Parties in assessing the impact of the implementation of response measures<sup>1</sup>, including guidance on modelling tools, as well as technical materials to assist developing country Parties in their economic diversification initiatives, for consideration at the forty-fourth sessions of the subsidiary bodies<sup>2</sup>.

## B. Objective, scope and approach

02. The objective of this technical paper is to start addressing one of the mandates referred to in paragraph 1 above: preparing technical materials to assist developing country Parties in their economic diversification initiatives. The other mandate referred to in paragraph 1 above, preparing guidance on the assessment of the impact of the implementation of response measures, is addressed in a separate technical paper<sup>3</sup>.
03. This paper seeks to assist developing country Parties by sharing available information and results from studies related to economic diversification. It also seeks to provide inputs that would assist Parties in formulating the work programme of the improved forum on the impact of the implementation of response measures (hereinafter referred to as the improved forum) established at COP 21<sup>4</sup>.
04. In order to achieve these objectives, this paper provides an overview of the work undertaken under the Convention on economic diversification in the context of the impact of the implementation of response measures, drawing on relevant information contained in the reports on the work of the forum on the impact of the implementation of response measures, submissions from Parties and presentations and statements made by Parties and observer organizations at previous sessions of the subsidiary bodies.
05. Furthermore, this paper synthesizes technical information on the concepts and theories of economic diversification to enhance the understanding of the subject, and provides general guidance on how to approach economic diversification initiatives at the national level. It uses information from peer-reviewed literature, publications of relevant organizations and technical inputs from experts, among other publications.

## C. Structure of the paper

06. This technical paper consists of five chapters, followed by references. Chapter I provides background information. Chapter II presents an overview of and findings from the work undertaken under the Convention on economic diversification, drawing on relevant information and submissions from Parties. Chapters III and IV compile findings from various studies undertaken by researchers and organizations.

---

1 Response measures are mitigation actions taken by Parties to address climate change.

2 Decision 11/CP.21, paragraph 9.

3 FCCC/TP/2016/4.

4 Decision 11/CP.21, paragraph 1.

Chapter III focuses on establishing a basic understanding of economic diversification in the context of the impact of the implementation of response measures; in addition, it presents existing methods that have been developed and tested to measure economic diversification and drivers that lead to and accelerate economic diversification initiatives. Chapter IV elaborates on lessons learned from key policy options that underpin some economic diversification initiatives. Finally, chapter V summarizes key messages and suggests potential follow-up actions that may be undertaken to support economic diversification under the improved forum from now until 2018.

## D. Possible actions by the subsidiary bodies

07. The Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation may wish to consider the information contained in this technical paper for the purposes of:
  - a. Advancing their work on economic diversification under the improved forum, including its work programme;
  - b. Providing guidance to developing countries on their economic diversification initiatives;
  - c. Providing guidance to the secretariat on additional technical materials that may assist developing countries in undertaking their economic diversification initiatives.



Chapter 2

OVERVIEW OF WORK UNDERTAKEN  
ON ECONOMIC DIVERSIFICATION  
UNDER THE CONVENTION

## A. Work of the subsidiary bodies

08. Economic diversification has been discussed from two angles in climate change negotiations: (1) within the framework of adaptation aimed at increasing economic resilience and reducing reliance on vulnerable economic sectors, especially for relevant categories of countries listed in Article 4, paragraph 8, of the Convention; and (2) in the context of response measures aimed at reducing the adverse impacts of the implementation of climate change mitigation policies that have cross-border effects, mainly on developing countries. This technical paper approaches the issue from the second angle.
09. Technical work on economic diversification under the Convention was initiated at a workshop held in March 2000<sup>5</sup>, where economic diversification was identified by Parties as a potentially effective means of reducing the adverse impacts of response measures. The workshop was organized with a view to progressing the implementation of Article 4, paragraph 8, of the Convention and Article 3, paragraph 14, of the Kyoto Protocol.
10. As a first step in facilitating economic diversification, the COP requested the secretariat to organize a workshop on the needs and options of Parties not included in Annex I to the Convention (non-Annex I Parties) for economic diversification and on support programmes undertaken by Parties included in Annex II to the Convention to address those needs<sup>6</sup>. The workshop was held on 18 and 19 October 2003 in Tehran, Islamic Republic of Iran, and broadly covered the impacts of climate change on vulnerable States and the role of economic diversification in preventing any potential damage.
11. Following up on the outcomes of that workshop, a subsequent expert meeting on economic diversification was held on 16 and 17 May 2006 in Bonn, Germany, which considered: how economic diversification could be integrated into sustainable development strategies; what technical assistance may be needed to develop the structural and institutional capacity necessary to achieve economic diversification; and how foreign and domestic private sector investments in these areas could be encouraged.
12. During the expert meeting, it was expressed that technical assistance is principally needed in the area of good policy formulation, along the lines of a solid diagnostic exercise. Considering that policies are dependent upon specific national circumstances, it was identified that the first step to providing assistance in policy formulation is to have a clear understanding of institutional and capacity improvement needs in each national context (Cosbey, 2006).
13. Furthermore, the need to prepare a blueprint of institutional and capacity improvement needs in national contexts (country by country), followed by providing international support focused on the countries and sectors determined as being most in need of assistance was identified.
14. An example of an inter-institutional cooperation programme for this type of analysis is the integrated framework for trade-related technical assistance to support the least developed countries (LDCs). The mandate of this programme was to diagnose the obstacles to exploiting the potential gains from liberalized trade and investment in the LDCs and to provide capacity-building to overcome those obstacles. The participating agencies in the

---

5 The report on the workshop is contained in document FCCC/SB/2000/2.

6 Decision 5/CP.7, paragraph 37.



programme were the International Monetary Fund (IMF), the International Trade Centre, the United Nations Conference on Trade and Development (UNCTAD), the United Nations Development Programme, the World Bank and the World Trade Organization.

15. The effect of national circumstances on economic diversification was further qualified by Parties during the in-forum workshop held at the thirty-eighth sessions of the subsidiary bodies. This workshop was on exchanging experience and discussing opportunities for economic diversification and transformation. In this workshop Parties agreed that the solutions to the challenge of economic diversification differ widely and therefore the solutions need to be specifically tailored to the unique national circumstances in each context.
16. The above-mentioned in-forum workshop was organized because economic diversification was included as one of the eight work areas of the forum on the impact of the implementation of response measures established by decision 8/CP.17. The highlights of the discussions at and conclusions arising from the in-forum workshop are as follows<sup>7</sup>:
  - a. Some participants mentioned that successful economic diversification would go beyond insulating economies from the impacts of response measures and would include lowering vulnerability to the impacts of climate change. It was noted that economic diversification would achieve a number of other nationally enunciated objectives and the broader process of sustainable development;
  - b. Some Parties expressed interest in having more focused sector-specific discussions, for example on how the tourism sector might be affected by the impacts of response measures and the potential for diversification initiatives. In this regard, some Parties suggested that one of the first tasks should be the identification of the specific sectors and countries most at risk, informed by economic modelling and the work of the forum on socioeconomic trends;
  - c. Most Parties agreed that, while the actual task of creating and administering programmes for economic diversification has to be undertaken at the national level, cooperation at the international level has a clear and important facilitative role in economic diversification initiatives. The roles of international cooperation were seen to be:
    - i. Contributing to the search for and sharing of best practices and experiences of countries that have successfully diversified their economies;
    - ii. Identifying non-domestic barriers to economic diversification, such as trade barriers;
    - iii. Identifying ways in which the international community could facilitate increased foreign investment in non-traditional sectors;
    - iv. Facilitating assistance, in the form of technology transfer, technical assistance and financial support, for the difficult task of diversification;
  - d. Some participants suggested that there are a number of intergovernmental organizations that have great expertise in helping countries to achieve economic diversification, primary among them being the development banks. Therefore, it was agreed that those undertaking efforts under the Convention would need to be aware of the work of other organizations and endeavour to collaborate with

them.

17. In their submissions in 2015<sup>8</sup> on the further elaboration of the work programme on the impact of the implementation of response measures and the modalities for its implementation, a few Parties expressed the need for training, capacity-building and the sharing of experiences and best practices from countries, experts and observer organizations.
18. In 2012, fossil fuel dependent countries including Bahrain, Qatar, Saudi Arabia and the United Arab Emirates indicated their readiness to put forward their actions and plans in pursuit of economic diversification that have co-benefits in the form of mitigation and adaptation to the impacts of climate change and response measures. COP 18 took note of this and invited Parties concerned and other Parties to submit further information on such actions and plans to the secretariat<sup>9</sup>.
19. Furthermore, most recently, Article 4, paragraph 7, of the Paris Agreement states that mitigation co-benefits resulting from Parties' adaptation actions and/or economic diversification plans can contribute to mitigation outcomes.

## B. Synthesis of information contained in Parties' reports

20. The review of various reports submitted by Parties under the Convention, including their national communications (NCs), national inventory reports (NIRs), biennial reports (BRs) and biennial update reports (BURs), indicates that very limited information has been reported on economic diversification. Two Parties included in Annex I to the Convention (Annex I Parties) included information related to economic diversification in their NIRs and a number of non-Annex I Parties included information on economic diversification as part of their intended nationally determined contributions (INDCs).
21. France and New Zealand included information about the support provided by them for regional economic diversification initiatives in their NIRs. France mentioned its participation as part of the European Union in regional initiatives for economic diversification such as through the Global Climate Change Alliance and the Mediterranean Solar Plan, while New Zealand reported on its ongoing aid programme, providing support to non-Annex I Parties for the purposes of economic diversification and renewable energy generation through private sector investment. Under the programme, new economic opportunities have been realized in Timor-Leste by rehabilitating the coffee sector (to increase the quality, quantity and value of coffee products), developing the aquaculture sector and providing capacity-building for small businesses in rural areas, particularly those run by women. New Zealand mentioned its commitment to providing long-term assistance to non-Annex I Parties for achieving economic diversification that is independent of fossil fuels and that includes the provision of secure, sustainable energy<sup>10</sup>.
22. A few Parties emphasized in their INDCs their special circumstance of being highly dependent on fossil fuel production. Most of them included a portfolio of actions and plans in pursuit of economic diversification with mitigation co-benefits, including:

8 FCCC/SB/2015/L.2.

9 Decision 24/CP.18, paragraphs 1 and 2.

10 FCCC/WEB/ART314/2015.

investing in clean energy technologies, energy efficiency, carbon capture and storage, methane recovery and flare minimization; improving emission standards in the transportation sector; investing in education; and promoting sustainable tourism. The targeted sectors mentioned that may require economic diversification include the financial, manufacturing and energy-intensive industries, the oil and gas industries, and tourism. The Parties indicated that some of their identified actions and plans will result in less domestic fossil fuel consumption and thus yield mitigation co-benefits.



## Chapter 3

# THE CONCEPT OF ECONOMIC DIVERSIFICATION

## A. Objective of economic diversification

23. Traditionally, economic diversification has been used as a strategy to transform the economy from using a single source to multiple sources of income spread over primary, secondary and tertiary sectors, involving large sections of the population. The objective has always been to improve economic performance for achieving sustainable growth; for example, building resilience against fluctuations in extraregional economic activity (Nourse, 1968), reducing vulnerability to income loss due to volatility of product price on the international market, creating job opportunities and alleviating poverty.
24. Realizing that economic diversification contributes positively to economic performance, much of the economic and sustainable growth policy discussion revolves around the development of strategies designed to induce greater economic diversification (Hackbart, 1975). Studies are continuously being undertaken by researchers to understand the complexities, linkages and performance of implemented economic diversification policies, including: developing and testing reliable empirical methods to measure economic diversification; understanding the performance of various determinants driving economic diversification; and understanding the effect of various policies on sustainable development (e.g. impact on labour market, employment generation, export growth). However, owing to the complexity created by differing national circumstances, standardized conclusive strategies are not advised; there are only lessons learned from experience to be tested and followed up on.
25. Recent developments under the climate change regime have added another dimension to the objective of economic diversification. Countries are implementing mitigation policies at the national or international level through bilateral and/or multilateral agreements to mitigate climate change. These actions are expected to intensify further when Parties start implementing actions to meet their commitments under the Paris Agreement (i.e. to hold the increase in the global average temperature to below 2 °C above pre-industrial levels by reducing emissions to 40 Gt)<sup>11</sup>.
26. Simultaneously, it has been acknowledged that the implementation of response measures has impacts that are not limited to national boundaries<sup>12</sup>, especially for the countries identified in Article 4, paragraph 8, of the Convention.
27. In order to build resilience to the adverse impacts of the implementation of response measures, economic diversification has been included in the development plans of many non-Annex I Parties (e.g. Gulf Cooperation Council (GCC) countries) (Shediak, 2008). The concern about the impacts of the implementation of response measures is greater for countries that have a narrow export profile and are highly vulnerable to response measures owing to new demands or standards from importers. In this context, economic diversification is a matter of concern for countries that exhibit the following two characteristics:
28. In this context, economic diversification is a matter of concern for countries that exhibit the following two characteristics:

---

11 FCCC/WEB/ART314/2015.

12 As footnote 11 above.

- a. A significant percentage of their total exports is concentrated on only a few products or services (high concentration index);
- b. Demand for those few products or services is likely to drop as a result of climate change mitigation measures in other countries (affected by response measures).

## B. Drivers of economic diversification

29. There are many factors other than the impact of the implementation of response measures that drive economic diversification. Because many of these factors act simultaneously, they need to be understood holistically. In addition, the factors may vary by national circumstances, and are more quantitative determinants at the firm level.
30. The World Bank reviewed various drivers of economic diversification in various studies and grouped them into three categories: economic reforms, structural factors and macroeconomic variables. A recent study on 212 exporting firms classified the drivers as internal and external; internal drivers include export commitments and the experience level of staff and the structure of human resources; while external drivers include competitive intensity and distances between the export firms and markets (Navarro-García, 2016).
31. This section synthesizes the results of various research studies that analysed the determinants of economic diversification through empirical evidence. Table 1 provides a summary of the discussion set out in this section.

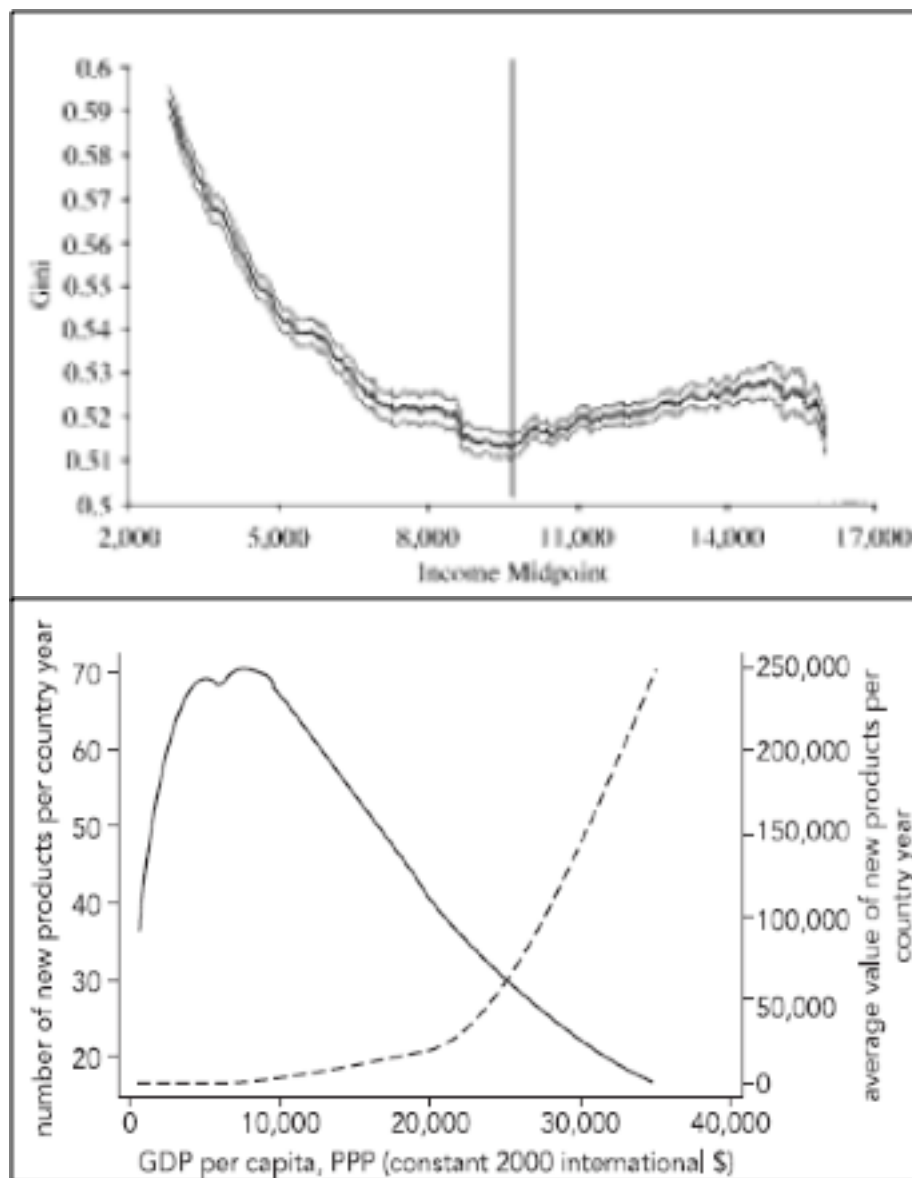
### B1. Economic determinants

- a. Productivity of firms
32. Firms are heterogeneous in their productivity levels and only the most productive ones become exporters (Melitz, 2003). As firms begin to export, they initially face higher costs as a result of their lack of knowledge and experience. Their production decreases in this period. Eventually, as diversification of the export market moves beyond a threshold level and investments cumulate, export market expansion results in lower average costs in the long run and thus higher productivity. This forms a U-shaped relationship between export diversification and firm productivity (Xuefeng and Yaşar, 2016).
  - b. Income (gross domestic product per capita)
33. Studies to establish the relevance of income to diversification have long been present in the literature. However, a non-linear relationship between them was first introduced in 2003 by Imbs and Wacziarg (2003), who studied the stages of diversification through econometric analysis. The study detected an inverted U-curved relationship between the diversification of products and gross domestic product (GDP) per capita. The findings revealed that low-income countries have a very specialized production structure. As countries' levels of GDP per capita increase, the sectoral distribution of economic activity

diversifies. This diversifying trend decreases with rising GDP per capita and after a turning point, which takes place at a very high level of income, the sectoral distribution exhibits respecialization. The turning point between specialization and diversification was generally found to be near the income level of USD 10,000 per capita in 1985 (see figure 1).

Figure 1

Non-parametric curves: income against the Gini index (above) and new products (below)



Sources: (1) Imbs J and Wacziarg R. 2003. Stages of diversification. *American Economic Review*. 93(1): pp.63–86 (left-hand side graph); (2) Cadot O, Carrère C and Strauss-Kahn V. 2011. Export diversification: what's behind the hump? *The Review of Economics and Statistics*. 93(2): pp.590–605 (right-hand side graph).

Note: In the graph on the right, the solid line represents the number of new products, while the dotted line traces the value of new products.

Abbreviations: GDP = gross domestic product per capita, PPP = purchase power parity.

34. Later, many studies focused on studying this relationship using different data sets, mostly by regressing export concentration and GDP per capita, and found the same trend (Imbs and Wacziarg, 2003; Klinger and Lederman, 2006; Cadot et al., 2011a). Figure 1 shows similar trends between the number of new export products and GDP. These studies have important implications for developing countries. As pointed out in a joint study conducted by the United Nations and the Organisation for Economic Co-operation and Development (OECD) on the African economy, these findings add weight to the case for diversification and serve as a caution against the hasty pursuit of specialization when economic growth levels are not sufficiently high (OECD and United Nations, 2011).
35. The real exchange rate, inflation, net inflows of foreign direct investment (FDI), terms of trade, and investment as a share of GDP are the macroeconomic variables that may drive economic diversification.
36. An overvalued exchange rate discourages investors from new activities owing to reduced profitability. Inflation is expected to reduce predictability and thus deters private sector development.
37. FDI has been found to affect different sectors differently depending on the choice of the investor in selecting the sector. Amighini (2014) found South–South FDI to have a different impact from that of North–South FDI in the continent of Africa. South–South FDI accelerates structural transformation by fostering diversification in key low-tech industries such as agro-industry and textiles and raises the average quality of manufacturing exports. However, there is strong evidence that FDI affects the sectoral composition of manufacturing employment and increases the horizontal diversification<sup>13</sup> of exports. The actual magnitude of the effect varies greatly across countries depending on the existing stock of FDI and the stage of diversification, giving rise to an almost inverted U-shaped relationship.
38. Terms of trade are represented by the ratio of the price of exporting goods and services (index of export prices) to that of importing goods and services (index of import prices). Higher terms of trade may raise export concentration as factors of production are reallocated to the few main sectors for which output prices have increased. On the other hand, higher terms of trade can lead to greater export profitability and result in higher diversification.
39. A high share of capital investment, as a percentage of GDP, has a positive impact on diversification.

### B3. Non-economic determinants

40. Diversification of exports is also affected by export volume in a monopolistic competition scenario. The ratio of exports to domestic products is directly related to the ratio of exports to domestic consumption or sales. Therefore, export volume also affects the diversity of exports.
41. In addition, distance between markets and the size of destination markets (country size) affect the diversity of bilateral trade (Amurgo-Pacheco and Pierola, 2008; Navarro-García, 2016). They are considered to be the most relevant and robust determinants of export

13 Horizontal diversification entails seeking new opportunities for new products beyond the traditional sector. In comparison, vertical diversification extends the production line by using the output of one activity as the input to another, thus upgrading the added value of the production.



diversity, once GDP per capita is controlled (Parteka and Tambari, 2008). These findings are consistent with an earlier study that showed that distance to trading centres and market access (through bilateral and multilateral trading arrangements, i.e. trade liberalization) are key determinants of diversification (Dutt et al., 2009).

#### B4. Economic reforms

42. Trade liberalization (i.e. the removal or reduction of barriers to trading between countries) facilitates competition and investment and contributes to creating jobs and increase in income (OECD, 2011). Trade liberalization or open access to markets is usually measured as a ratio of exports and imports to GDP. Trade liberalization brings benefits to consumers because of the availability of imported products at low cost. Companies also benefit by having more opportunities to export. These constitute short-term gains during economic crisis. Long-term gains come from the reallocation of labour resources across sectors and from labour productivity growth (OECD, 2011). Access to open markets also has positive impacts on the total factor of productivity, thus increasing the number of firms that are capable of exporting and hence providing the potential for increased export diversification (Agosin, 2012; Melitz, 2003). A recent study using a steady-state model observed that trade openness had a positive impact on export performance in OECD member countries (Ratnaik, 2012).
43. Access to finance is measured as the share of domestic credit to the share of private sector credit in GDP. The value can be extracted from the World Development Indicators database of the World Bank. Firms obtaining financial services have positive impacts on export diversification. Small and medium-sized enterprises' access to finance has been identified as a strong constraint and many policies and initiatives are being implemented to improve access (International Finance Corporation, 2013; European Commission, 2016).

#### B5. Structural factors

44. Structural factors, including a country's population, human capital and quality of institutions, have a positive impact on economic diversification. Diversification increases with increasing population as local firms have access to a larger market and thus benefit from economies of scale. Human capital allows economies to change their specialization patterns from primary commodities towards more knowledge-intensive manufactured goods. Political and economic institutions foster business confidence and cultivate the development of new business activities by creating a friendly investment environment.

#### B6. Structural factors Climate change and mitigation policies

45. Economic diversification strategies are being increasingly implemented by countries that are vulnerable to climate change and whose economies are driven primarily by sectors that are sensitive to climate change and mitigation policies, such as tourism, agriculture, fisheries, forestry and energy production.
46. In this context, countries diversify their economies either by expanding to new industrial sectors or by promoting adaptation measures in vulnerable sectors to increase resilience within those sectors.

Table 1

## Drivers and their impacts on economic diversification

Determinant	Impact on economic/export diversification
Economic reforms: Trade liberalization and access to finance	Positive driver of export diversification at both intensive and extensive margins, including unilateral trade liberalization
Economic determinants: Income (gross domestic product (GDP) per capita) and productivity	Positive; quadratic relationship between the Theil index and GDP per capita is mainly driven by the extensive margin
Macroeconomic variables: Real exchange rate, inflation, terms of trade and preferential market access	Preferential market access has an impact on both intensive and extensive margins
Net inflows of foreign direct investment (as percentage of GDP)	Concentrates export value on some products and thereby increases concentration on intensive margin
Investment as a share of GDP	Positive
Structural factors: Country's population, human capital, quality of institutions and education	Quality of institutions, larger population and education have positive impacts; about 10 per cent increase in years of schooling decreases Theil index by 1.1 per cent and number of products
Infrastructure	Better infrastructure increases diversification on both intensive and extensive margins Once GDP per capita is controlled, infrastructure still appears to be an important driver of diversification; a 10 per cent increase in infrastructure decreases Theil index by 0.7 per cent
Non-economic determinants: Volume of products, number of products and volume of trading market	Positive
Remoteness (distance between trading markets)	Negative (more remote, low diversification, high concentration index), especially for extensive margin and number of products

Sources: (1) Longmore R, Jaupart P and Cazorla MR. 2014. Toward Economic Diversification in Trinidad and Tobago. World Bank Policy Research Working Paper No. 6840; (2) Cadot O, Carrère C and Strauss-Kahn V. 2011. Trade diversification: drivers and impacts. In: M Jansen, R Peters and JM Salazar-Xirinachs (eds.). Trade and Employment: From Myths to Facts. International Labour Office and European Commission.

## C. Tools and methods for measuring economic diversification

47. Economic diversification and growth of non-extractive sectors and economic competitiveness are important development objectives of resource-rich countries and many development banks, including the World Bank. However, there is neither common definition of diversification nor metrics to measure it. International organizations monitor and publish diversification index values for countries around the world. Empirical research on international trade, international specialization patterns and concentration indices continues and uses a wide array of statistical tools, ranging from simple descriptive indicators to complex econometric techniques. Yet there seems to have been no agreement on which index is best, although the empirical results depend heavily on the statistical methods and measures employed.
48. From the response measures perspective, analysing economic diversification at the national level adds value to planning policies aimed at increasing the diversification of sectors or countries affected by the impacts of the implementation of response measures.
49. This section synthesizes technical information that could be useful for quantifying and analysing economic diversification. The information in this section has been sourced from the academic literature and technical reports of professional organizations<sup>14</sup> specialized in studying economic diversification. The content of this section has also been derived from a study conducted by the State of Hawaii, which focused on economic diversification at the state or regional level and organized the methodologies for measuring economic diversification into eight categories (Research and Economic Analysis Division of the State of Hawaii, 2008).

### C1. Measurement methods

50. Most of the theories used to measure the level of economic diversification link it to levels of employment, exports or income. Economic diversification can be measured as the share of sectors in GDP, the share of sectors in exports (export concentration), the dependence of a country on the export of a good or commodity, and the employment share of sectors.
51. The measurement of export concentration is considered to be a reliable proxy to measure economic diversification.
52. In general, the indices can be classified into two groups: one group that measures a country's absolute specialization (e.g. ogive index, entropy index, Herfindahl-Hirschmann index, Gini index, diversification index); and a second group that measures a country's economic structure from a reference group of industries (e.g. Theil index, relative Gini index, inequality in productive sectors). Indices that measure absolute specialization indicate the level of specialization in a country (e.g. if a small number of industries exhibit high shares of the overall employment of the country or the income of the country). For example, Italy specializes in textiles, most GCC countries in oil products, Scandinavian countries in the production of pulp and paper,

and most developing countries in agriculture and food products.

53. The measurement methods can also be classified by the theoretical concept that they apply to measure diversification.
54. The characteristics of economic diversification measurement tools and indices are summarized in table 2.
- a. Industrial organization theory (absolute specialization indices)
55. This theory assumes that the organization of the industrial sector in a country accounts for its level of economic diversification. A greater number of sectors in a country represents less market concentration meaning higher diversification. More diversified sectors (i.e. less concentrated) are more competitive (Scherer, 1980). The common empirical methods under this theory are the ogive index, the entropy index, the Herfindahl-Hirschmann index and the Gini index, which measure absolute specialization.
56. The Herfindahl-Hirschmann index (HHI) is widely used to measure market concentration and also economic diversity. It is further used for macroeconomic specialization analyses. It measures the extent to which a particular economy is dominated by a few sectors (i.e. if a monopoly exists) and is calculated as follows:

$$\text{Herfindahl-Hirschmann index} = \sum_{i=1}^n S_i^2$$

where  $S_i$  is the share of economic activity in sector  $i$  of the total economy and  $n$  is the number of sectors in the economy (e.g. the share of exports by sector  $i$  in the total exports or the share of employment by sector  $i$  in total employment). The value of the index ranges from zero to one. A country with a perfectly diversified economy will have an index close to zero. A higher value indicates more concentration or greater specialization. The share of each industry is squared ( $S_i^2$ ), which brings more weight to larger firms in the final estimation. This could be because HHI also aims to determine if a monopoly exists.

57. When HHI is calculated as a measure of diversity, total HHI diversification can be split into intersectoral HHI diversification and inter-industry HHI diversification (Acar and Sankaran, 1999).
58. The ogive index of economic diversity measures the distribution of economic activity<sup>15</sup> among sectors in a country and is calculated as follows (McLaughlin, 1930; Tress, 1938):

$$\text{Ogive index} = \sum_{i=1}^N \frac{(S_i - 1/N)^2}{1/N}$$

where  $N$  is the number of sectors in a country and  $S_i$  is the sectoral share of economic activity for the  $i^{\text{th}}$  sector. An even distribution of economic activity among sectors represents higher economic diversity. With  $N$  sectors, an equal distribution implies that  $S_i$  is equal to  $1/N$ , the ideal share for each sector, and the ogive index equals zero, meaning perfect diversity. The ogive index can also be explained as a linear transformation of HHI (Palan, 2010).

59. The entropy index, also called the Shannon entropy index (SEI), compares the existing

economic activity distribution among industries in a country with an equi-proportional distribution, and is calculated as the negative sum of employment shares multiplied by the natural logarithm of employment shares of each single industry, as follows:

$$\text{Entropy index} = \sum_{i=1}^n S_i \ln\left(\frac{1}{S_i}\right) = - \sum_{i=1}^n S_i \ln(S_i)$$

where  $n$  is the number of sectors,  $S_i$  is the share of economic activity in the  $i$ th industry and  $\ln$  is the natural logarithm. Considering that equally distributed economic activity is considered more diverse, higher entropy index values indicate greater relative diversification, while lower values indicate greater relative specialization. If employment is used as an indicator of economic activity, the equal distribution of employment among all industries will result in a higher entropy index. The minimum value of zero would occur if employment were concentrated in one industry (i.e. maximum specialization).

60. Because SEI measures in logarithmic form, the relative weights of large industries are reduced compared with the HHI or the ogive index. This means that countries that are specialized as a result of having large industries will be shown as being more specialized by HHI and the ogive index than by SEI (Palan, 2010).
61. HHI is an easily computable index and is regarded as superior to other indices used to measure absolute specialization. SEI can be problematic if industries with an employment share of zero are contained in the sample. The Gini index is more time-consuming to calculate and fails to meet other criteria for preferred indices (Palan, 2010).
- b. Economic base theory (export base theory)
62. Export base theory assumes that economic growth is driven by export demand. This hypothesis was derived by Frank Hachman. The Hachman index is a measure of how closely the employment distribution of a State or region resembles that of the nation as a whole (Hachman, 1994). The index value varies between zero and one, where one means that the State or region has exactly the same industrial structure as the nation and zero means that it has a completely different industrial structure. The Hachman index is calculated as follows:

$$\text{Hachman index} = \frac{1}{\sum_{i=1}^N [S_i^{\text{state}} / S_i^{\text{Country}}] \times S_i^{\text{state}}} = \frac{1}{\sum_{i=1}^N [LQ \times S_i^{\text{state}}]}$$

where  $S_i^{\text{state}}$  is the State's share of employment in the  $i$ th industry,  $S_i^{\text{Country}}$  is the country's share of employment in the  $i$ th industry,  $N$  is the number of industries and  $LQ$  is the location quotient for that State in the corresponding industry.

63. The location quotient (LQ) quantifies the concentration of a particular industry, cluster or occupation in a region compared with its concentration in the country. In more exact terms, LQ is a ratio that compares a region with a larger reference region according to some economic activity (Sentz, 2011).

64. Suppose X is the amount of some economic activity in a region (e.g. oil industry jobs) and Y is the total amount of economic activity in the region (e.g. all jobs). The ratio of X to Y (X/Y) is then the 'concentration' of oil jobs in the region. If X' and Y' are similar data points for a larger reference region (e.g. the country), then the LQ or relative concentration of oil jobs in the region compared with in the country is (X/Y)/(X'/Y').
65. LQ can also be used by a country to determine the composition of a particular region. The sectors with LQ greater than one are considered as export (basic) sectors and part of their output is assumed to be exported outside the region. Sectors with LQ less than one are known as non-basic (indigenous) sectors and their outputs are assumed to be sold within the local economy.
- c. Regional business cycle theory
66. Similar to export base theory, regional business cycle theory assumes economic instability is driven by export demand and measures instability in terms of the difference between stable and unstable sectors. To test this relationship, a region's share of stable or unstable sectors is used as a measure of economic diversity.
67. The economy in a region is considered stable if its sectoral composition is similar to that of the nation. This hypothesis is tested by the national average index (NAI), which is calculated as follows:

$$NAI = \sum_{i=1}^N \frac{(S_i^{State} - S_i^{Country})^2}{S_i^{Country}}$$

where  $S_i^{State}$  is the  $i^{th}$  sector's share of economic activity in the State or region,  $S_i^{Country}$  is the country's average share of economic activity in the  $i^{th}$  sector and N is the number of sectors. As the region's share of economic activity approaches the country's share for all sectors, the NAI approaches zero. As the region's share diverges from the country's economy, the NAI becomes increasingly larger.

68. NAI can be considered a relative measure of economic diversity because it measures the amount of disparity between a country's and a region's industry distribution.
- d. Portfolio theory
69. Although portfolio theory was originally applied to financial assets, Conroy (1974, 1975) extended its usage to the analysis of economic diversification. Following the portfolio concept of investments, if every sector is considered an individual investment in a region, the bundle of sectors represents a portfolio of investments in the region studied. Similar to financial investments, an economic portfolio of sectors has a relationship with expected returns and associated risk, where expected returns may include income, employment, products, exports, industries, etc., and risk includes economic instability.
70. Every region has a limited set of resources to be utilized. In this context, economic diversification aims to reduce instability in aggregate returns to the region by allocating its limited resources to the portfolio of sectors.
71. By capturing the characteristics of individual industries and inter-industry relationships relating to regional growth and instability, the portfolio framework assists policymakers

in developing appropriate diversification strategies that can serve the purpose of stimulating economic growth and stabilizing the economy.

72. A region's portfolio variance, representing regional instability, is calculated as follows (Markowitz, 1959):

where  $S_i$  and  $S_j$  are the shares of economic activity (employment, income, output,

$$\sigma_p^2 = \sum_{i=1}^N S_i^2 \sigma_i^2(X_i) + \sum_{i=1}^N \sum_{j=1, j \neq i} S_i S_j \sigma_{ij}(X_i, X_j)$$

$X_i$  of the  $i^{\text{th}}$  and  $j^{\text{th}}$  sectors,  $\sigma_i^2$  is the variance of economic activity in the  $i^{\text{th}}$  sector and  $\sigma_{ij}$  is the covariance of economic activities in the  $i^{\text{th}}$  and  $j^{\text{th}}$  sectors. The regional instability is the weighted sum of the variances (individual sector fluctuations) and covariances (intersectoral fluctuations) for a given economic activity. Thus, the regional economic stability is sensitive not only to the fluctuations of the individual sectors but also to the correlation of fluctuations between sectors.

73. Lower portfolio variance indicates a more diversified economy. Studies have found that portfolio variance is a superior measure of economic diversity in explaining regional economic instability compared with other measures of diversity (e.g. the ogive index, entropy index and NAI) (Conroy, 1974; Brewer and Moomaw, 1985; Wundt, 1992).

74. However, portfolio variance cannot be used to establish a relationship between diversity and instability because it does not measure diversity independent of instability (Sherwood-Call, 1990).

e. Location theory

75. Location theory is concerned with the spatial distribution of economic activity, including the development of spatial clusters. The theory holds that the cost of production is lower in industrial clusters, and this is an important reason for specialization and regional competitive advantage (Hoover and Giarratani, 1985). Economic clusters also benefit from linkages between a region's firms and sectors. However, a diverse economy with unlinked firms and sectors may also benefit from economic clusters.

f. Economic development theory

76. According to economic development theory, economic diversification is driven by simultaneous changes in production, consumption and trade patterns. It has been argued that diversification may be expedited by forces of unbalanced growth, especially the faster growth of sectors with high income elasticity of demand<sup>16</sup>. To evaluate growth and instability impacts, knowledge of the types of sectors and intersectoral linkages is needed. Economic diversification can be viewed in terms of changes in an input-output (I-O) matrix or based on intersectoral linkages detailed in an I-O matrix.

g. Input-output model: a unified framework

77. Siegel et al. (1995) suggested an I-O model that incorporates elements of portfolio theory be used as the integrating framework for the analysis of economic diversity

16 A measurement of how much percentage change in demand is due to every 1 per cent increase or decrease in consumer income.

and diversification.

78. The I-O model provides a comprehensive framework for modelling not only a region's economic structure in terms of production, consumption and trade relationships (including the level and mix of exogenous final demands), but also the region's economic performance as a direct function of its economic structure.
79. The I-O framework enables the growth and stability impacts of different diversification strategies involving changes in the level and mix of exogenous final demands, for example an export promotion programme, to be compared. It is also possible to determine similar impacts resulting from changes in I-O relationships in the I-O matrix.
80. Import substitution is a popular diversification strategy and its impacts can be modelled using the I-O model. These impacts can be measured for the economy as a whole as well as for specific sectors. The sectoral distribution of growth and stability impacts can also be derived. This will allow policymakers to rank different policies on the basis of their growth and stability objectives and preferences with respect to growth and stability trade-offs.
81. The main limitation of using this approach on a regional basis is the lack of consistent I-O tables over time. Regional I-O models (e.g. IMPLAN<sup>17</sup>, REMI<sup>18</sup> and RIMS<sup>19</sup>) can provide the necessary data to produce the baseline relationship between economic structure and performance, but the problem is the lack of time-series data on exogenous final demands to estimate their expected growth and variance.

---

17 The IMpact analysis for PLANning model uses classic I-O analysis in combination with region-specific social accounting matrices and multiplier models.

18 The REMI model incorporates aspects of four major modelling approaches: I-O, general equilibrium, econometric and economic geography.

19 Rational-driven Evolution and Management Information System.



Table 2

Summary of the characteristics of economic diversification measurement tools and indices

Method	Basis of making judgment on diversification	Relationship between index and diversification
Herfindahl-Hirschmann and ogive indices	Equal distribution of employment across sectors is the highest benchmark of diversification	The lower the value, the more diversified the economy
Entropy index (Shannon entropy index)	Equal distribution of employment across sectors is the highest benchmark of diversification	The higher the value, the more diversified the economy
Hachman index and location quotient	The resemblance of the employment distribution of a State or region to that of the nation is a measure of economic stability	The higher the value, the more stable the economy; a sector with a high value is an export sector
National average index	A region's share of stable or unstable sectors is a measure of economic diversity	As the region's share of economic activity approaches the country's share for all sectors, the index approaches zero
Portfolio variance	Captures the characteristics of individual industries, and inter-industry relationships with regional growth and instability	The lower the variance, the more diversified the economy
Input-output matrix	Economic diversification is viewed as driven by simultaneous changes in production, consumption and trade patterns	Diversification may be expedited by forces of unbalanced growth, especially the faster growth of sectors with high income elasticity of demand
Input-output model: a unified framework	Compares the growth and stability impacts of diversification strategies involving changes in the level and mix of exogenous final demands	Determines the growth and stability impacts of different diversification strategies, resulting from changes in input-output relationships in the input-output matrix

## C2. Choosing the right tool: the policymaker perspective

82. Certain criteria need to be satisfied by the measurement index for it to be applied successfully to economic analysis for planning policies for diversification, including simplicity, affordability, suitability for international and temporal comparison, and transparency.
83. Concentration ratio and HHI are the simplest and most affordable indices owing to their ease of comprehension and availability of data. In terms of suitability for comparison and transparency, most of the indices can be used owing to the homogeneous and verifiable manner of the export data collected by UNCTAD (Chris, 2008). An export diversification index for countries across the world is published by the World Bank, UNCTAD and IMF<sup>20</sup>.
84. When attempting to measure export concentration, the policymaker has the choice of absolute and relative measures. In some ways, absolute measures are superior to relative measures because they take account of exports from new product groups. Moreover, absolute measures are better than relative measures because two countries could have identical concentration ratios but different product shares (Chris, 2008).
85. While assessing measurement methods against axioms for absolute measurement, Palan (2010) found that HHI met all axioms, and the entropy index followed as the next best index in meeting axioms. The studied axioms included anonymity, progressive transfers, decomposability, splitting or merging, industries with a share of  $i$  industry ( $S_i$ ) of zero, and bounds.
86. The policymaker has a choice between summary measures and discrete measures. The main discrete measure, the concentration ratio, has a number of defects, namely: (1) it ignores relative size variations in commodity groups; (2) it could equally describe a country exporting one product and a country exporting  $X$  product groups with similar shares; and (3) it neglects the non- $X$  products in a country's export portfolio.
87. In view of these points, country concentration results should ideally be based on summary measures rather than discrete or semi-discrete measures. In this way, it is possible to obtain a clearer picture of the peaks and shifts in country concentration over time.
88. Nevertheless, summary measures can also be defective. For instance, the same HHI values can be obtained for different product groups with different shares.
89. In this regard, there are a number of axioms that describe the desirable features that a concentration measure should have:
  - a. Concentration curve ranking criterion: if the concentration curve of country A lies above the concentration curve of country B, country A's exports are more concentrated than country B's;
  - b. Export transfer principle: the value of the measure of concentration should change if countries start exporting products that previously had smaller market shares;
  - c. Export of new products: if a country starts exporting a new commodity previously untapped and this new product's export share is below the average size of existing product shares, the concentration should be reduced, always assuming that the

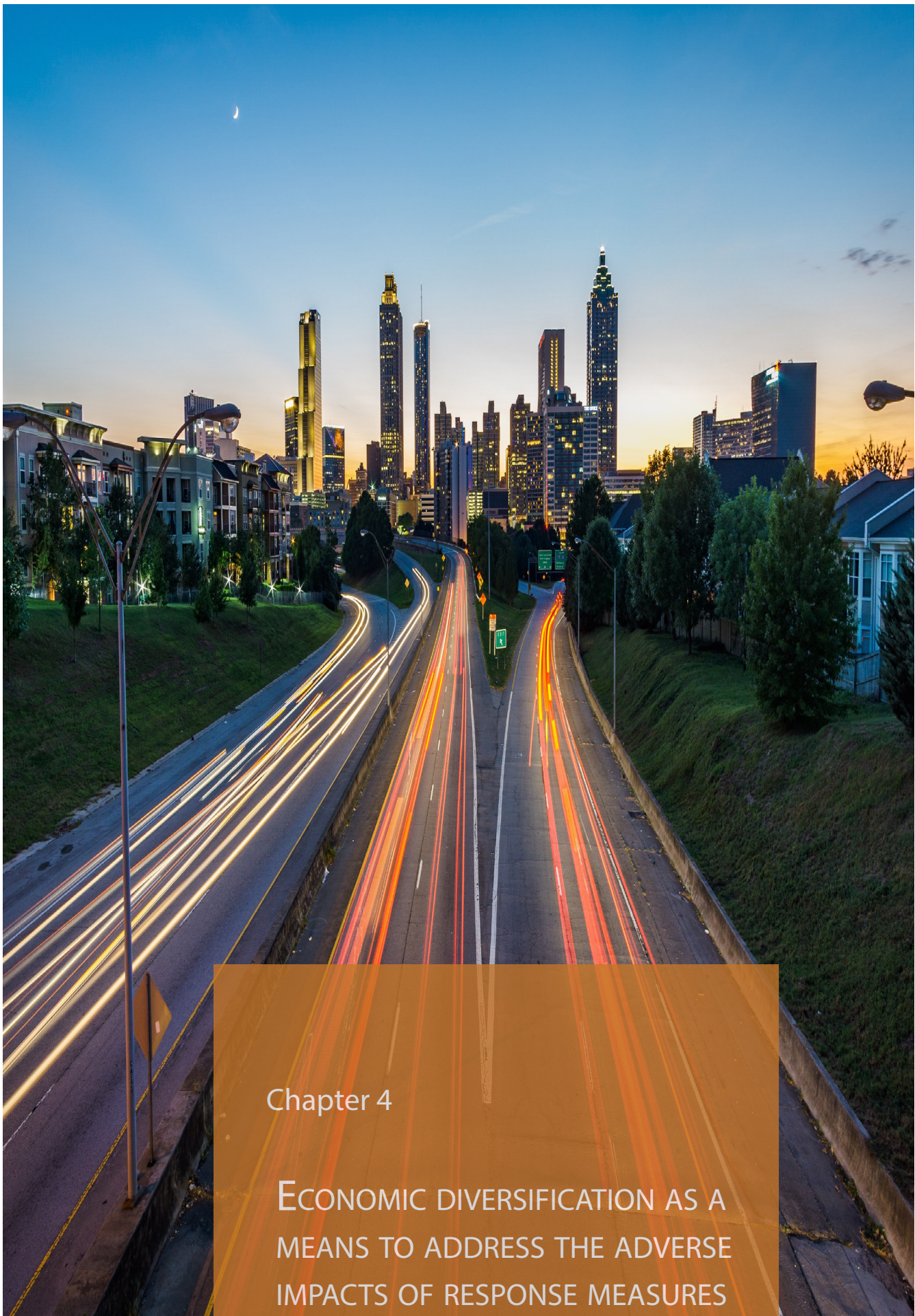
20 See table 4.1 of the UNCTAD Handbook of Statistics 2015 <<http://unctad.org/en/Pages/Publications/Handbook-of-Statistics.aspx>> and <<http://www.imf.org/external/datamapper/index.php?db=SPRLU>>.

relevant shares of existing product groups remain unchanged.

90. HHI satisfies most of the axioms for effective measurement of export concentration. However, because summary measures also have drawbacks, there is no optimal measure. The policymaker has to choose according to the specific aspects being researched. It needs to be stated that concentration measures should not be used in isolation because, first, there could be interlinkages between product groups and, second, concentration measures will reveal only the export pattern of a country in previous time periods – they do not take account of the complexities of the changing economic environment (Palan, 2010).
91. However, for advanced planning, measurement of export concentration only is not sufficient. The policymaker needs to analyse diversification and its linkages with economic growth and employment. For example, in countries where the economy is dominated by exports of products from one sector, the export diversification indices are expected to be closer to one, signifying less diversification. Thus, the ogive, entropy and HHI indices are not useful: they will provide only an aggregate picture of industrial structure without information on the cause of changes. For example, increased diversification in a country using these indices may be a result of a decrease in total exports and not of export gains, which are the desired outcome. Therefore, these indices do not assist in planning which industries should be targeted for recruitment, retention and expansion for enhancing economic diversification for promoting economic growth and stability.
92. In order to plan or monitor the performance of the economy, analytical tools that focus on specific industries are more useful (e.g. LQ, shift-share analysis and input–output models) (Research and Economic Analysis Division of the State of Hawaii, 2008).
93. LQ can assist in: determining which industries make the regional economy unique to the region; identifying the extent of exports of an industry and which industry exports the most in the region; identifying emerging export industries in the region; and identifying endangered export industries that could erode the region's economic base.
94. Industries with high LQ are typically (but not always) export-oriented industries. These are important because they bring money into the region, rather than simply circulating money that is already in the region.
95. Industries that have both high LQ and relatively high total job numbers typically form a region's economic base. Policymakers need to pay particular attention to these industries not only for the jobs that they provide but also for their contributions to dependent sectors.
96. LQ analysis can be extended with two pieces of information: size of industry, cluster or occupation in terms of jobs; and percentage change in LQ over a given time period. A high-LQ industry with a small number of jobs may be an export-oriented industry but is not vital to the region's economy. A high-LQ industry with a large number of jobs and with declining LQ over time, however, endangers the regional economy. This aspect of LQ can be used for impact analysis. For example, if it is identified that one particular industry is affected by the implementation of a response measure or by any

domestic policy, the policymaker can use LQ to assess whether that sector is critical for the region.

97. Combining LQ with shift-share analysis has been found to illustrate a framework for cluster identification and analysis. Applying this approach to detailed industry-level data may help to identify and facilitate understanding of emerging and growing industries. This is helpful for the formulation of appropriate policies and programmes to support the growth of identified emerging and growing industries (Research and Economic Analysis Division of the State of Hawaii, 2008).
98. Instead of aggregate measures of economic diversity, a better approach from a policy perspective can be to develop an index (such as share in total employment) for targeted clusters of industries and to relate that to the overall performance of the country's economy. Because each country has specific national circumstances, more country-specific case studies are required in order to understand the emerging sectors of the economy and how policies can be planned to support their growth to attain the greater objective of sustainable economic growth.



## Chapter 4

ECONOMIC DIVERSIFICATION AS A  
MEANS TO ADDRESS THE ADVERSE  
IMPACTS OF RESPONSE MEASURES

99. It should be noted that there are ways other than economic diversification to reduce the negative impacts associated with response measures:
- a. States can invest some portion of the rents from the dominant economic activity into a wealth fund, the purpose of which is both to engage in countercyclical spending and to invest in the domestic economy in ways that increase the competitiveness of other tradable sectors;
  - b. States can blunt the impacts of the price shocks associated with response measures through reforms to ensure exchange rate flexibility and by shunning the dollarization of the economy;
  - c. Transparency in the administration of the collection and disbursement of the rents of the dominant economic sector can help to avoid the negative institutional impacts of rent-seeking behaviour.
100. Some of these measures begin to touch on the central challenge of economic diversification, which is more than simply shielding an economy against negative impacts; it involves moving towards ensuring that such impacts do not occur by reducing the problematic dependence on a narrow range of export activities. Relevant questions are, for example, where exactly the investment of resource funds should be directed, and if governments should be 'picking winners' – deciding which sectors offer the best potential for diversifying their economies and investing accordingly.
101. This discussion also relates to the realm of industrial policy. Until recent years, the consensus was that industrial policy was at best a risky business for governments, who were poor at picking winners and losers and typically weak in the face of the entrenched interests that they created with their largesse. But this thinking has evolved, in part in the face of the rise of the emerging developing countries that have made judicious use of industrial policy to transform their economies (Amsden, 2001).
102. A more nuanced argument now seems to prevail, which takes note of both the successes and the failures of the past and seeks ways in which to learn from the former and avoid repeating the latter (Rodrik, 2004; Cimoli et al., 2009). The World Bank, once a bastion of the consensus against this sort of government intervention, recently published a book on inclusive green growth with a how-to chapter on green innovation and industrial policies (World Bank, 2012).

## Box 1

## Economic diversification: how easy is the task?

It must be clear that there is no miracle recipe for achieving diversification overnight. Fostering diversification will be a long, drawn-out process and should hence be seen as a long-term goal. Second, there is no shortage of examples of failed diversification policies and economists know fairly well on the basis of international experience what does not work. Fiscal irresponsibility as well as large-scale state investment in pet industrial projects ranks at the top of the list of what should be avoided. Unfortunately, there is less agreement among economists about what does work, as policies that work well in one place often fail dramatically elsewhere. Indeed, failures have been so common (and sometimes so spectacular) that, in recent years, economists have often preferred not to give any advice at all with respect to diversification policies.

Source: Rudiger A. 2006. How to sustain growth in a resource-based economy? The main concepts and their application to the Russian case. OECD Economics Department Working Paper No. 478.

103. It is particularly important to note that there is no single policy prescription that will work in all cases (see box 1). There are, however, some principles that are widely accepted, including investment in infrastructure, support for agriculture and the promotion of private sector investment in the non-extractive sectors. Many governments have attempted a proactive industrial policy through a system of targeted subsidies and incentives.

## A. Sectoral vulnerability and economic diversification strategy

### A1. Vulnerability due to narrow export profile

104. Many developing countries have progressed in reducing their dependence on a small basket of product exports. The share of product exports (metals, minerals and agricultural products) reduced from 75 per cent in 1980 (Collier and Dollar, 2001) to

56 per cent in 2007<sup>21</sup>. However, this diversification is uneven in terms of sectoral coverage and has mostly taken place in the agriculture sector, while metal, mineral and energy exporters remain overdependent on narrow baskets of exports.

105. In terms of regional coverage, improvements have been marked in Asia and in some parts of Latin America, but reducing dependence has proved more difficult in Africa, the Middle East and Central Asia. For the Middle East and North Africa, fuel exports as a percentage of merchandise exports dropped in 2009 from 72.2 per cent in 1999 to 69.2 per cent only<sup>22</sup>.
106. The problems inherent in dependence on a small number of product exports are numerous, including lower levels of economic growth (Birdsall and Hamoudi, 2002), but the primary concern is the vulnerability to price shocks, given the historically cyclical pattern of product price swings (Adler and Sosa, 2011).
107. This way of framing the issue does not reflect perfectly the primary concern of States vulnerable to the impacts of response measures, but it is nonetheless relevant. Whether the effects come as a result of cyclical swings or of policies enacted in key markets, the final effect is a loss of export revenue as a result of falling prices. With these similarities and differences in mind, the lessons learned from product dependence can be viewed as instructive in the challenge of achieving economic diversification.
108. The key conclusions put forward by most analysts involve a focus on policies and institutions as a mediating force in determining how serious a problem product dependence can be. Adler and Sosa (2011) compared the experiences of Latin America with emerging Asia and found that, while product dependence is an important ingredient of vulnerability to price shocks, the ultimate degree of vulnerability is determined by the flexibility and quality of a country's policy framework. The study also found that a number of policy features serve as shields against the negative effects of price shocks, including prudent fiscal management during boom periods and exchange rate flexibility. Other policies, such as financial dollarization, tend to serve as amplifiers of negative effects.
109. In fact, the challenge of addressing product dependence is part of the broader challenge of economic development of ensuring a stable economic base for the long-term sustainable growth of the economy.

## A2. Vulnerability due to response measures

110. Many developing countries are overdependent on the export of only a few types of commodities (e.g. many LDCs are dependent upon different agricultural commodities and many African and GCC countries are resource-dependent). The country is affected if those sectors (i.e. the agriculture sector and the resources sector) suffer economically as a result of response measures in their key target markets.
111. A number of types of response measure that might be enacted by Annex I Parties and that might have impacts outside the enacting country are listed in table 3<sup>23</sup>.

21 According to information in the World Development Indicators database.

22 Idem

23 See document FCCC/KP/AWG/2009/INF.3.



Table 3

Selected response measures and their impacts

Policy	Key impacts
Domestic carbon taxes and cap-and-trade schemes	Loss of market share for foreign exporters of conventional fuels
Subsidies for renewable energy technology producers	Loss of market share for foreign competitors (renewable energy technology and conventional fuels)
Standards and labelling requirements	Loss of market share for producing firms
Border carbon adjustment	Loss of market share for foreign exporters in energy-intensive trade export sectors
International carbon taxes or levies	On aviation: loss of tourism revenue for airline destinations and loss of market share for air-freighted goods
	On maritime transport: reduced trade flows

112. To summarize, the export sectors that might be vulnerable to the impacts of response measures include: conventional oil, gas and coal fuels; renewable energy technologies; consumer goods subject to eco-labelling and standards, including agriculture sector products; energy-intensive trade-exposed goods (aluminium, iron and steel, cement, chemicals, and pulp and paper); air-freighted goods; tourism; and marine-transported goods, including bulk agricultural commodities, such as cocoa.
113. Only a few of the above-mentioned sectors are relevant in the context of the need for economic diversification. Overdependence is not a significant problem for some sectors, such as renewable energy technologies and air-freighted goods. Maritime transport is an interesting case because some 90 per cent of all international trade takes place by that mode. Given the widespread nature of maritime transport in international trade, economic diversification (i.e. moving away from a dependence on maritime transport) does not seem to be a feasible or desirable solution to the impacts that any maritime levies might impose.
114. This leaves an important subgrouping of export sectors (and, by implication, producer countries) for which overdependence is a problem, which might be subject to significant impacts of response measures and for which economic diversification might be a solution:
- a. Conventional oil, gas and coal fuels;
  - b. Energy-intensive trade-exposed goods (aluminium, iron and steel, cement, chemicals, and pulp and paper);

- c. Tourism;
  - d. Agriculture.
115. Clearly, any in-depth approach to economic diversification in the context of response measures would involve as a first step a more rigorous analysis of vulnerable sectors and countries, but as a rough indicator it can be safely asserted that the above-listed sectors are the key sectors to be further analysed in terms of their potential economic diversification in response to the impacts of response measures.
116. Many of the vulnerable sectors are characterized by high levels of rent. Oil and gas in particular sell at global market prices, with great variability of costs across producers. Tourism is often founded on fixed natural attractions and tourism operations that are based on those attractions are often operated on a permitted concession basis. In both cases, the result can be high rents accruing to some producers. Agriculture is another important sector as, despite increasing reliance on resource rents, it is still the sector that employs the largest share of the labour force.
117. In that context, some of the literature on the resource curse may be relevant, as the key ingredient of the resource curse is overdependence on high-rent exports. The focus of the resource curse scholarship has been almost exclusively on States dependent on mineral or oil exports, where rents are generally higher than is the case for other types of commodity (e.g. agricultural), and there has been little focus on tourism exporters; however, many of the observations and lessons learned are relevant to tourism as well.
118. Literature on the resource curse was spawned by the observation that countries rich in mineral or oil resources do not seem to show higher rates of economic growth, and in some cases show lower rates, than countries without such resource endowments (Sachs and Werner, 1995; Auty, 2004; Ross, 2001; Stevens, 2003). The analysis of the problem has tended to centre on three aspects, with various authors arguing for the greater significance of one or another:
- a. The problem of volatility: the product dependence subjects States to the cyclical nature of global product markets. Volatility is a recognized problem for the tourism industry as well, as demand is highly income-elastic and subject to changing tastes;
  - b. 'Dutch disease': the appreciation of exchange rates arising from resource booms, the competition for domestic labour and materials and the subsequent crowding out of other tradable sectors;
  - c. Institutional impacts: the damaging effects of rent-seeking that can be spawned by the presence of high-resource rents.
119. The problem of volatility is most acute in cases where the export concentration is particularly pronounced (UNCTAD, 2005). Ahmadov (2012), Huchet-Bourdon (2011) and Shaxson (2005) suggest that it may be a particularly important problem for oil exporters and agriculture. But tourism is also vulnerable: it has a high income elasticity of demand and any economic downturns or upswings in export markets are keenly felt in the sector.
120. The agriculture sector started facing the problem of volatility after the Marrakesh

Agreement in 1994<sup>24</sup>, as a result of the increased liberalization of agricultural products. Since the Agreement, economic shocks in international markets have been transmitted much more rapidly to domestic markets than before. In this context, domestic prices exhibit volatility that agricultural producers did not face in the past, with low-income countries suffering the most. The high correlation with the crude oil price for some agricultural products during the 2000s may confirm that biofuel products have played a role in the recent price surges. Agricultural price volatility remains an important policy concern. Further periods of sharp price surges and declines similar to those that occurred in 2006–2009 cannot be ruled out, with their adverse implications for food prices, food security and farm incomes (Huchet-Bourdon, 2011).

121. There are several key concerns with volatility: the direct income losses associated with the falling prices of exported commodities; the constraint of the crippling state of foreign exchange that can follow price shocks; and the deleterious impacts of the shocks themselves, felt in terms of lowered long-term growth and reduced investment.
122. Volatility is essentially considered as a fiscal management issue, calling for prudent fiscal policy in boom times and appropriate spending in bad, to balance out the cycles. Stabilization funds are a frequently used instrument and need to be established to provide insulation against the short-term demands for budget balancing (Rudiger, 2006; Humphreys and Sandbu, 2007).
123. Dutch disease has not been analysed extensively in recent literature. In part this is because, like volatility, it is a straightforward matter of proper economic management: taxing the rents of the ascending industry and distributing them appropriately so as to foster increased competitiveness in other tradable sectors (Usui, 1997; Sachs, 2007). That is not to imply that the task of judicious distribution is a simple one. Rudiger (2006) proposes using the revenue to lower non-wage labour costs across all sectors of the economy, helping to increase productivity across the spectrum of traded goods.
124. It should be noted that the crowding out of other tradable sectors is in itself not necessarily a negative outcome, but rather depends on the relative characteristics of the crowded and crowding sectors. For example, if commodities or tourism exports crowd out manufacturing exports, and if it is assumed that there are positive spillover effects (learning, technology transfer, etc.) that accrue to the manufacturing sector that do not accrue to commodities or tourism, then the final effect is negative. Fossil fuels are not typical commodities, however, and some are much more akin to manufacturing in the technical complexity of their processing. As such, they might be expected to foster spillovers comparable with any fostered by manufacturing activity. Besides, there is no solid consensus in the literature on the presence of spillovers from FDI. For example, Gallagher and Zarsky (2004) concluded that spillover benefits depend on local production, policy or financial conditions. Schiff and Winters (2003) argue the prevailing wisdom that spillovers will occur primarily in the sectors where FDI creates backward and forward linkages.

---

24 The Marrakesh Agreement, signed on 15 April 1994, established the World Trade Organization. The agreement developed out of the General Agreement on Tariffs and Trade, supplemented by a number of other agreements on issues including trade-in services, sanitary measures, trade-related aspects of intellectual property and technical barriers to trade. It also established a new, more efficient and legally binding means of dispute resolution.

125. Institutional impacts arise from the presence of sizeable rents and the diversion of energy from productive activities to rent-seeking (Salah-i-Martin and Subramanian, 2003; Auty, 2004; Pegg, 2006). It has been argued that this has at least two undesirable outcomes: (1) it will necessarily decrease the competitiveness of the sector involved vis-à-vis international competitors; and (2) it provides scope for corruption among those charged with managing the rents. Some have argued that civil unrest and civil war constitute the extreme cases of fallout from battles for resource rents (Collier and Hoeffler, 2004). It has also been argued that the presence of ample rents allows governments to postpone necessary economic and social reforms, in the long run undermining the very human well-being that short-run spending aims to achieve. The arguments on institutional effects have never been alleged or even explored in the context of tourism exports; these effects may be more relevant in the context of extractive industry exports.
126. Managing potential institutional impacts is not as straightforward a proposition as managing volatility and exchange rate appreciation. The specifics of each case will necessarily differ, depending on the social, historical and economic context. Several proposals advocate some form of openness, as for example in the form of increased transparency of revenue streams (Salah-i-Martin and Subramanian, 2003; Global Witness, 2004). Others advocate appropriating most of the rent from oil and mineral development, with the proceeds to be used for general welfare such as social programmes (Rudiger, 2006) or public infrastructure, higher education and science and innovation policies (Sachs, 2007). The challenges here are at least threefold: in setting tax levels that still allow for necessary investments in the sector; in finding programmes that will enhance productivity, such as education and training; and in efficiently and fairly administering the disbursement.
127. Much of the resource curse debate has, unfortunately, tended to polemic sterility, with analysts focusing on whether oil and mineral endowments are necessarily a burden on economic growth. In recent years, however, a more productive line of analysis has emerged that argues as follows (Rudiger, 2006; Maxwell, 2004; Davis and Tilton, 2005; Sachs 2007):
- a. Resource-rich States will continue to exploit their resources;
  - b. Oil and mineral resources are neither a blessing nor a curse a priori, but rather represent potent opportunities;
  - c. The most interesting question is how to successfully exploit the opportunities to create economic development and avoid the pitfalls that others have suffered.
128. The key lessons drawn from the ongoing analysis in this area are instructional for the work on economic diversification and the impacts of response measures. They are, in essence, that overdependence on high-rent sectors raises the stakes, making it imperative to pursue sound fiscal and monetary policy. In addition, the importance of functioning institutions, such as open and efficient bureaucracy and judiciary, is highlighted as a bulwark against the deleterious effects of excessive rent-seeking. Similarly, the implications of product dependence tend towards broader management of the economy to ensure a sustainable base for current and future development.

## B. Policy options for accelerating economic diversification

129. There is no clear consensus on the measures that are necessary to achieve economic diversification. The most compelling conclusion based on recent studies and confirmed by the practical experience of most successful countries, such as Chile, is that the most important step a government can take is to focus on the fundamentals, that is: to maintain macroeconomic stability and improve the business climate (control of inflation, an open trade policy, transparency and good governance, a conservative and countercyclical fiscal policy, a healthy banking sector, etc.); to invest in infrastructure (roads, communication and access to electricity and water); to improve the business climate and encourage private investment; and to invest in people, especially in education at all levels (IEG, 2016).

### B1. Import substitution or export-led policy?

130. Industrialization that is based on import substitution promotes domestic industries to replace foreign-made goods. Export-led industrialization speeds up the industrialization process by opening up domestic markets to foreign competition and by supporting export sectors.

131. In this debate, the economic performance of the newly industrialized Asian economies is often contrasted with the development experience of Latin American and African countries in the 1970s. While larger Latin American countries such as Argentina, Brazil and Mexico had some success with the import substitution strategy, smaller and poorer countries failed to industrialize their economies strictly following inward-oriented policies. In contrast, the successful industrialization experience of some Asian nations, including Malaysia and the Republic of Korea, is largely attributed to their export-promoting policies rather than import-substitution strategies.

132. In terms of policy options, countries that adopted an import-substitution strategy relied on more direct government interventions in the economy, while export-led industrialization is mostly associated with creating incentives that indirectly influence the behaviour of economic agents.

133. At the industry level, the diversification debate boils down to the selection of particular industries that have the potential to expand and ultimately develop sufficient capacity to compete with advanced economies in the global market.

### B2. Soft or hard industrial policy?

134. Soft industrial policy focuses on improving the investment climate by taking measures that will improve investment conditions for a range of sectors and actors, without targeting specific 'winners'. The effectiveness of this sort of policy is not

controversial (Harrison and Clare-Rodríguez, 2010). Examples include: strengthening the banking system; improving access to credit, in particular for small and medium-sized enterprises; making the bureaucracy more efficient; creating a stable macroeconomic environment (low inflation, stable currency, etc.); building critical infrastructure in transport and communications; and removing regulatory barriers to foreign ownership and participation in key sectors. Kaplinsky and Farooki (2011) did not use the 'hard' and 'soft' industrial policy dichotomy when talking about the different types of industrial policy; instead, they proposed a useful division of three levels (see box 2).

#### Box 2

##### Three levels of industrial policy

**Macro policies:** A first level of policies tries to ensure that the macroeconomic conditions are right to attract investment. These policies include fiscal stabilizers to smooth out cyclical swings, monetary policy to combat inflation, an exchange rate policy that does not punish exporters, etc. These policies are sector-neutral in their effects.

**Addressing market failures:** A second level of industrial policies seeks to encourage industrial development by addressing failures of underinvestment. There is a clear need for the State to invest in areas such as infrastructure (e.g. transportation and energy), education, environmental protection, public order, public health and other prerequisites for sustainable investment that would not be provided by the market alone.

**Targeted support:** A third level of industrial policy is more targeted at specific sectors, motivated by the belief that government investment will help unleash latent comparative advantage or will overcome firm-level market failures of underinvestment. In theory, targeted support aims to foster infant industries that will someday become globally competitive and independent of any government support.

135. Hard industrial policy is designed to foster competitiveness in a particular sector and can take the form of sector-specific tax preferences, grants, land grants, low-interest loans, export financing, tariff protection, support for research and development, or government procurement of supported goods or services.
136. The hard policy is still debated (Pack and Saggi, 2006) as the specificity of the measures involved gives rise to certain important risks that are not associated with soft industrial policy.
137. Primary concerns with hard policies include the fact that supported infant industries may remain perpetual infants, unable to survive without support, but creating established vested interests that pressure governments to maintain the costly lifelines. That is,

governments may 'pick wrong' and never correct their error. Also of concern is that when governments do pick wrong, the resources directed to support one type of economic activity will penalize other economic activities that might in fact be more promising.

138. There are a number of design considerations that might help avoid such outcomes. Newfarmer (2011) proposed a set of 10 guiding precepts for successful industrial policy, drawn from experience to date:
- a. As a first step, remove policy, institutional and cost elements in the value chain that limit production and exports, such as perverse subsidies;
  - b. Be transparent: quantify amounts in budget to parliament, beginning by quantifying the industrial policy that you have;
  - c. Incentives or subsidies should be provided only to 'new' activities, which are the real target for support;
  - d. Objectives should be clear, with established benchmarks or criteria for success and failure;
  - e. Phase out subsidies and other support automatically;
  - f. Projects should entail private risk commensurate with public risk; private actors without risk have the wrong kind of incentives;
  - g. Avoid raising barriers to entry and import competition;
  - h. The agency administering intellectual property rights must have demonstrated competence, with clear political oversight and accountability;
  - i. The coordinating ministry should maintain channels of communication with the private sector;

The portfolio of support recipients should be subject to regular ex post external evaluation.

### B3. Special economic zone

139. A special economic zone (SEZ) is a separate bounded area in a country where business-friendly rules apply. The government sets the preferential conditions, which may include tax incentives, low tariffs, streamlined customs procedures, flexible regulations and better access to electricity and transportation, etc.
140. The forms of SEZ include export processing zones, financial SEZ, eco-industrial parks and charter cities (zones built around new urban areas with the power to set their own laws). Initially, such SEZ were prominent in nineteenth century European industrial development (in Germany, Italy and the United Kingdom of Great Britain

and Northern Ireland) and in the United States of America, and then in Japan.

141. Many developing countries have chosen to establish SEZ in order to boost trade, create jobs and promote reforms. Successful cases include China, Malaysia, the Republic of Korea and the United Arab Emirates. SEZ are considered to have been a central reason for industrial development in China and India during the twentieth century. In China, the development of SEZ and the promotion of clusters of firms went hand in hand to achieve long-term industrial development objectives (Rubini et al., 2015). In some countries (e.g. the Dominican Republic and Mauritius), SEZ have helped to create a sizeable manufacturing sector in an economy previously reliant on agriculture.
142. Aiming for diversification, the development of SEZ should go along with learning from the prior experience of industrial districts in Europe, the United States and Japan. SEZ have proved to flourish in countries that were otherwise improving governance and were moving forward with reforms. In countries with bad governance and political instability, in particular those in sub-Saharan Africa, SEZ failed to shelter investors and consequently never really took off. They were viewed by governments and sometimes donors as a way to cut through 'impossible reforms', namely barriers to promoting export and FDI. SEZs protect exporters, which is normally done through good governance.

#### B4. Extensive or intensive margin?

143. Economic transformation depends not only on how much countries export but also on what they export and with whom they trade. Generally, to increase their exports countries can choose to either continue exporting existing products or diversify into new product lines in new trading regions. In order to understand their relation with export diversification, intensive and extensive margins are studied.
144. The intensive margin relates to changes in diversification for a set of products that has been sold by a country over a period of time, while the extensive margin relates to expanding exports to new products and new markets, as illustrated in figure 2.

Figure 2

Export margins

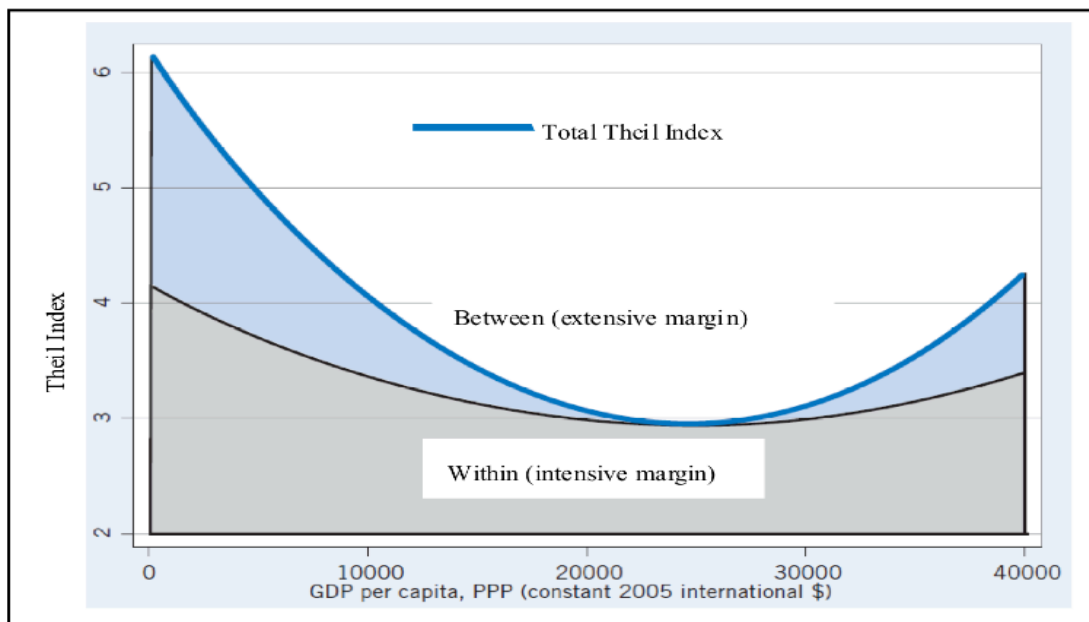




145. The literature indicates that export growth in developing countries has mainly arisen from the intensive rather than the extensive margin. However, Hummels and Klenow (2005) found that the extensive margin accounts for 62 per cent of the greater exports of larger economies. This was a contradicting view to the initial understanding that the intensive margin accounts for export growth. To understand it further, Cadot et al. (2011a) studied the contribution of the between-group (extensive margin) and within-group (intensive margin) components to Theil's overall index. Figure 3 shows the Theil curve for various countries against GDP per capita and the contribution of existing products and new products to the total Theil index. The results of Cadot's study showed that greater changes in concentration levels happened at the extensive margin, meaning export diversification (decrease in concentration index) happens mainly as a result of a rise in the number of new exported products. Another study clarified that once the extensive margin is corrected for the survived new exports introduced, it dominates the intensive margin to lead export growth.
146. Studies to understand export diversification within the extensive margin found that the export of existing products to new geographical markets accounted for a greater share of developing countries' export growth than the export of new products.

Figure 3

Contribution of the intensive and extensive margins to the Theil index in all countries



Source: Cadot O, Carrère C and Strauss-Kahn V. 2011. Trade diversification: drivers and impacts. In: M Jansen, R Peters and JM Salazar-Xirinachs (eds.). Trade and Employment: From Myths to Facts. International Labour Office and European Commission.  
Abbreviations: GDP = gross domestic product per capita, PPP = purchase power.

147. The important implications to be drawn from this discussion for policymakers are that:
- a. If governments are ultimately interested in export growth, the intensive margin is better. An export strategy that ignores the scope for expanding exports at the intensive margin will miss important opportunities for export expansion and for propelling growth. This means that public and private efforts that focus on continually upgrading quality, reducing costs and increasing productivity have a high payoff;
  - b. In general, promoting diversification of existing products into new markets is likely to be more effective as a growth stimulus, and arguably easier to achieve, than focusing on developing new products for export to new markets;
  - c. Learning from the survival and death patterns of new exports could lay the basis for more effective export promotion;
  - d. The growth of new products and markets may have a significant impact on economic growth by disseminating information on new technologies, helping firms to capture economies of scale and reducing terms-of-trade volatility;
  - e. However, if the government's aim is diversification, the approach is a little different as diversification and growth are not equivalent objectives. Diversification is driven by the extensive margin, whereas growth is driven by the intensive margin. Even seemingly well-established 'stylized facts' linking concentration to growth, such as the natural resource curse (a negative correlation between the importance of natural resources to a country's wealth and its subsequent growth), does not hold (Cadot et al., 2011b). A country aiming for diversification cannot ignore the extensive margin.

### B5. Where to start diversification?

148. Taking forward the lessons learned on policies and which margin matters, another requirement of governments is that they decide exactly which sectors should be supported for diversification.
149. There is no consensus on the advisability of this sort of hard industrial policy, but there are emerging tools that might be helpful in directing government support towards sectors of greater promise, such as the concept of product space (Hidalgo and Hausmann, 2009).
150. According to product space theory, countries will be more successful if they choose to branch out into new products that are not too distant in product space from their existing export pattern. Distance is assessed by means of observed patterns of relationships. For example, it may be that countries that have a revealed comparative advantage in sanitation equipment typically also export refrigeration equipment, and the stronger that empirical relationship the closer the goods are to each other in product space.
151. There are many possible explanations for such a relationship between two goods being in the same product space, such as the fact that both require the same legal and institutional context, the same business services or natural resource base, or the same skilled labour force. The cause of the relationship is not as important as its predictive value, which infers that a country that exports sanitation equipment (for example) might potentially diversify into exporting refrigeration equipment.

152. Conversely, it can be predicted that certain sectors would not be a good fit for diversification for countries with a given pattern of exports; they are simply too great a leap in product space.
153. While this sort of tool has its useful place as one of a set of inputs that governments must consider in weighing the possibility of implementing hard industrial policy, it provides far from the final word on the subject. For one thing, being based on historical data it is inherently ill-equipped to predict the advisability of venturing into new sectors, such as clean energy or aspects of the emerging green economy. For another, even a close statistical association does not preclude some omitted variable that is responsible for the success of the 'new' sector in studied countries but which may be absent in the country considering its economic diversification strategy.
154. Despite such limitations, the concept of product space theory is useful and has been applied to help guide policymakers in numerous countries in their decision-making and planning processes. It has also been extended in some novel ways, such as to facilitate the process of moving towards a green economy (Hamwey et al., 2013).
155. Tools such as the product space methodology again highlight the importance of context. There is no one-size-fits-all recipe for economic diversification; rather, it is a matter of discovering case-by-case what works in particular circumstances of economy, history, social setting, politics, geography and natural resource endowments.



## Chapter 5

# THE WAY FORWARD

## A. Key messages and concluding remarks

156. The economy of a country is vulnerable to the adverse impact of response measures if it is dependent upon the export of a narrow range of products and those products are affected by response measures taken to combat climate change.
157. Economic diversification is one of the means that can be used to build resilience to the adverse impacts of climate change and policies that have been implemented to mitigate climate change.
158. Realizing the vulnerability, a few Parties have included a portfolio of actions and plans in pursuit of economic diversification with mitigation co-benefits in their INDCs. However, economic diversification is expected to be a challenging task. One of the GCC countries is still struggling to diversify successfully, even after the implementation of 10 development plans since 1970 with economic diversification as their main objective (Albassam, 2015).
159. From the perspective of the LDCs and poor economies, economic diversification has to be considered as a broader sustainable development strategy, owing to the much wider range of benefits that it brings other than greater resilience to the impacts of response measures.
160. Every country has to effectively utilize its limited resources by allocating them to its portfolio of sectors, aiming to reduce instability in aggregate returns to the country.
161. The review of various reports submitted by Parties under the Convention, including NCs, NIRs, BRs and BURs, indicates that very limited information has been reported on economic diversification.
162. The literature review undertaken for the preparation of this technical paper revealed various facts and understandings of the economist community with regard to export diversification, especially in non-extractive sectors, and economic growth.
163. The key findings detailed in this technical paper are as follows:
  - a. Poor countries initially diversify as they grow, but they start to specialize once they reach higher income levels. This means that poor countries have a wider scope of diversification than economies with higher income levels;
  - b. There is evidence that portfolio variance is a superior tool for measuring economic diversity in explaining regional economic instability than other measures of diversity (e.g. the ogive index, entropy index and NAI);
  - c. Analytical tools that focus on specific industries were found to be more useful for planning economic diversification (e.g. LQ, shift-share analysis and I-O model);
  - d. Combining LQ with shift-share analysis was found to illustrate a framework for cluster identification and analysis. Applying this approach to detailed industry-level data may help to identify and facilitate understanding of emerging and

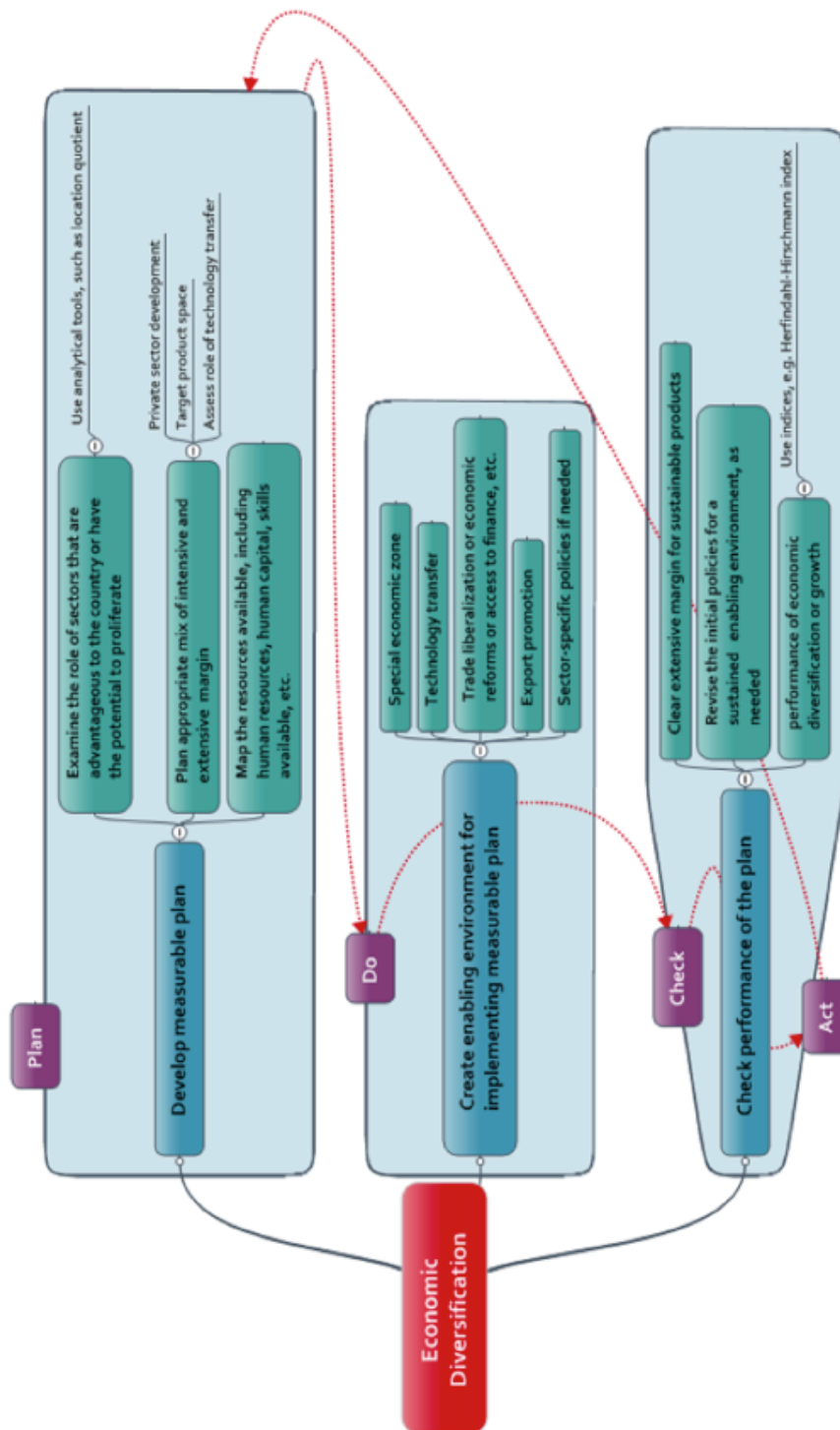
growing industries. This is helpful for the formulation of appropriate policies and programmes to support their growth;

- e. For a government to plan export diversification, a systematic plan with a mix of extensive and intensive margins is required. An extensive margin with a correction of sustainable products at a later stage helps as diversification is driven more by the extensive margin but export growth is driven more by the intensive margin;
  - f. (Government intervention is necessary to make policies to promote export growth and diversification. Soft and hard industrial policies need to be implemented appropriately;
  - g. There is no clear consensus on the measures that are necessary to achieve economic diversification. The most important step that a government can take is to focus on getting the fundamentals right; that is, to maintain macroeconomic stability, invest in infrastructure, improve the business climate, encourage private investment and invest in people, especially in education at all levels.
164. Other than policy advice, there is not much literature on how economic diversification can be produced. However, one study established a model that showed that economic diversification is driven by differences in the availability of skilled labour (Acemoglu and Zilibotti, 2000). Technology development in developed countries is typically tailored to the needs of a skilled workforce. If those technologies are transferred to skill-scarce countries, no industrial policy (hard or soft) can make them successful exports. The most sensible policies are then supply-side ones, particularly in education; for example, the gradual build-up of a world-class network of technology institutes in India.
165. At the same time, it is true that most of the countries that have well-diversified industries were aggressive imitators of the technology of more advanced economic powers. All those countries expanded their basket of exports by plundering technology. On the other hand, intellectual property rights are taken as one of the basic good-governance prerequisites for development. Encroachment on the intellectual property of advanced countries is now fought more vigorously than ever before. This shows that supporting technology transfer along with skills development is an important aspect of economic diversification that cannot be neglected.
166. According to product space theory, countries will be more successful if they choose to branch out into new products that are not too distant in product space from their existing export pattern. Distance is assessed by means of observed patterns of relationships. For example, it may be that countries that have a comparative advantage in sanitation equipment typically also export refrigeration equipment, and the stronger that empirical relationship, the closer the goods are to each other in product space.
167. It is evident that a much more rigorous process is required for planning and implementing policies targeting economic diversification. There is no one-stop policy that can be adopted.
168. Policies have to be planned on the basis of national circumstances, on a case-by-case basis, taking into consideration geographical location and available skills, technology, resources, etc. Figure 4 constitutes an attempt to present the key information on economic diversification provided in this technical paper in an action chart.

169. In conclusion, there is a need to conduct more region- and sector-specific studies to support developing country Parties in their economic diversification initiatives.

Figure 4

Key information on economic diversification in an action chart



## B. Possible elements of the work programme of the improved forum

170. Considering that economic diversification has been included as one of the work areas of the improved forum under the subsidiary bodies, there is an ample amount of work that can be undertaken to assist non-Annex I Parties in diversifying their economies with the broader objective of dealing with the effects of response measures.
171. There is a need to prepare additional technical materials to assist developing country Parties in their economic diversification initiatives. Therefore, the secretariat may continue to prepare additional technical materials on economic diversification to fulfil the mandate referred to in paragraph 1 above, which may include:
- a. Preparing detailed guidelines for economic diversification initiatives;
  - b. Developing sector-specific case studies for the agriculture sector, the financial, manufacturing and energy-intensive industries, the oil and gas industries and the tourism sector aimed at sharing success stories and lessons learned on successful diversification strategies for vulnerable sectors and industries;
  - c. Developing country-specific case studies, especially for the economies vulnerable to response measures, aimed at sharing good practices and successful diversification strategies.
172. The review of relevant technical literature and work progressed by Parties under the Convention brought together elements that can provide the potential direction to the work on economic diversification under the improved forum, including:
- a. Developing an inventory of response measures that have potential cross-border impacts, that is, identifying which response measures are likely and what their impacts might be, followed by identifying the countries that are overdependent on the export streams in question. This sort of concrete statement of the problem would yield the necessary informed starting point for addressing it;
  - b. Preparing a blueprint of the most needed types of institutional and capacity improvement in national contexts, focusing on the identified countries and sectors, going country by country to create a diagnostic assessment. The blueprint may include:
    - i. Identifying countries, regions and sectors vulnerable to the impacts of response measures;
    - ii. Presenting overlapping diversification strategies, including sector-specific diversification strategies, by working with policymakers on macroeconomic reforms to create a welcoming environment for investment;
  - c. Enhancing collaboration with related international institutions to support economic diversification initiatives (e.g. the United Nations Industrial Development Organization, UNCTAD, IMF, the International Centre for Trade and Sustainable Development and the World Bank) by:



- i. Organizing workshops or expert meetings on key issues (e.g. sharing experience from ongoing collaborative projects to assist the LDCs, policy advice, challenges identified from on-the-ground experience);
      - ii. Preparing policy advice;
    - d. Preparing technical materials to:
      - i. Identify non-domestic barriers to economic diversification, such as trade barriers;
      - ii. Identify ways in which the international community could facilitate increased foreign investment in non-traditional sectors;
      - iii. Facilitate assistance, in the form of technology transfer, for the challenging task of diversification;
    - e. Building capacity of Parties.
173. In the long term, international support can be provided in the form of public sector investment. Almost all governments are already making investments and support is typical for official development assistance programming. Certainly more support is needed, given the results of any diagnostic assessment, and should be focused on countries that are vulnerable to the impacts of response measures.

## References

- Acar W and Sankaran K. 1999. The myth of the unique decomposability: specializing the Herfindahl and entropy measures? *Strategic Management Journal*. 20: pp.969–975.
- Acemoglu D and Zilibotti F. 2000. *Technology Differences*. Mimeo.
- Adler G and Sosa S. 2011. *Commodity Price Cycles: The Perils of Mismanaging the Boom*. International Monetary Fund Working Paper WP/11/283.
- Agosin MR, Alvarez R and Bravo-Ortega C. 2012. Determinants of export diversification around the world: 1962–2000. *The World Economy*. 35(3): pp.295–315.
- Ahmadov A. 2012. *Political Determinants of Economic Diversification in Natural Resource-Rich Developing Countries*. Paper presented at the Oxford-Princeton Global Leaders Fellowship Programme 4th Annual Colloquium.
- Ahrend R. 2006. *How to Sustain Growth in a Resource Based Economy? The Main Concepts and Their Application to the Russian Case*. OECD Economics Department Working Paper No. 478. Paris: OECD Publishing.
- Albassam BA. 2015. Economic diversification in Saudi Arabia: myth or reality? *Resources Policy*. 44: pp.112–117.
- Amighini A and Sanfilippo M. 2014. Impact of South–South FDI and trade on the export upgrading of African economies. *World Development*. 64: pp.1–17.
- Amsden AH. 2001. *The Rise of “the Rest”: Challenges to the West from Late-Industrializing Economies*. Oxford University Press.
- Amurgo-Pacheco A and Pierola MD. 2008. *Patterns of Export Diversification in Developing Countries: Intensive and Extensive Margins*. World Bank Policy Research Working Paper No. 4473.
- Auty R. 2004. The political economy of growth collapses in mineral economies. *Minerals & Energy – Raw Materials Report*. 19(4): pp.3–15.
- Birdsall N and Hamoudi A. 2002. *Commodity Dependence, Trade, and Growth: When “Openness” Is Not Enough*. Center for Global Development Working Paper No. 7.
- Brewer HL and Moomaw RL. 1985. A note on population size, industrial diversification, and regional instability. *Urban Studies*. 22(4): pp.349–354.
- Cadot O, Carrère C and Strauss-Kahn V. 2011a. Export diversification: what’s behind the hump? *The Review of Economics and Statistics*. 93(2): pp.590–605.
- Cadot O, Carrère C and Strauss-Kahn V. 2011b. Trade diversification: drivers and impacts. In: M Jansen, R Peters and JM Salazar-Xirinachs (eds.). *Trade and Employment: From Myths to Facts*. International Labour Office and European Commission.
- Cimoli M, Dosi G and Stiglitz JE (eds.). 2009. *Industrial Policy and Development: The Political Economy of Capabilities Accumulation*. Oxford University Press.
- Collier P and Dollar D. 2001. *Globalization, Growth, and Poverty: Building an Inclusive World Economy*. A World Bank Policy Research Report.

- Collier P and Hoeffler A. 2004. Greed and grievance in civil war. *Oxford Economic Papers*. 56: pp.563–595.
- Conroy ME. 1974. Alternative strategies for regional industrial diversification. *Journal of Regional Science*. 14(1): pp.31–46.
- Conroy ME. 1975. The concept and measurement of regional industrial diversification. *Southern Economic Journal*. 41(3): pp.492–505.
- Cosbey A. 2006. Background Paper: Expert Meeting on Economic Diversification: Implementation of Article 4, paragraphs 8 and 9, of the Convention. Bonn: UNFCCC.
- Davis GA and Tilton JE. 2005. The resource curse. *Natural Resources Forum*. 29(3): pp.233–242.
- Dutt P, Mihov I and Van Zandt T. 2009. Trade Diversification and Economic Development. INSEAD mimeo.
- European Commission. Access to Finance for SMEs. Available at <[http://ec.europa.eu/growth/access-to-finance/index\\_en.htm](http://ec.europa.eu/growth/access-to-finance/index_en.htm)>.
- Gallagher KP and Zarsky L. 2004. Sustainable Industrial Development? The Performance of Mexico's FDI-led Integration Strategy. Global Development and Environment Institute, Tufts University.
- Global Witness. 2004. Time for Transparency: Coming Clean on Oil, Mining and Gas Revenues.
- Hachman F. 1994. Bureau of Business and Economic Research, University of Utah. Available at <<http://www.governor.utah.gov/DEA/Rankings/States/Hachman99.PDF>>.
- Hackbart MM and Anderson DA. 1975. On measuring economic diversification. *Land Economics*. 51(4): pp.374–378.
- Hamwey R, Pacini H and Assunção L. 2013. Mapping green product spaces of nations. *Journal of Environment and Development*. 22(2): pp.155-168.
- Harrison A and Rodríguez-Clare A. 2010. Trade, foreign investment and industrial policy for developing countries. *Handbook of Development Economics*. 5: pp.4039–4214.
- Hidalgo CA and Hausmann R. 2009. The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*. 106(26): pp.10570–10575.
- Hoover EM and Giarratani F. 1985. *An Introduction to Regional Economics*. Third edition. New York: Alfred A Knopf.
- Huchet-Bourdon M. 2011. Agricultural Commodity Price Volatility: An Overview. Organisation for Economic Co-operation and Development (OECD) Food, Agriculture and Fisheries Paper No. 52.
- Hummels D and Klenow PJ. 2005. The variety and quality of a nation's exports. *American Economic Review*. 95(3): pp.704–723.
- Humphrey M and Sandbu ME. 2007. The political economy of natural resource funds. In:

- M Humphreys, JD Sachs and JE Stiglitz (eds.). Escaping the Resource Curse. New York: Columbia University Press. pp.183–217.
- Imbs J and Wacziarg R. 2003. Stages of diversification. *American Economic Review*. 93(1): pp.63–86.
- IEG (Independent Evaluation Group). 2016. Economic diversification and nonextractive growth. Available at <[https://ieg.worldbankgroup.org/Data/reports/chapters/ccpe-synthesis\\_ch4.pdf](https://ieg.worldbankgroup.org/Data/reports/chapters/ccpe-synthesis_ch4.pdf)>.
- International Finance Corporation. 2013. Access to Finance: Sub-Saharan Africa.
- Klinger B and Lederman D. 2006. Diversification, Innovation, and Imitation Inside the Global Technological Frontier. World Bank Policy Research Working Paper No. 3872.
- Longmore R, Jaupart P and Cazorla MR. 2014. Toward Economic Diversification in Trinidad and Tobago. World Bank Policy Research Working Paper No. 6840.
- Markowitz HM. 1959. Portfolio Selection: Efficient Diversification of Investments. New York: Wiley Press.
- Maxwell P. 2004. Chile's recent copper-driven prosperity: does it provide lessons for other mineral rich developing nations? *Minerals & Energy – Raw Materials Report*. 19(1): pp.16–31.
- McLaughlin GE. 1930. Industrial diversification in American cities. *Quarterly Journal of Economics*. 45(1): pp.131–149.
- Meilak C. 2008. Measuring export concentration: the implications for small States. *Bank of Valletta Review*. 37.
- Melitz MJ. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*. 71(6): pp.1695–1725.
- Navarro-García A. 2016. Drivers of export entrepreneurship. *International Business Review*. 25(1): pp.244–254.
- Newfarmer R. 2011. What is 'Smart' Industrial Policy? Presentation given at the International Institute for Sustainable Development conference on trade, investment and climate change: searching for progress on key issues.
- Nourse HO. 1968. *Regional Economics: A Study in the Economic Structure, Stability, and Growth of Regions*. McGraw-Hill.
- OECD (Organisation for Economic Co-operation and Development). 2011. The Impact of Trade Liberalisation on Jobs and Growth. OECD Trade Policy Paper No. 107.
- OECD (Organisation for Economic Co-operation and Development) and United Nations. 2011. *Economic Diversification in Africa: A Review of Selected Countries*. Paris: OECD Publishing.
- Pack H and Saggi K. 2006. The Case for Industrial Policy: A Critical Survey. World Bank Policy Research Working Paper No. 3839.
- Palan N. 2010. Measurement of Specialization – The Choice of Indices. FIW Working Paper No. 62.
- Parteka A and Tamberi M. 2008. Determinants of Export Diversification: An Empirical

- Investigation. Universita Politecnica delle Marche Working Paper No. 327.
- Pegg S. 2006. Can policy intervention beat the resource curse? Evidence from the Chad–Cameroon pipeline project. *African Affairs*. 105(418): pp.1–25.
- Ratnaike YC. 2012. Is there an empirical link between trade liberalisation and export performance? *Economics Letters*. 117(1): pp.375–378.
- Research and Economic Analysis Division of the State of Hawaii. 2008. *Measuring Economic Diversification in Hawaii*.
- Rodrik D. 2004. *Industrial Policy for the Twenty-First Century*. John F. Kennedy School of Government Faculty Research Working Paper RWP04-047, Harvard University.
- Ross ML. 2001. *Extractive Sectors and the Poor: An Oxfam America Report*. Boston: Oxfam America.
- Rubini L, Di Tommaso MR and Barbieri E. 2015. Special economic zones and cluster dynamics: China. In: JD Wright (ed.). *International Encyclopedia of the Social & Behavioral Sciences*. Second edition. Oxford: Elsevier. pp.207–212.
- Rudiger A. 2006. How to sustain growth in a resource-based economy? The main concepts and their application to the Russian case. *OECD Economics Department Working Paper No. 478*.
- Sachs J. 2007. How to handle the macroeconomics of oil wealth. In: M Humphreys, JD Sachs and JE Stiglitz (eds.). *Escaping the Resource Curse*. New York: Columbia University Press. pp.165–182.
- Sachs JD and Warner AM. 1995. *Natural Resource Abundance and Economic Growth*. National Bureau of Economic Research Working Paper No. 5398.
- Sala-i-Martin X and Subramanian A. 2003. *Addressing the Natural Resource Curse: An Illustration from Nigeria*. National Bureau of Economic Research Working Paper No. 9804.
- Scherer FM. 1980. *Industrial Market Structure and Economic Performance*. Second edition. Boston: Houghton Mifflin Company.
- Schiff M and Winters LA. 2003. *Regional Integration and Development*. Washington, DC: World Bank and Oxford University Press.
- Sentz R. *Understanding Location Quotient*. Available at <<http://www.economicmodeling.com/2011/10/14/understanding-location-quotient-2/>>.
- Shaxson N. 2005. New approaches to volatility: dealing with the ‘resource curse’ in sub-Saharan Africa. *International Affairs*. 81(2): pp.311–324.
- Shediak R, Abouchakra R, Moujaes CN and Najjar MR. 2008. *Economic Diversification: The Road to Sustainable Development*. Booz & Company.
- Sherwood-Call C. 1990. *Assessing regional economic stability: a portfolio approach*. *Economic Review*. Winter 1990(1): pp.17–26. Federal Reserve Bank of San Francisco.

Siegel PB, Alwang J and Johnson TG. 1994. Toward an improved portfolio variance measure of regional economic stability. *Review of Regional Studies*. 24(1): pp.71–86.

Siegel PB, Alwang J and Johnson TG. 1995. A structural decomposition of regional economic instability: a conceptual framework. *Journal of Regional Science*. 35(3): pp.457–470.

Siegel PB, Johnson TG and Alwang J. 1995. Regional economic diversity and diversification. *Growth and Change*. 26(2): pp.261–284.

Stevens P. 2003. Resource impact: curse or blessing? A literature survey. *Journal of Energy Literature*. 9(1): pp.3–42.

Tress RC. 1938. Unemployment and the diversification of industry. *The Manchester School*. 9(2): pp.140–152.

UNCTAD (United Nations Conference on Trade and Development). 2005. *Trade and Development Report 2005*. Geneva: UNCTAD.

Usui N. 1997. Dutch disease and policy adjustments to the oil boom: a comparative study of Indonesia and Mexico. *Resources Policy*. 23(4): pp.151–162.

World Bank. 2012. *Inclusive Green Growth: The Pathway to Sustainable Development*. Washington, DC: World Bank.

Wundt BD. 1992. Reevaluating alternative measures of industrial diversity as indicators of regional cyclical variations. *Review of Regional Studies*. 22(1): pp.59–73.

Xuefeng Q and Yaşar M. 2016. Export market diversification and firm productivity: evidence from a large developing country. *World Development*. 82: pp.28–47.



**United Nations**  
Framework Convention on  
Climate Change