

# D. A new role for commodities in development strategies

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### Some key facts and findings

- ... 2000 a 2011. ... 200 ... a a
- ... 2001 a 2011, -20 ... 1 ... 2 ... a ... 10 ...
- ... a a a a a a a a - a a a a
- ... a a a a a a a 2000 a 2010, ... 2012, ... a a 31. ... 25% ... 2005 a 21. ... 2000.
- ... a a a a a a a a a a a



Throughout this section, the word •commoditiesŽ will refer both to what Morris et al. (2012) call •soft commoditiesŽ (predominantly agriculture) and to what they call •hard commoditiesŽ (predominantly mining) and •energy commoditiesŽ (predominantly oil and gas). Mineral products (including metals) and energy products (coal, oil and natural gas) will fall under the designation of •natural resourcesŽ. Agricultural products, in turn, will include traditional products, fresh fruit and vegetables, specialty products and processed products (see Box D.3). In line with the rest of the Report, in this section G-20 developing countries indicates developing country members of the G-20 (as defined in Appendix Table B.1) and not the •G-20 group of developing countriesŽ relevant for agricultural negotiations at the WTO.

This section will analyse natural resources<sup>1</sup> and agriculture separately. This is for three main reasons. First, there are differences in the production and consumption structure across the two sectors. The weight of the agricultural sector in terms of employment and consumption is significantly higher than that of the natural resources sector. Moreover, agricultural production relies a lot more on smallholder production than the natural resources sector. Secondly, most (although not all) of the development challenges and opportunities are different in the two sectors. To provide an example, while the issue of management of windfall revenue is crucial in the natural resources sector, it does not play a significant role in the agricultural sector.<sup>2</sup> Thirdly, the trade policy issues are very different. While in the natural resources sector they

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## Box D.1:C

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It is widely recognized that natural resource prices are highly volatile. The WTO (2010), for instance, included volatility in the list of distinctive characteristics of natural resources. As explained by the WTO (2010) with reference to oil prices, volatility (at least in the long run) is largely caused by demand-driven factors, such as the rapid income growth of key G-20 developing economies. Volatility has long been a concern for resource-exporting countries for at least three reasons. First, it is a source of uncertainty that adversely affects investment and production decisions. Secondly, risk-averse consumers need to spend income on hedging against the risk of large swings in resource prices. Thirdly, when exporters borrow against high export earnings to fund additional imports and consumption, they may confront worrisome debt burdens when natural resource prices fall.

Box D.1:C

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(continued)



Source: World Bank Commodity Price Data.

Note: Panel (a) moving window (60 months) standard deviation; panel (b) moving window (60 months) coefficient of variation (standard deviation/mean).

\* month refers to month.



and 2012, and it fell by 5.5 per cent in the last decade. address existing malnutrition and hunger. Some have Demand for oil in countries other than China or the OECD therefore argued that high (rather than declining) food group rose by 32 per cent between 1992 and 2012, and prices are going to predominate in years to come. by 14 per cent in the last decade.

Another reason why agricultural and food prices are likely to Economic growth is slowing down in China but growth remain high in the years to come is the relationship between rates remain high. GDP growth, which was as high as oil and food prices, which has increased dramatically since 10 per cent (measured in USD 2005 PPP), is projected 2006. Some claim that the connection between food and to attain a still considerable 6.6 per cent in the period oil is systemic: modern agriculture uses oil products to fuel 2011-30 (OECD, 2012). Accordingly, there is little farm machinery, to transport other inputs to the farm and to reason to expect any significant slowdown in its demand transport farm output to the ultimate consumer (Heinberg, for imports of mineral resources. The Chinese steel 2011). Moreover, oil is often used as input in agricultural industry, for instance, is set to increase output from 700 chemicals. Oil price increases therefore put pressure on all million tonnes (Mt) to 900 Mt by 2030 (Lee et al., 2012). these aspects of commercial food systems. The European At the same time, other G-20 developing economies will Commission (2012) confirms that energy prices (costs) experience high and sustained growth rates in the next cause an increase in the price of fertilizers and food decades. Notably, in the period 2011-30, Brazil's GDP is commodity prices. A recent study by Baffin and Dennis projected to grow at a rate of 4.1 per cent, Indonesia's (2013) reaches similar conclusions: oil prices affect food at 5.3 per cent and India's at 6.5 per cent (OECD prices more significantly than several other long-term price 2012). Although some G-20 developing economies drivers, including exchange rates, interest rates and income, are net exporters of metals, OECD projections suggest that overall demand for metals will grow at 5 per cent Demand- and supply-side developments, technological a year up to 2030, mainly driven by new players in the change, environmental policies, consumers' preferences and international economic arena. Recent price declines several other factors will interact in complex ways to affect of metals reflect moderate demand growth in G-20 the evolution of prices of commodities. Such evolution is developing and most OECD economies, together with therefore subject to uncertainty, and that uncertainty needs a strong supply response. The latter was the result of to be taken into account when formulating growth strategies increased investment of the past few years which was based on commodity production and export. induced by high prices (World Bank, 2014).

## Demand-side effects will continue to dominate energy price trends in the near future. **2. Agricultural trade and development**

The International Energy Agency (IEA) (2013) predicts that global energy demand will increase by one-third from 2011 to 2035. Although the the overall economy in developing countries and above all share of fossil fuels, such as coal, oil or natural gas, in the least-developed countries (LDCs). In many countries, world's energy mix is predicted to fall from 82 per cent to 76 per cent in 2035, demand will grow for all forms of energy, distribution processes have contributed to modernizing including fossil fuels. Notably, demand for natural gas is parts of the agricultural sector in recent years and to expected to rise by almost 50 per cent by 2035 (IEA, 2013). giving the sector a more dynamic role within the overall economy. High agricultural prices relative to other sectors

In the case of agricultural commodities, different causes have also provided an opportunity for some countries have been identified for the price hikes that began into reap windfall benefits, notably through agricultural 2003. The most notable are extreme weather, policies exports. For other countries, high agricultural prices have to promote use of biofuels, depreciation of the US dollar, increased the cost of importing food, with potentially longer-term economic growth in several large developing undesirable consequences for poverty levels. countries, increased demand for commodity futures markets as a result of both speculation and portfolio The question discussed in this section is whether recent diversification, low levels of stocks caused in part by changes in the agricultural sector are likely to affect the some of the factors noted above, and trade policies that sector's role in developing countries. The question is also encouraged producers to withhold supplies (Anderson et al., 2013; Gilbert and Morgan, 2010). advantage of recent price changes or whether those changes have represented a burden for them.

There are, however, reasons to believe that demand for food will grow in the future because of the growth in a number of large G-20 developing economies. The Food and Agriculture Organization of the United Nations (FAO) (2011b), for instance, predicts that by 2050 global food production will have to further expand by 70 per cent in order to feed a growing world population and simultaneously crucial both in terms of production and consumption. On

### (a) The agricultural sector is important for development

In many developing countries, the agricultural sector is





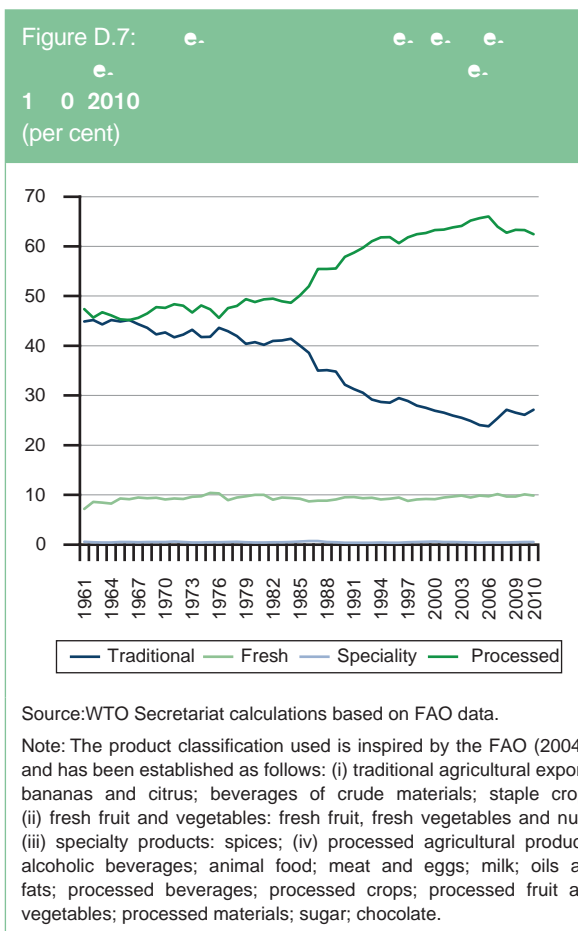
the supply side, the agricultural sector employs around half of the labour force in the developing world. The sector represents over 70 per cent of the labour force in LDCs. The sector's relevance in terms of consumption stems from the fact that poor households tend to spend a large share of their income on food. Combined with the fact that three out of every four poor people live in rural areas in developing countries and that most of them depend on agriculture for their livelihoods (World Bank, 2007), it is obvious that the sector is of utmost importance for any development strategy in the developing world.

Evidence suggests that growth in agriculture delivers more poverty reduction than growth in other sectors in low-income economies and that virtually all economies that managed to reduce poverty significantly went through a period of increased agricultural productivity (World Bank, 2007; Timmer, 2009). More specifically, Christiaensen et al. (2011) find that growth in agriculture is significantly more effective in reducing poverty among the poorest of the poor than growth in other sectors. This is the case because of the much larger participation of poorer households in growth from agriculture and the lower poverty reducing effect of non-agriculture sectors, particularly extractive industries.

According to Maertens et al. (2011), a positive effect on reducing poverty also materializes if agricultural productivity is enhanced through the integration of developing countries into global value chains ... effectively world production lines. Globally, over one-third of the workforce active in agriculture has the status of 'own account workers' (i.e. the self-employed) and around one-quarter of the workforce consists of contributing (unpaid) family workers (Cheong and Jansen, 2013). This suggests that informal employment is widespread in developing countries' agriculture as both groups of workers are often informally employed (International Labour Office (ILO) and WTO, 2009). Households in this sector are also often resource-poor and lowly educated. One way through which integration in global markets contributes to poverty reduction is by giving such households access to paid (wage) employment in the agro-industry. The number of smallholders may decline but overall the effect on poverty reduction is significant because the poorest households are better off in a situation of wage employment (Maertens and Swinnen, 2009; Maertens et al., 2011).

In the following section, we examine whether recent developments in the agricultural sector have affected developing countries' possibilities to use increased integration in global agricultural markets as a development strategy.

different sectors and sub-sectors and to identify supply-side constraints. DTISs typically contain an action matrix with advice on how to overcome the most important supply-side constraints. This information is used by the Enhanced



decades. In 1990, agricultural imports of European countries were twice as high as those of Asian countries. In 2000, European imports exceeded those of Asia by less than 50 per cent and in 2012 by a mere 25 per cent. China was the ninth-largest importer of agricultural products in 2000 but ranked second in 2012 behind the European Union<sup>11</sup>.

These changes in the relative weight of different destination markets are even more pronounced in trading patterns of developing countries. Asia has overtaken Europe as the main LDC export market for agricultural products. In 2012, 39 per cent of LDC exports went to Asia. Africa, with a market share of 23 per cent, was the second-largest regional destination market for LDC exports, followed by Europe with 22 per cent (see Table D.2). The role of Asia as a destination market for LDC exports is lower in agriculture than it is for fuel and mining products (54 per cent) but more important than in the case of manufacturing exports (19 per cent).

Table D.3 reflects changes in the export patterns of LDCs according to income groups. In 2000, half of LDC agricultural exports were directed towards developed economies. WTO estimates suggest that this share had shrunk to one-third by 2012. Other developing countries as a group now receive 69 per cent of LDC agricultural exports. The export share to other LDCs nearly doubled over the 12-year period and the export share to developing countries that are neither LDCs nor G-20 increased by around 50 per cent. The weight of G-20 developing economies in LDC agricultural exports remained fairly stable.

Box D.3). The three last groups are typically considered to represent high value added agricultural exports and are therefore considered by some to have a greater potential to contribute to growth. Box D.3 provides more insights on the composition of the groups and on how the categories used in this section relate to those used in the relevant literature.

**(iv) New production structures**

An important phenomenon of the past 50 years has been that the share of raw traditional agricultural exports by increased levels of vertical coordination. These changes in global agricultural exports has declined significantly, have important implications for developing countries implying that the weight of high value-added agricultural trade has increased. The traditional agricultural exports segment includes cereals (including wheat, rice and maize), beverages (coffee, tea, cocoa), banana and citrus fruit, oilseeds and raw materials (including wood and rubber). Until the mid-1980s, raw traditional agricultural products represented around 40 per cent of total trade in agricultural goods. In the following decade, the share of traditional agricultural exports dropped sharply by over ten percentage points (see Figure D.7). Processed agricultural products (which include processed traditional export products) now represent over 60 per cent of total exports of agricultural goods.

The agricultural sector has been undergoing a number of other important changes in recent years. The sector has attracted significant levels of investment, including in the form of foreign direct investment (FDI). Food standards are spreading rapidly and food supply chains are characterized by increased levels of vertical coordination. These changes have important implications for developing countries (Maertens and Swinnen, 2014). A series of major food safety problems in high-income countries has led to increased demand in these countries for food safety and for standards and regulation guaranteeing food safety. As a consequence, there appears to be an increased use of food safety and quality standards within agricultural value chains. Those standards can be of public or private nature<sup>12</sup>. The need for final consumer products to meet certain standards has led to an increased emphasis on quality control within agricultural value chains and this, in turn, has affected the way in which such chains function. In addition, final good producers and retailers in industrialized countries increasingly apply product differentiation strategies in food products. This means that competition takes place not only in price but also in factors such as reliability, product variety, product quality and speed of innovation (Dolan and Humphrey, 2010). Increasingly,

**(iii) New destination markets**

Patterns of trade have changed significantly in recent years. The share of Asia ... and in particular of China ... as an importer of agricultural products has increased significantly in the past

Two Senegalese case studies illustrate the channels through which agricultural exports contribute to poverty reduction. They also show that contributions to poverty reduction can be strong in cases where smallholder farming is replaced by wage employment.

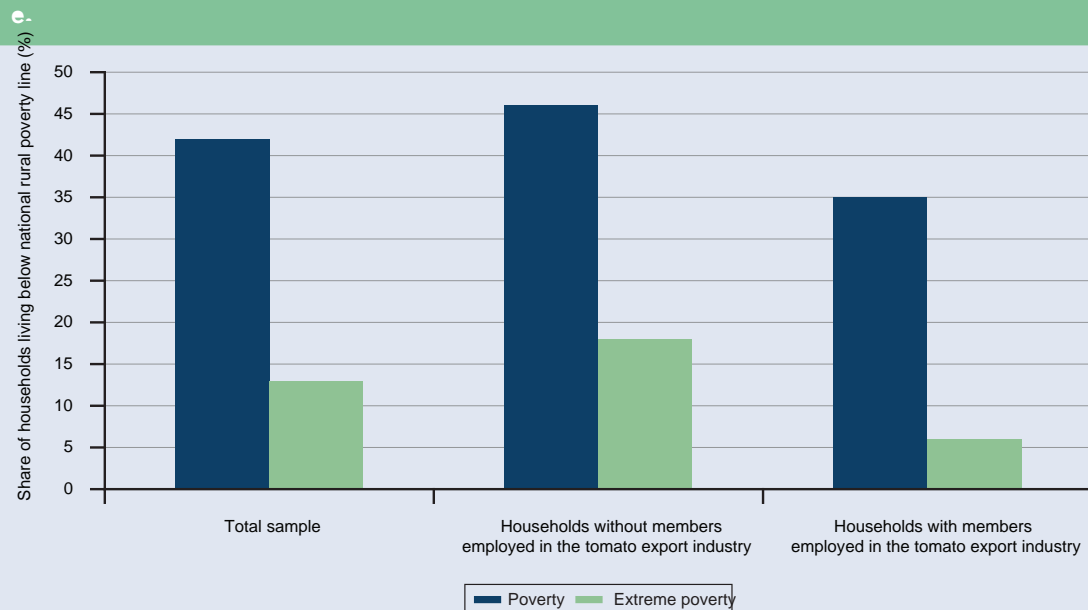
The Senegalese tomato export sector is dominated by one multinational company that started exporting tomatoes from Senegal to the European Union in 2003. The tomato export supply chain is completely vertically integrated under a common ownership. Smallholder procurement is 0 per cent and production, processing, trade and distribution are completely integrated within the subsidiaries of the multinational company. This is an extreme case of complete vertical integration. Rural households only benefit through labour market effects as there is no contract-farming and procurement from smallholder farms.

Evidence, however, suggests that poor households, and in particular the poorest among them, benefit from this form of integration because of the creation of employment in tomato export chains. Households employed in the tomato export industry, either on the fields or in the processing units of the export company, have incomes that are more than double the income of other households in the region (see Figure D.8). Before the multinational company was established in 2003, these households had lower land and non-land asset holdings. Increased tomato exports have resulted in increased employment, increased incomes and ultimately reduced levels of poverty and extreme poverty (see Figure D.9).

The Senegalese bean export sector has also been characterized by increased vertical integration although to a lesser extent. In this sector, increasing standards have prompted a shift from smallholder contract-farming to vertically integrated estate production by the exporting companies themselves. It is estimated that smallholder procurement under contract decreased from 95 per cent of export produce in 1999 to 52 per cent in 2005. The change in the supply chain structure has also shifted the way that local households benefit. These benefits are increasingly through agro-industrial employment and labour market effects rather than through contract farming and product market effects.

In the bean sector, both participation in contract farming and participation in agro-industrial employment have resulted in significantly higher incomes (see Figure D.10). It is estimated that contracting within the export sector leads to incomes that are 110 per cent higher than the average income in the region, while for employment in

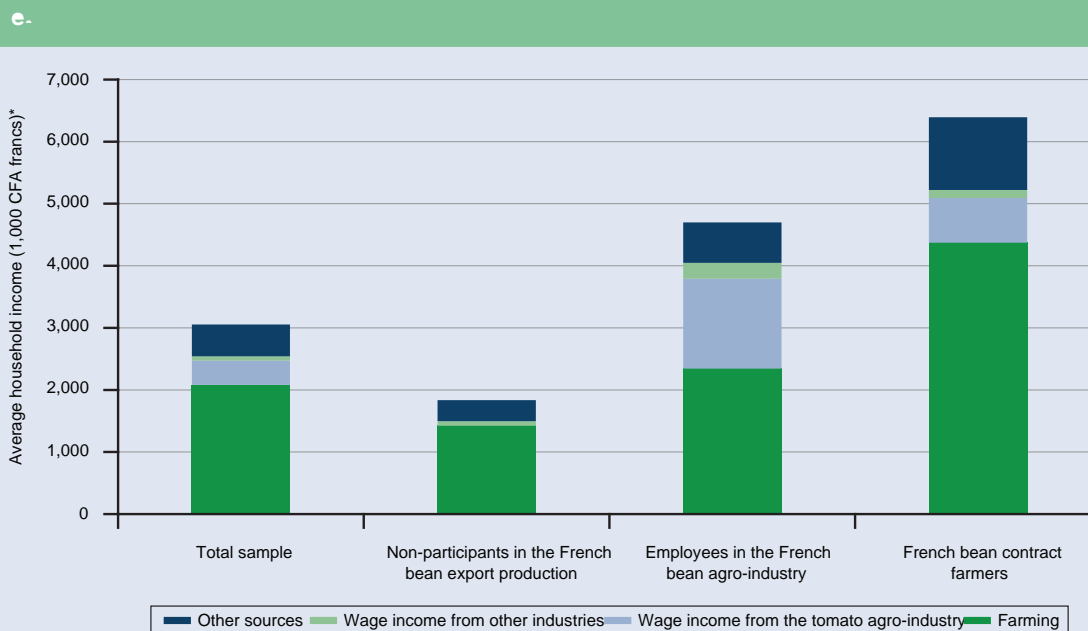
Figure D.9:C



Source:Maertens et al. (2011).

Note: •Total sampleŽ refers to 299 households in 18 villages in two rural communities (Gandon and Ross Bethio).

Figure D.10:C



Source:Maertens and Swinnen (2009).

Notes: •Total sampleŽ refers to 300 households in 15 villages in three rural communities (Sangalkam, Diender, and Noto).

When comparing employees in certified and non-certified export companies, employees in certified companies are found to reap greater rewards. Certification to GlobalGAP is found to increase the length of companies' export season, which results in longer employment periods for workers in certified companies. In addition, workers in certified companies receive slightly higher wages than workers in non-certified companies.

Moreover, employees in the export sector invest the wage earned in the export companies at least partially in their own farms. Access to wages from the export sector therefore has a positive effect on farm intensification and leads to increased use of modern inputs, such as mineral fertilizer and improved seeds.

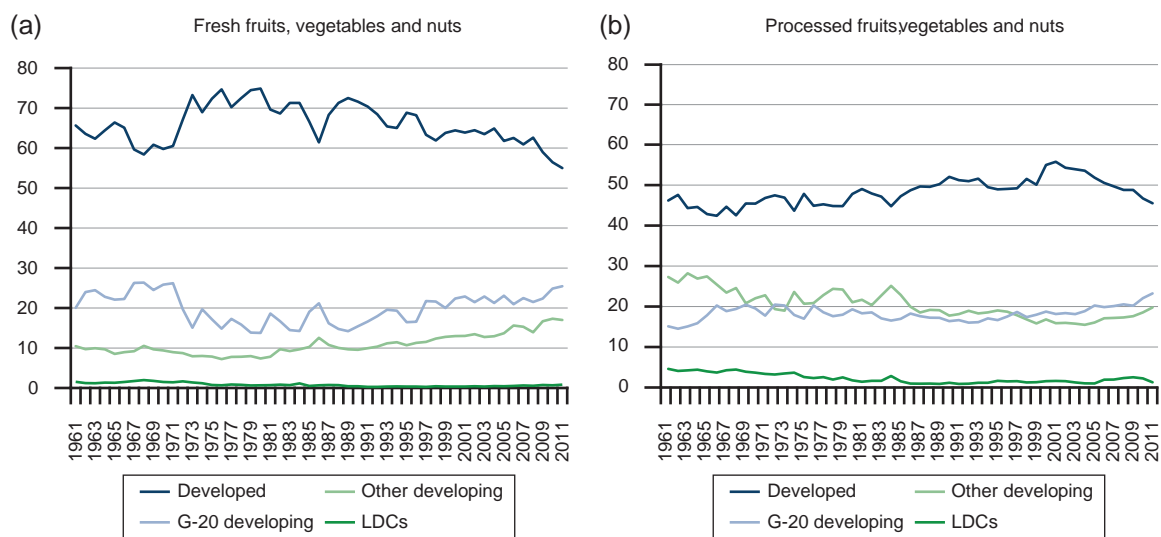
Table D.2: Value and Share in LDC exports, 2000-2012 (US\$ billion and per cent)						
	Value		Share in LDC exports		Annual percentage change	
	2012	2000	2012	2011	2012	2000...12
<b>Agriculture</b>						
World	21	100	100	26	2	11
Asia	8.2	30	39	27	6	13
Africa <sup>a</sup>	4.8	16	23	34	4	14
Europe	4.5	37	22	26	...9	6
Middle East	1.9	7	9	25	...8	13
North America	0.6	7	3	13	5	2
Commonwealth of Independent States (CIS)	0.4	0	2	64	5	27
South and Central America	0.1	1	0	0	...11	3







Figure D.13: **e. e.e. e. e.e. e. e.**  
**1 1 2011**  
 (per cent)



Source:WTO Secretariat calculations based on FAO data.  
 Note: In these figures, •G-20 developing countriesŽ indicates developing country members of the G-20 (as defined in Appendix Table B

2011a), and there is evidence that price hikes affect the food intake of the poor<sup>9</sup>. The ILO (2011) reports that, in most developing countries, the poorest households (those in the lowest income quintile) spend more than 60 per cent of their income on food, according to a sample asi8to a5ile) s



of 72 developing countries. The World Bank (2011) has estimated that rises in food prices between June and December 2010 pushed an additional 44 million people below the US\$ 1.25 a day poverty line. This is despite the fact that the high food prices experienced in international markets have probably not been fully reflected in the domestic markets of many developing countries (Ng and Aksoy, 2010a).

### 3. Making agricultural trade work for development: the policy environment

Given the importance of the agricultural sector for poverty reduction and given the increasing importance of international trade for agricultural activity, the policy and institutional environment governing agricultural trade has important impacts on developing countries' development strategies. Indeed, the agricultural sector is much more likely to contribute positively to growth within a sound policy environment and with high-quality institutions (Mehlum et al., 2006). This is the case for both net exporters and net importers. In the next section, five policy areas will be discussed that affect the role agriculture can play in development strategies:

- (a) productivity gap ... where significant productivity gaps exist, developing country producers may find it hard to maintain existing production levels or to grow through exports when markets are open
- (b) price-based policy measures, such as tariffs and subsidies ... these have been frequently used in the agricultural sector and may continue to affect developing country exporters
- (c) trade-related fixed costs, such as those related to implementing sanitary and phytosanitary (SPS)

Region	Agricultural TFP growth (annual %)					Average share in world agricultural exports (%)				
	1961...70	1971...80	1981...90	1991...2000	2001...09	1961...70	1971...80	1981...90	1991...2000	2001...09
Selected developing countries (by region)										
Sub-Saharan Africa	0.2	..0.1	0.8	1.0	0.5	10.0	5.0	3.1	2.2	2.0
Latin America and Caribbean	0.8	1.2	1.0	2.3	2.7	13.9	13.5	12.3	10.6	13.1
Brazil	0.2	0.5	3.0	2.6	4.0	3.3	4.1	3.7	3.1	4.8
Asia (except West Asia)	0.9	1.2	1.4	2.7	2.8	11.9	9.6	10.8	11.6	13.1
China										



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highly negative in developing countries. This is above all through a variety of channels. Meeting foreign standards the case for cotton. Products experiencing relatively lower regulations can, for instance, increase production costs support in all countries include feed grains and soybeans for exporters, in particular if foreign measures differ from pork and poultry (Anderson et al., 2013).

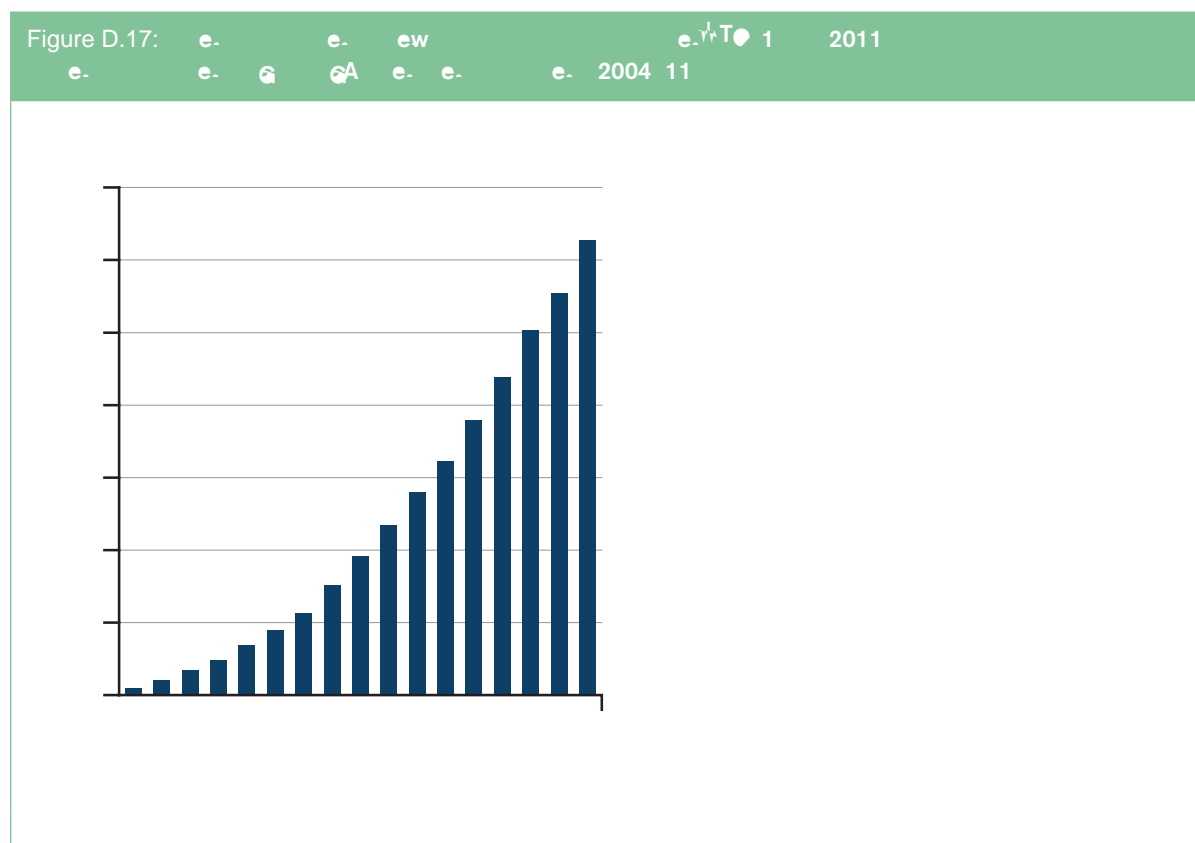
(c) Food standards, regulations and procedural obstacles

those applied at home (Jansen, 2010; WTO, 2005; 2012; Ferro et al., 2013). Additional costs arise from the fact that exporters often need to be able to prove that their products actually meet foreign standards. Related certification procedures can be prohibitively costly, in particular for

Standards and regulations are prominent policy tools in the exporters from developing countries<sup>29</sup>. agricultural sector and they are often meant to guarantee the safety of human and animal health. Information on Additional production and certification costs may arise both in SPS notifications to the WTO and on certification issued the case of public standards or regulations and in the case of by GlobalGAP ... Global Good Agricultural Practice, a non-voluntary private standards. The latter can have an important governmental organization that sets voluntary standards influence on trade flows, in particular if they are applied by for the certification of agricultural products ... is reported well-positioned NGOs or by major players in the distribution in Figure D.17. It suggests that the number of standards channels in the destination market. While the nature of the in international food trade has increased in recent years costs involved with complying with standards is by now well There also appears to be agreement that the complexity understood, little is known about the size of compliance costs. of standards has increased (Gibbon and Lazaro, 2010). Only a few studies have attempted to estimate compliance costs empirically, and their estimates vary widely.

According to evidence from business surveys conducted by the International Trade Centre (ITC), agricultural Private (voluntary) standards are developed by a exports are disproportionately affected by non-tariff number of entities, including companies, non-governmental measures (NTMs), such as SPS measures. In the 11 standardizing bodies (such as regional or international countries covered by the surveys, 53 per cent of surveyed bodies), certification and/or labelling schemes (e.g. the Marine businesses indicated that they were negatively affected by Stewardship Council scheme) and sectoral associations NTMs or related obstacles to trade. This percentage was (e.g. Florverde for flowers) (WTO, 2012) (see Box D.4). higher for businesses in the agricultural sector (60 per Standards tend to be set to ensure a certain level of quality or cent) and lower among manufacturing firms (51 per cent). to ensure compatibility with existing standards. In markets characterized by a limited number of active purchasers,

Although non-tariff measures exist to pursue valid policy however, standards can be used to leverage the market objectives, they can seriously hamper trade. Costs can arise power of purchasers (WTO, 2012).



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Quantitative research has shown that regulatory measures and logistical processes related to the importing or exporting applied by OECD countries can significantly reduce the cost of goods in general. To the extent that such processes are applied by developing countries to exports to OECD countries but do not take time, they can significantly hamper exports or not necessarily affect trade between OECD members and imports, in particular for time-sensitive products such as fresh fruit and vegetables or flowers. The United States Agency for International Development (USAID) (2007) estimates that even for less perishable crops, such as cereals, each day of delay from harvest to market reduction effects (Maertens et al., 2011). Also, Kadigi et al. (2010) find positive effects of standards for the fishery sector in East Africa. Liapis (2011) finds that measures that reduce time delays in crossing borders also have a significant effect on the export performance of processed agricultural goods.

The seemingly contradictory evidence about the effects of standards on trade can be explained in the following way. Meeting a standard implies costs but adhering to higher standards may also make it easier to conquer new market segments and/or to benefit from the higher prices attached to products meeting higher standards. The lower the cost of meeting the standard and the higher the return from meeting the standards ... in terms of higher sales or higher prices ... the more likely it is that the benefits from adhering to standards is positive.

Measures reducing time spent at borders can notably take the form of computerizing relevant operations and combining this with the training of relevant staff (Kiriti, 2014). The presence of economies of scale in different segments of the food chain has led to situations where individual segments are dominated by a few companies, often large multinational agro-enterprises. Concentration of market power is, for instance, present at the beginning of chains where the provision of inputs, such as pesticides or seeds, is dominated by a few players. The World Bank (2007) reports that in 2004 the four top providers of agrochemicals held 60 per cent of the global market. In the case of seeds, the top four providers held 33 per cent of the market. Similar levels of concentration can be observed towards the end of the chain.

### (d) Capturing mark-ups and influencing policy-making

Existing evidence suggests that positive outcomes are more likely in cases where suppliers have a medium- to long-term relationship with their buyers. Iacovone et al. (2011) describe the advantages that Mexican suppliers at the beginning of chains where the provision of inputs, such as pesticides or seeds, is dominated by a few requests suppliers to meet certain product and process standards and to accept very competitive market prices. On the other hand, the retailer significantly decreases transaction costs for the suppliers and makes it possible for them to supply markets nationally while producing locally. Iacovone et al. (2011) show that this arrangement is very profitable for suppliers that are relatively productive and that find it relatively easy to meet standards. The World Bank (2007) reports that the top four international traders of coffee held a market share of 40 per cent and the top four coffee roasters a share of 45 per cent. This implies that nearly half of the coffee produced by an estimated 25 million farmers and farm workers is channelled through only four companies before reaching an estimated 500 million consumers. This reflects one reason why the share of the retail price retained by producers is often relatively small and why the revenue of producers does not necessarily move in parallel with price fluctuations at the retail end.

Similar evidence exists for cases where suppliers sell inputs into downstream production processes, notably where the buyer of the inputs is a multinational. In these cases, part of the costs of meeting higher standards is borne by the foreign multinational, which has an implicit role in transmitting new technological know-how.

One way to strengthen the bargaining position of small and medium-sized suppliers within global value chains is to create producer organizations. Producer organizations can also play a role in influencing policy-making, including trade policy-making (World Bank, 2007). In many countries, smallholders only influence trade policy-making indirectly through the agricultural ministry while large landowners and agro-businesses have direct access to the trade ministries the border. Some of these costs stem from administrative processes linked to the certification of standards or smallholders find it easier to directly influence trade policy-making. Examples even exist of efforts to create

Another type of fixed cost that can have a significant impact on export and import flows is costs occurring at the border. Some of these costs stem from administrative processes linked to the certification of standards or smallholders find it easier to directly influence trade policy-making. Examples even exist of efforts to create

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Peru is the largest exporter of fresh asparagus worldwide. The sector currently accounts for about 25 per cent of the country's total agricultural exports. More than 220,000 tons of asparagus are produced yearly. There is no domestic market for asparagus so 99 per cent of production is exported, of which 70 per cent is fresh produce and mainly sent to the United States and the European Union.

Asparagus exports from Peru have increased tremendously in the past decades, from 4,590 tons with a value of US\$ 6.4 million in 1993 to 134,992 tons with a value of US\$ 286.5 million in 2011 (see Figure D.18). The number of firms exporting each year has tripled, from around 40 firms at the end of the 1990s to almost 120 firms in 2006, and has stabilized at around 100 firms per year since 2006 (see Figure D.19). A variety of private standards ... including GlobalGAP (Global Good Agricultural Practices), HACCP (Hazard Analysis and Critical Control Points), BRC (British Retail Consortium), LEAF (Linking Environment And Farming), IFS (International Featured Standards), GMP (Good Manufacturing Practices), SQF2000 (Safe Quality Food 2000) ... have been established in the sector since the early 2000s.

With the spread of private standards, the export volumes and values have continued to increase. Yet, this does not necessarily imply that private standards have had a positive effect on export volumes. Certified firms are observed to export larger volumes and values but they were already doing so before they became certified. It is the best-performing companies that seek certification and this can be confounded with certification having an impact on the export performance of companies<sup>34</sup>.

However, certification in line with private standards has had an effect on the sourcing strategies of export companies. Certified export firms currently source less from smallholder producers (1.5 per cent) than do non-certified firms (25 per cent). Before becoming certified (in 2001), instead, export firms sourced more from smallholder producers (20 per cent). The evidence reported in these studies therefore suggests that certification in line with private standards, especially production standards such as GlobalGAP, has decreased sourcing from smallholder suppliers in the case of asparagus exports from Peru (see Figures D.20 and D.21).

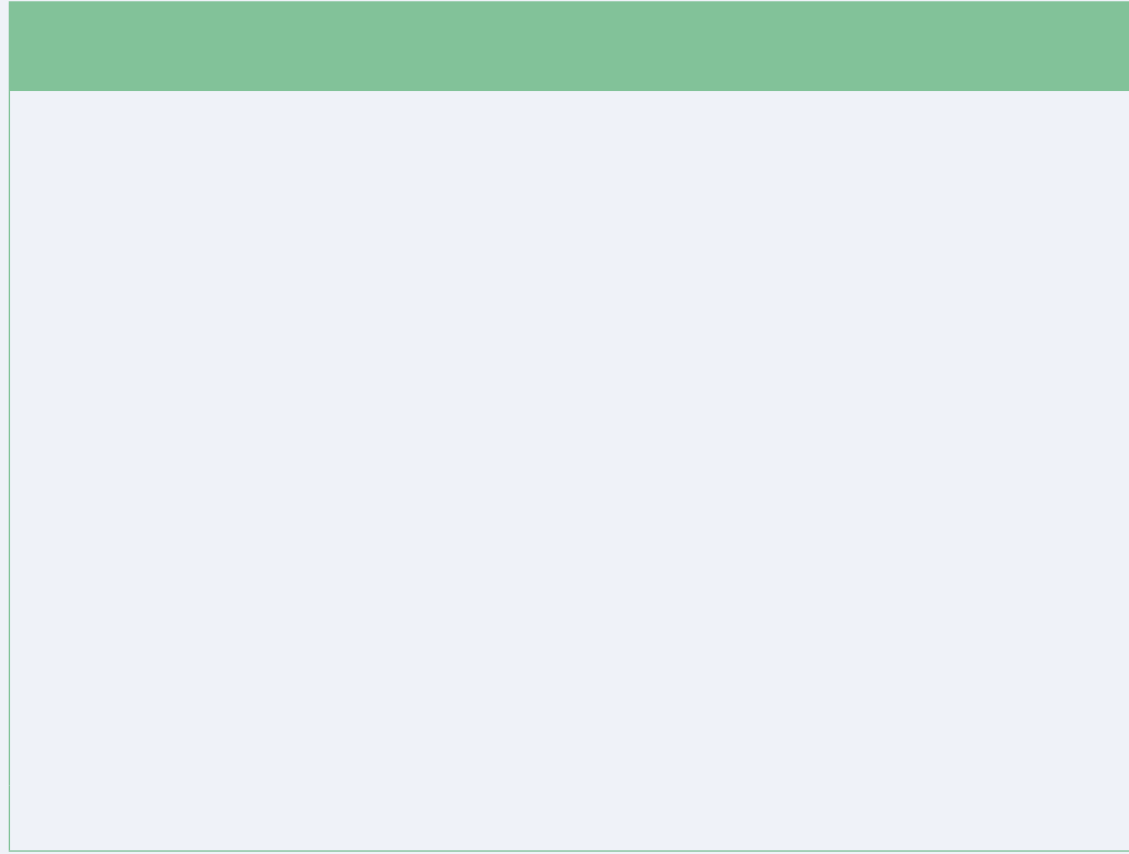
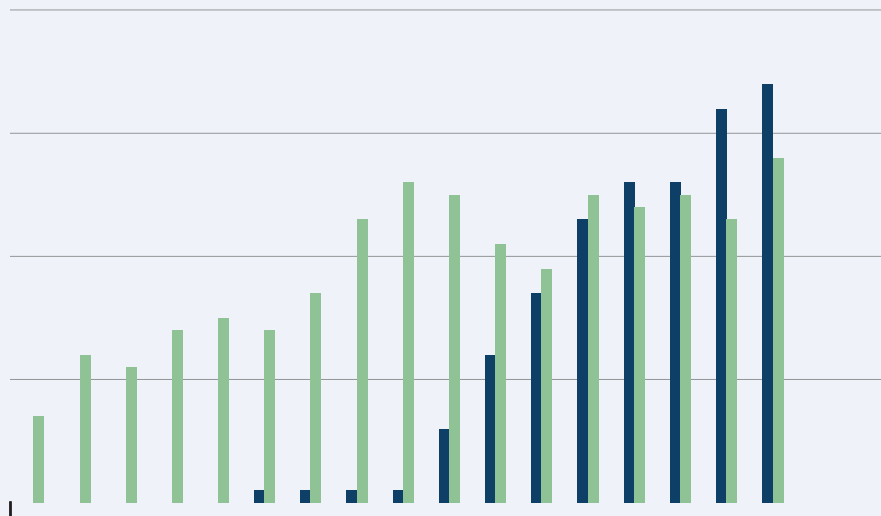




Figure D.19:

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Box D.5: A e- e- e- Ce- A e- e-

Agro-food exporters in a number of Central American countries face three main challenges in connecting to global value chains, according to the Centre for the Promotion of Imports from developing countries (CBI) (2014). These challenges are to identify products with export potential, to meet relevant product standards and to establish access to the relevant supply or retail chains.

The Centre's technical assistance activities have helped to address these challenges in the following ways:

- 1) To identify products with export potential, first research was undertaken. Products with high export potential for European markets were identified as tropical fruit (including avocado, mango, pineapple, banana, rambutan and berries), processed fruits and ingredients (including fruit juice, fruit pulps and concentrates) and honey, sesame seed, peanuts and spices.
- 2) To help exporters meet relevant product standards, technical assistance was provided in the form of coaching and support for businesses and business support organizations. For the identified products with export potential, compliance with food safety protocols is typically a minimum requirement. Furthermore standards certifying sustainable production and Corporate Social Responsibility play an important role.
- 3) To help exporters establish access to the relevant supply or retail chains, assistance has focused on the development of branding and marketing strategies at the national level and supporting individual exporters in attending European trade fairs relevant for their products.

prices, in particular in the case of crops that have a relatively lengthy gestation period<sup>34</sup>. For consumers, volatile prices are above all a problem when prices are high, as was the case at the end of the 2000s. Poor households typically spend a large share of their income on food, and high food prices can have severely negative impacts on these households, as discussed above. This explains why concerns about food security were at the forefront of the political debate during the Great Recession of 2008-09, as reflected, for instance, in the establishment of the High Level Panel of Experts on Food Security and Nutrition (HLPE) as the science-policy interface of the UN Committee on World Food Security (CFS).

Different policy instruments exist to deal with price volatility. The High Level Panel of Experts on Food Security and Nutrition (HLPE) (2011) distinguishes between two types of measures that aim at reducing the impact of price volatility measures to manage price

slump. The share of fuel and mining products in global sectors play a dominant role, using three criteria: (1) manufacturing exports has increased therefore, especially resources account for more than 20 per cent of exports; in regions such as Sub-Saharan Africa and Latin America (2) resources generate more than 20 per cent of fiscal and the Caribbean. revenue; or (3) resource income is more than 10 per cent

Countries in these regions have experienced noticeable number of resource-driven countries increased from 58 in economic growth during the years of sustained resource 1995 (representing a share of 18 per cent of global GDP) price increases. The question is, however, whether resource 81 in 2011 (with a share of 26 per cent of global GDP). based growth can be sustained and translated into positive in regions such as Sub-Saharan Africa and Latin America development outcomes. A series of policies can potentially and the Caribbean, the share of fuels and mining products underpin resource-based development. These are analysed in total merchandise exports increased significantly (see the second part of the section and include policies to harness Figure D.24).

windfall revenues, diversification policies, FDI policies, and policies to address social and environmental concerns.

For countries and regions with high shares of natural resources in exports, fiscal revenue or economic output, the question is whether specialization in natural resource sectors can be an engine of growth and development.

(a) Trade in natural resources: recent trends

Trade in natural resources increased significantly between 2000 and 2010, notwithstanding the slump in 2008, as shown in Figure D.22. Trade rose not only in value terms (an unsurprising result, given large price increases up to the 2008 crisis) but also in terms of volume.

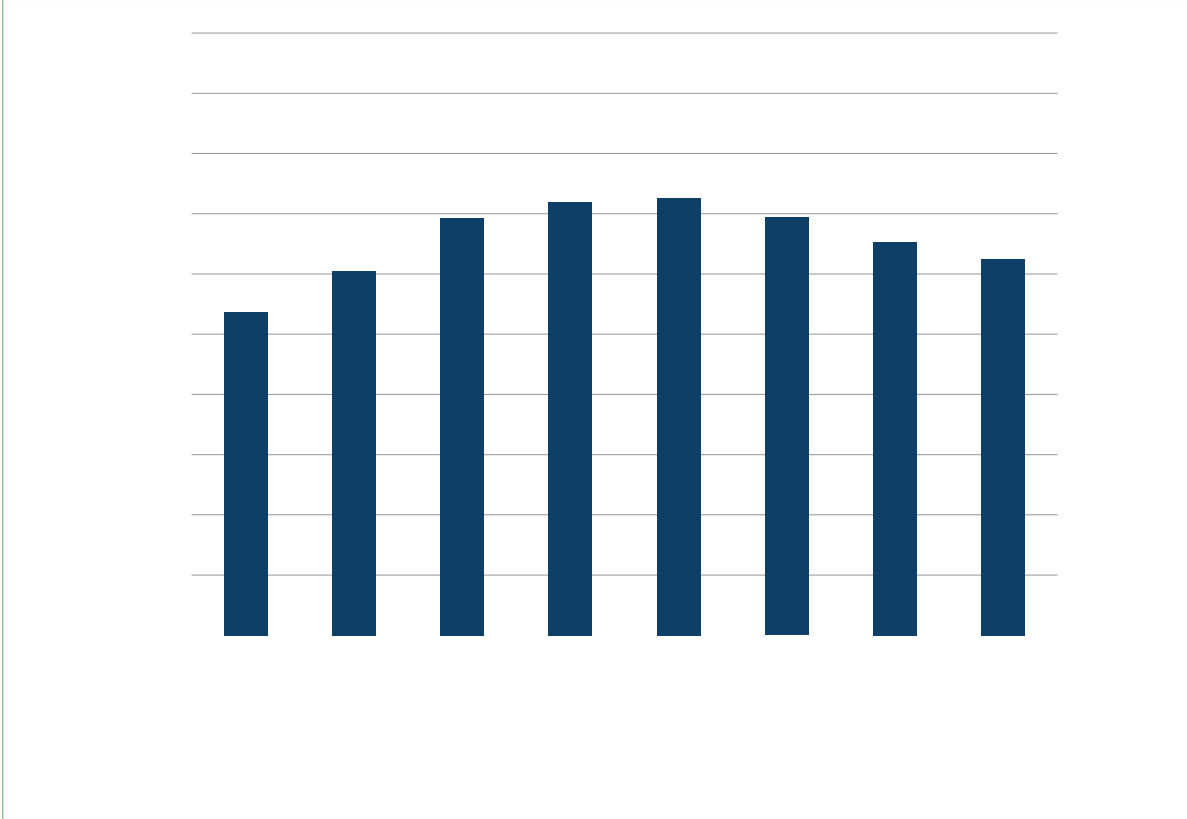
(b) Can the 'natural resource curse' be made history?

The idea that there is a 'natural resource curse' is common. The WTO (2010) identifies three

transmission channels for the resource curse: Mostly because of rising prices (at least until 2008), the share of fuels and mining products in world merchandise (1) exports increased from 13.2 per cent in 2000 to 22.7 per cent in 2012. Manufactured goods still make up the bulk of world merchandise exports but their share decreased from 72.5 per cent in 2000 to 62.4 per cent in 2012 (see Figure D.23).

Dobbs et al. (2013a) define 'resource-driven countries' as those economies where the oil, gas and mineral

Figure D.23: e- w e- e.e- 1 80 2012 (per cent)



to institutional worsening. Thirdly, natural resources may increase the probability of civil wars, especially in countries marked by an uneven distribution of natural resources within their territory and ethnic divisions.

As argued in WTO (2010), however, the empirical relevance of the resource curse is mixed. On the one hand, greater natural resource wealth is associated with higher GDP per capita in a cross-country sample (Sinnott et al., 2010). On the other hand, almost 80 per cent of resource-driven countries identified by Dobbs et al. (2013a) have per capita income below the global average.

Since 1995, more than half of these countries have failed to match the average growth rate (of all countries). These seemingly contradictory results also emerge from a recent study by Bluedorn et al. (2013). They analyse episodes of growth take-offs in nearly 70 developing economies or low-income countries (LICs) over the past six decades. The study reveals that resource-rich LICs with recent growth take-offs performed particularly well (with GDP per capita typically rising by 80 per cent in ten years) but at the same time many resource-rich countries did not manage to jump-start growth.

The sustained increase in natural resource prices in the early- and mid-2000s documented in Section D.1 has, without any doubt, contributed to economic growth in several resource-rich developing countries, especially in Sub-Saharan Africa and in Latin America. Since 2000, resource exporters in Sub-Saharan Africa have experienced higher GDP per-capita growth than other countries in the region (International Monetary Fund (IMF), 2012c).<sup>37</sup> According to the IMF analysis, the stronger growth reflects not only favourable commodity-price developments but also the effects of new resource discoveries (for example, in Angola, Equatorial Guinea and Tanzania). For Latin America, the Economist (2010) suggests that the rise in world prices of commodities, and the related increase in their output (and exportation), may have accounted for between one-third and one half of the region's growth over the decade 2000-10.

Natural resource abundance, however, has not been the only route to strong and sustained growth in these regions. In a recent study, the IMF (2013a) identifies the top six growth performers in Sub-Saharan Africa between 1995 and 2010 based on two criteria: real output growth greater than 5 per cent and real GDP per capita growth of more than 3 per cent. The following countries meet these criteria: Burkina Faso, Ethiopia, Mozambique, Rwanda, Tanzania and Uganda. None of these countries was resource-rich at the beginning of the sample period. In these countries, growth was spurred and sustained by improved macroeconomic management, stronger institutions, increased aid and higher investment in both physical and human capital (IMF, 2013a). High prices of natural resources played an indirect role, with some of these countries (especially Mozambique) having received large investments related to discovery of natural resources.



Table D.7A <sup>e</sup> <sub>e</sub> <sup>e-e</sup> <sub>we</sub> <sup>††</sup> 2012 (US\$ billion and percentage of GDP)					
Country	Year started	Origin	Assets (US\$ billion)	GDP (US\$ billion)	Assets (% of GDP)
China	1997	Non-commodity	1,142.0	8,227.1	13.9%
United Arab Emirates	1976	Oil	803.2	383.8	209.3%
Norway	1990	Oil	611.0	500.0	122.2%
Saudi Arabia, Kingdom of	n/a	Oil	532.8	711.0	74.9%
Singapore	1974	Non-commodity	404.7	276.5	146.4%
Kuwait, the State of	1953	Oil	296.0	183.2	161.5%
Hong Kong, China	1993	Non-commodity	293.3	263.3	111.4%
Russian Federation	2008	Oil	149.7	2,014.8	7.4%
Qatar	2005	Oil	100.0	192.4	52.0%
Australia	2006	Non-commodity	80.0	1,532.4	5.2%
United States	1854	Oil/Minerals/Non-commodity	79.0	16,244.6	0.5%
Kazakhstan	2000	Oil	58.2	203.5	28.6%
Algeria	2000	Oil	56.7	205.8	27.6%
Republic of Korea	2005	Non-commodity	43.0	1,129.6	3.8%
Malaysia	1993	Non-commodity	36.8	305.0	12.1%
Azerbaijan	1999	Oil	30.2	66.6	45.3%
Brunei Darussalam	1983	Oil	30.0	17.0	176.9%
Ireland	2001	Non-commodity	30.0	210.6	14.2%
France	2008	Non-commodity	28.0	2,611.2	1.1%
Iran	1999	Oil	23.0	552.4	4.2%
New Zealand	2003	Non-commodity	15.9	171.3	9.3%
Canada	1976	Oil	15.1	1,779.6	0.8%
Chile	2007	Copper	15.0	269.9	5.6%
Brazil	2008	Non-commodity	11.3	2,252.7	0.5%
East Timor	2005	Oil and Gas	9.9	1.3	765.7%
Bahrain, Kingdom of	2006	Non-commodity	9.1	30.4	30.0%
Oman	1980	Oil and Gas	8.2	78.1	10.5%
Total			4,977.1		
Total oil- and gas-related					

Box D.6: e.e. we.

There are two main origins of funding for sovereign wealth funds (SWFs): resources such as oil, gas and copper; and financial non-commodity sources. The focus of this box is on resource-backed SWFs.

If natural resources generate a substantial stream of income, resource-rich countries will often channel this into their newly established SWFs. As already highlighted, these funds are created not only to stabilize the economy and to support intergenerational savings but also to boost domestic investment, mainly in infrastructure. Even though SWFs are a relatively recent phenomenon, they have managed to accumulate significant reserves. In 2012, the average amount of assets in SWFs of an oil-rich country was above 100 per cent of the country's GDP, as shown in Table D.7.

Some African countries have developed explicit fiscal frameworks aimed at saving resources for the future or creating a fiscal buffer to help protect budget spending from revenue volatility. Since 1994, fiscal policy in Botswana has been guided by a Sustainable Budget Index principle, which seeks to ensure that non-investment spending is financed only with non-resource revenue. Nigeria created a SWF in 2011. Ghana put 70 per cent of petroleum revenue revenues into public spending and divided the rest between a stabilization fund and a heritage fund.

Investment in social protection is one of the most powerful ways in which governments in Africa can extend the benefits of resource wealth to their citizens. The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2012) estimates that increased revenue from minerals could put another 16 million children into school across 17 resource-rich countries. In Rwanda, much of the rapid decline in poverty, from 57 per cent of the population in 2006 to 45 per cent in 2011, results from the Umurenge Programme of Public Works and from government payments to the poor. During the 2011 drought in East Africa, Ethiopia's Productive Safety Net Programme not only saved lives but also provided support to help people cope with the crisis without having to sell off vital productive assets or take children out of school.

need to finance infrastructure and debt reduction. Higher investment puts the economy on a higher growth path, with beneficial effects on wages and on subsequent consumption. After depletion, the consumption increment remains positive, but moves towards zero. This is because instead of building up an overseas sovereign fund, the resource wealth has been used to build up the human and physical capital stock of the economy, improving its growth prospects.

The results of Van der Ploeg and Venables (2011) suggest that the establishment of an intergenerational fund that would spread out the benefit of resource windfalls across generations is relatively more attractive for rich countries than for poor countries<sup>43</sup> Resource-rich countries facing capital scarcity and paying a risk premium on their sovereign debt would instead find it more attractive to build a domestic investment fund (Van der Bremer and Van der Ploeg, 2013; Arezki et al., 2012). Such a fund would channel part of the windfall towards domestic investment in infrastructure, health and education. The important caveat, underlined both by Van der Bremer and Van der Ploeg (2013) and by Arezki et al. (2012), is that,





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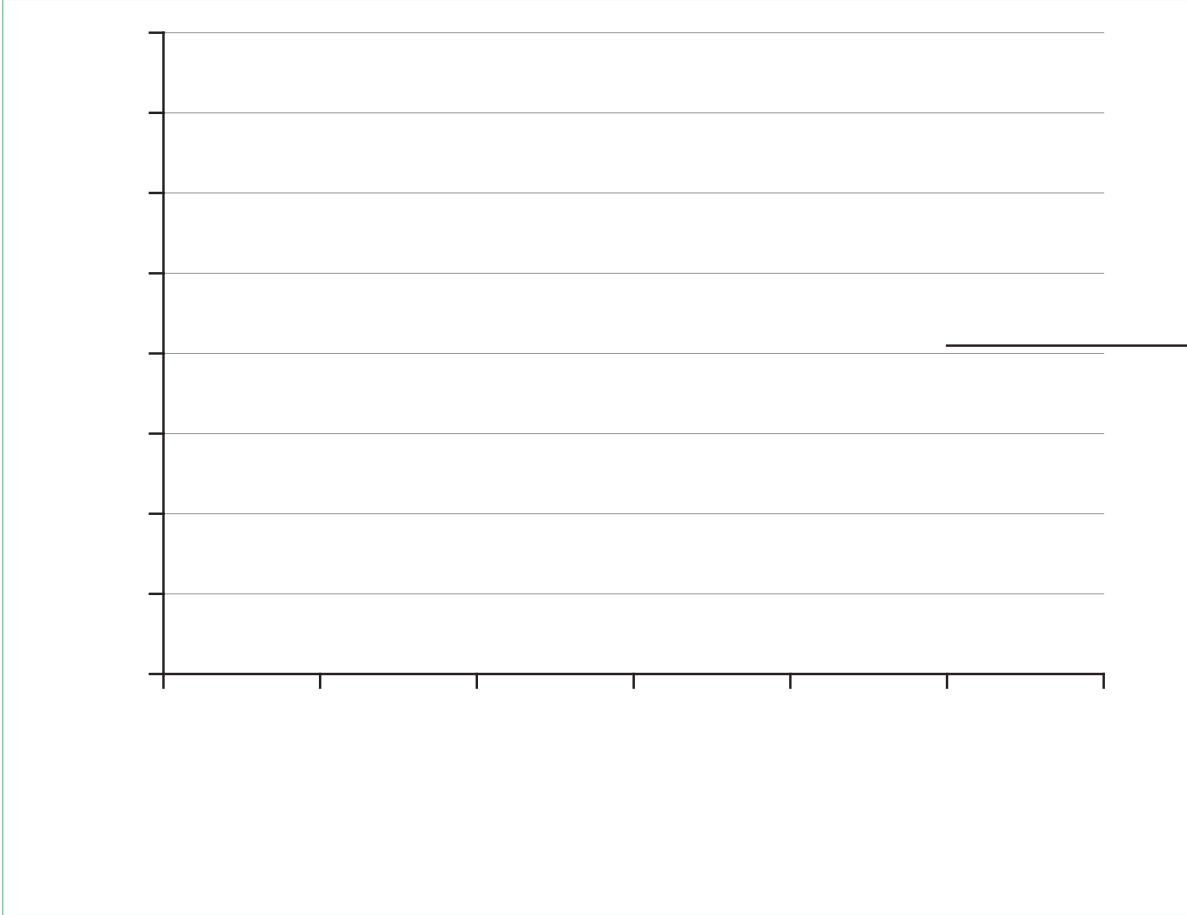
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While resource abundance unambiguously increases FDI in resource sectors, its effect on overall FDI is less clear. On the one hand, studies such as Sanfilippo (2010), Cheung et al. (2012) and Kolstad and Wiig (2012) find a positive effect of resource abundance on FDI. On the other hand, Poelhekke and van de Ploeg (2010) argue that resource-based FDI (which is positively affected by resource abundance) displaces non-resource-based FDI (which is negatively affected by resource abundance). Therefore, they argue, aggregate FDI is lower in resource-rich countries, especially if they are geographically close to many other big markets.

A potential risk is that resource-based FDI is very capital-intensive and can lead to fewer beneficial spillover effects into the non-resource sectors of the host economy than non-resource FDI if it relies less on local sub-contractors or suppliers. As argued above, the outcome in terms of spillover effects of resource FDI on the local economy is likely to depend on the economic and institutional environment. Moreover, recent experience in Sub-Saharan Africa shows that resource FDI has positive spillovers on physical infrastructure (Kaplinsky and Morris, 2009). It can therefore lead to opening up growth corridors that can be beneficial to other sectors in the economy, such as agriculture (Weng et al., 2013).

There are several other FDI-related challenges facing

Figure D.28:C e- e-wee- e- e- e- e- e- e- e-  
1 0 2010







Agriculture represents an important sector, both for developing country producers in global competition. terms of production and in terms of consumption, Thirdly, access to developed and G-20 developing for many developing and least-developed countries• markets continues to be an issue, especially (LDCs). The sector therefore plays a crucial role for LDC exporters. This is partly due to relatively high their development strategies. Countries that managed agricultural tariffs but in particular it is due to the costs to increase productivity in the agricultural sector have of meeting standards (including private standards) and been characterized by high rates of economic growth sanitary and phytosanitary (SPS) regulations, and to the and poverty reduction (in particular, improvements in costs caused by delays in crossing borders. the livelihoods of the very poor). Agricultural trade has

increased significantly in recent years, in the context The section has highlighted two more challenges. First, of high and rising agricultural prices. This has created numerous value chains in the agricultural sector are opportunities for developing countries to leverage characterized by market concentration, sometimes at agricultural exports for development. multiple points along the value chain. This may create

problems for small producers in developing countries. This section has highlighted the various development Secondly, prices in the agricultural sector are notoriously challenges facing exporters of agricultural goods, and volatile, which can create difficulties for consumers and in particular LDCs. First, the rising share of processed for producers in the light of investment decisions they may goods in total agricultural trade, which reflects increased have to take. Evidence suggests that if counter-cyclical vertical coordination of production structures, indicates measures that aim at reducing volatility are introduced that involvement in food supply chains is very important jointly by net importers and net exporters, price hikes may Secondly, productivity gaps may represent a disadvantage actually be exacerbated.

# Endnotes

- 1 Forestry and fishery are excluded from the definition of natural resources because the focus of the literature that has analysed the link between natural resource exports and development has exclusively been on extractive resources, such as minerals and oil.
- 2 Some challenges are, however, common to both the natural resources and agricultural sectors. These include the management of price volatility and the attraction of foreign direct investment (FDI).
- 3 See, for instance, Erten and Ocampo (2012). The authors define commodity super-cycles as episodes in which the upward price trend lasts much longer than usual (10-35 years) and covers a broad range of commodities.
- 4 The Africa Progress Panel (2013) reports that since the end of the 1990s, consumption of refined metals in China has climbed by 15 per cent a year on average. The country's share of global demand for copper, aluminium and zinc has more than doubled; for iron ore, nickel and lead it has tripled. Metal intensity (measured as resource use per US\$ 1,000 of real GDP) is nine times higher in China than the global average. The fact that China's ores are lean and difficult to smelt raises their extraction costs (China.org.cn, 2013).
- 5 See WTO (2010) for an in-depth discussion on the causes of oil price volatility and on its effects on oil-exporting and on oil-importing countries.
- 6 Following the shifting patterns in global economic activity outlined in WTO (2013c), global energy trade will be re-oriented from the Atlantic basin to the Asia-Pacific region. China will become the largest oil-importing country and India will become the largest importer of coal by the early 2020s (IEA, 2013).
- 7 An alternative explanation is proposed by Baumeister and Kilian (2013). They argue that the link between food and oil prices is largely driven by common macroeconomic determinants, rather than the pass-through from higher oil prices to food prices.
- 8 For an in-depth discussion on mineral and energy commodities, see Lee et al. (2012). Studies that argue in favour of permanently higher prices of commodities include Kaplinsky and Morris (2009) and Dobbs et al. (2013b).
- 9 Any analysis of the relationship between export growth and development suffers from obvious endogeneity problems. The relationship depicted in Figure D.6 is nevertheless striking as it contrasts with the more common finding that primary exports are associated with poor economic performance (e.g. Wood, 2007).
- 10 The 12 countries covered are Mauritania (2001), Mozambique (2004), Niger (2008), Rwanda (2005), Sao Tomé and Príncipe (2006), Senegal (2003), Sierra Leone (2006), Sudan (2008), Tanzania (2005), Togo (2010), Uganda (2013) and Zambia (2005).
- 11 WTO International Trade and Market Access data accessed on 2 April 2014.
- 12 See also the discussion in Section D.4 on the role of standards in agricultural trade.
- 13 The sources of this information are Maertens and Swinnen (2014), based on Maertens et al. (2011), Maertens, 2009; Maertens and Swinnen, 2009; Colen et al., 2012.
- 14 For the sake of consistency, the same category definitions will be used for the discussion of trade flows and of tariff structures in this section.
- 15 See also similar findings in Liapis (2011).
- 16 LDC exports of agricultural goods have, for instance, grown by an annual 11 per cent in the years between 2000 and 2012 (see Table D.6). Growth was significantly stronger among food items (11.6 per cent) than among raw materials (6.4 per cent). Average annual growth (2010-12) was somewhat stronger, i.e. 12.8 per cent, for LDCs that are categorized by the WTO as 'exporters of agricultural products'. Within this group, annual export growth of agricultural products was strongest in Rwanda (22.4 per cent) and Burkina Faso (21.6 per cent).
- 17 See also Ng and Aksoy (2010b).
- 18 Their 'low-income country group' overlaps to a significant extent with the 'LDC group' in this section.
- 19 Iannotti and Robles (2011) as cited in International Food Policy Research Institute (2011).
- 20 Quote from Wood (2003), page 163.
- 21 See also the evidence presented in Szirmai (2012).
- 22 However, reports also indicate that there is a significant difference between expressed interest in investments and actual investments in farm operations (e.g. Arezki et al., 2011).
- 23 See, for instance, Delich and Lengyel (2014) on the role of the Fundación Pro Arroz in the export success of Argentinian rice.
- 24 WTO (2013). Average tariffs are based on best applicable tariffs (MFN and preferential treatments granted to LDCs and developing countries), and weighted using a standard export structure based on 2000-01 (WTO, 2013b).
- 25 The RRA is a measure based on price-related distortions to agricultural markets. It notably takes into account the output-price-altering equivalent of any product-specific input subsidies or taxes (Anderson et al. 2013, p. 428).
- 26 Order according to severity of bias from high to low according to Anderson et al. (2013), Figure 5.
- 27 Order according to severity of bias from high to low according to Anderson et al. (2013), Figure 5.
- 28 See Figure C.15 in WTO (2012) based on 'ITC Business Surveys on NTMs'. The countries covered by the surveys are Burkina Faso, Egypt, Jamaica, Kenya, Madagascar, Mauritius, Morocco, Paraguay, Peru, Rwanda and Uruguay.
- 29 Sometimes certification costs are the only costs developing countries have to incur, for instance in cases where traditional production methods meet importing countries' sustainability criteria (Gibbon and Lazaro, 2010).
- 30 Maertens and Swinnen (2014) report that Aloui and Kenny (2005) and Cato et al. (2005) have estimated the cost of compliance with SPS measures for tomato exports from Morocco and for shrimp exports from Nicaragua respectively to be only a small fraction, less than 5 per cent of total production costs, while Asfaw et al. (2010) find that investment costs related to GlobalGAP certification represent 30 per cent of annual crop income for vegetable farmers in Kenya. From their own interviews with asparagus exporters in Peru in 2009, Maertens and Swinnen (2014) estimate the cost of certification and audits related to a variety of private standards to be around US\$ 4,500 to US\$ 7,000 annually, but this cost is small relative to total production costs (less than 1 per cent).



- 31 Also called •monopsonistic marketsž.
- 32 Versus a 0.6 per cent tariff equivalent for textiles and 0.3 per cent for pharmaceuticals as reported in WEF (2014) based on USAID (2007).
- 33 Box adapted from Maertens and Swinnen (2014) based on Schuster and Maertens (2013a; 2013b).
- 34 For example, Schuster and Maertens (2013a; 2013b) have examined the relationship between certification and exports for the case of Peru. They do not find evidence of certification having a direct impact on firms' export performance.
- 35 See, for instance, Mc Millan et al. (2002) on the difficulties of farmers in Mozambique to take decisions regarding the planting of cashew trees in an uncertain policy environment.
- 36 For a recent overview of the resource curse literature, see Heinrich (2011).
- 37 This is partly confirmed by regression analysis that estimates the conditional correlation between GDP per-capita growth and two measures of natural resource exports (respectively, the share of fuels and the share of mining products in total merchandise trade) for the sub-sample of Sub-Saharan African countries, controlling for country- and year-fixed effects. The coefficient on the share of fuel in total merchandise trade turns from statistically not significant in the 1980-99 period to positive and statistically significant in the 2000-12 period. The coefficient on the share of mining products in total merchandise trade turns from negative and statistically significant in the 1980-99 period to statistically not significant in the period 2000-12.
- 38 Three of these countries became resource-rich after the beginning of the sample: Burkina Faso, Tanzania and Mozambique. Burkina Faso has become a gold producer since the mid-1990s. Tanzania and Mozambique are both on the Indian Ocean, where large discoveries of oil and natural gas were made recently. With production that could reach 100 million tonnes over the next decade, Mozambique is also primed to become a major exporter of coal to India and China (Africa Progress Panel, 2013).
- 39 Several studies have used the ratio of primary exports to total exports as a proxy for natural resource abundance. Wood (2007) criticizes this measure because the export ratio depends on a country's stock of physical and human capital, which in turn is strongly correlated with development success. To address this issue, the measure of natural resource abundance used in this section is total natural resource income as a percentage of GDP. It is defined as the difference between the value of production at world prices and total costs of production for oil, natural gas, coal, minerals and forestry.
- 40 Lee et al. (2012), however, point out that despite increased exploration efforts, world-class mineral discoveries have become less frequent. Moreover, as ore grades decline for base and precious metals, production costs are increasing significantly in mature mining countries, such as Chile and South Africa (Africa Progress Panel 2013).
- 41 Collier and Venables (2010) show the significant extent of under-exploration in Africa relative to OECD countries: as of the year 2000, some US\$ 114,000 of sub-soil assets were known to lie beneath the average square kilometre of the OECD. The equivalent figure for Africa was a mere US\$ 23,000. This reflects, among other things, the need for commitment technologies for resource exploration and exploitation.
- 42 See IMF (2012b) for an in-depth discussion.
- 43 According to Van der Bremer and Van der Ploeg (2013), the size of an intergenerational fund would then be larger if future generations are not expected to be much richer than current generations.
- 44 Increased spending during commodity price booms is, among other things, associated with real exchange rate appreciation (this is the so-called •spending effectž of the Dutch disease ... see WTO (2010)). If a bust follows the boom, governments are then forced to cut spending and allow sharp devaluations of the real exchange rate (Sinnott et al., 2010).
- 45 Most studies focus on government spending because tax receipts are endogenous with respect to the business cycle. Indeed, as explained by Frankel et al. (2013), an important reason for pro-cyclical spending is that government receipts from taxes or mineral royalties rise in booms, and the government cannot resist the temptation or political pressure to increase spending proportionately, or more.
- 46 A cautionary note is in order. Analysing the cyclicity of fiscal behaviour in 28 developing oil-producing countries during 1990-2009 ... and correcting for reverse causality between non-oil output and fiscal variables ... Erbil (2011) provides evidence of strong pro-cyclicity of fiscal policy in oil-rich countries. The results are not uniform across income groups: expenditure is pro-cyclical in the low- and middle-income countries, while it is counter-cyclical in the high-income countries.
- 47 Imbs and Wacziarg (2003) find a U-shaped pattern, whereby countries in the earlier stages of development diversify production and countries above a certain level of income tend to re-concentrate production.
- 48 For a detailed explanation, see WTO (2010), especially Box 10.
- 49 In case of severe environmental degradation, the marginal environmental damage may be larger than the marginal benefit of extracting the resource, making it optimal to keep the resource in the ground. Technological shocks that threaten comparative advantage include the invention of substitutes or the opening up of new sources of supply. A notable example is hydraulic fracturing (fracking) technology, which has largely increased the availability of unconventional oil and, especially, natural gas reserves in the United States ... see *The Economist* (2013).
- 50 Diversification into manufactured goods characterized countries such as Malaysia, Thailand, Indonesia and Sri Lanka (Coxhead, 2007). Diversification into services with high growth potential has been noticeable in some Gulf Cooperation countries in the last decades. Bahrain, for instance, developed a financial services industry following the relocation of the international banking community from Lebanon after the outbreak of the civil war in Lebanon in 1975. The development of aviation, tourism, real estate, recreational, educational, logistics and business services in countries such as Qatar (which will host the FIFA World Cup in 2022) and the United Arab Emirates constitute other notable examples. For an overall critical assessment of economic diversification in Gulf Cooperation countries, see Hvidt (2013).
- 51 Africa Progress Panel (2013) reports, for instance, that Africa's growth surge over the past decade was driven by extractive industries operating in enclaves with few links to the local economy and exporting largely unprocessed oil and minerals.
- 52 Aragon and Rud (2009), cited in Sinnott et al. (2010).
- 53 See Coxhead (2007) for an account of the Chilean experience in achieving growth by widening the range of resource-based exports to include new and more sophisticated products.
- 54 Beverelli et al. (2011) build a theoretical model showing that the appreciation of the real exchange rate (Dutch disease) can be escaped if patterns of specialization shift towards the manufacturing industries that use the natural resource more intensively. Using various sources of available information on oil discoveries in 132 countries, they provide empirical support for this hypothesis.
- 55 As noted by Sinnott et al. (2010), this is true of manufacturing sectors as well, explaining why enclave-like export processing zones can sometimes succeed in countries with poor business

- environments. For an articulated discussion on the link between natural resource endowment and institutional quality, see WTO (2010).
- 56 Examples include: large investments in an oil pipeline and associated port facilities in Sudan; the construction of a deep-water port at Santa Clara, a railway track running 560 km from Bellinga to the coast and a hydro-electric power plant (Gabon); the refurbishment of the rail network connecting Angola, the Democratic Republic of the Congo and Zambia.
- 57 For example, in Iraq the government allocated its service contracts for oil extraction through highly successful open and competitive auctions. The winning consortium at the Rumaila oil field will be taking US\$ 2 per barrel less than demanded by the next best bidder, which could result in a difference of US\$ 1.8 billion per annum to the Iraqi Treasury by 2017 (Sustainable Development Solutions Network (SDSN), 2013).
- 58 Guriev et al. (2011) analyse the determinants of nationalizations in the oil industry around the world during 1960...2006. They show, both theoretically and empirically, that high oil prices increase the likelihood of nationalization.
- 59 For a detailed discussion of the hold-up problem in natural resource sectors, see WTO (2010), Section E.
- 60 On the EITI and other transparency initiatives, such as the Kimberley Process Certification Scheme (KPCS), see WTO (2010), Section E.
- 61 Country fixed effects capture any country-specific characteristic that does not vary over time. Year fixed effects control for global business cycles.
- 62 Production of a barrel of shale oil can generate up to 1.5 tons of solid waste, which may occupy up to 25 per cent greater volume than the original shale (European Academics Science Advisory Council, 2007).
- 63 Over 150 billion cubic metres (or 5.3 trillion cubic feet) of natural gas are being flared and vented annually. The gas flared annually is equivalent to 25 per cent of the United States gas consumption (Global Gas Flaring Reduction public-private partnership (GGFR), 2013). A public-private partnership called Global Gas Flaring Reduction Partnership (GGFR) was launched at the World Summit on Sustainable Development in Johannesburg in 2002. Poverty reduction is also an integral part of the GGFR programme, which is developing concepts for how local communities close to the flaring sites can use natural gas and liquefied petroleum gas that may otherwise be flared and wasted. The programme has already evaluated opportunities for small-scale gas utilization in several countries.
- 64 The Environmental Performance Index (EPI), constructed by the Yale Center for Environmental Law and Policy, ranks how well countries perform on high-priority environmental issues in two broad policy areas: protection of human health from environmental harm and protection of ecosystems.