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NIGER:

Leveraging Export Diversification to Foster Growth

Volume II. Annexes

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Examining Structural Change in Niger

Literature on economic diversification is extensive.[1] In general terms, it commonly views economic diversification as the process of structural transformation through which a country moves from producing « poor country, low value-added » goods to producing « rich country, high value-added » goods. Thus, diversification happens when the country produces an increasing variety of more sophisticated goods and services to improve the standard of livings of the population. And in modern economies, this often requires a familiar sectoral pattern of rising manufacturing, services and trade combined with falling, often dominant, subsistence-based agriculture. This typologie may also be applied to export diversification.

The underlying assumption of export diversification is that although many natural resource-dependent countries have developed their economies and enjoy high standards of livings, the most successful ones are those that have been able to move into a less concentrated non-natural resource-based production and export base. Malasia, Indonesia and Mexico have all moved away from oil-dependence by diversifying their exports, in contrast to Angola, Nigeria and Lybia who have not done so and reported lower export per-capita in the past three decades (World Bank, 2015). Chile, as an example of a diversified economy, exports more than 2,800 products to more than 120 countries. In contrast, Zambia, a country similarly endowed with copper resources, exports just over 700 products—one fourth of Chile's export basket—and these go to just 80 countries. A similar situation occurs with oil-exporting Nigeria, which exports just about 780 products (Fruman, 2017).

For countries like Niger, diversification featuring structural change would be the case where new agricultural products, with export potential, expand the agricultural (non-subsistence) base and become primary inputs to agri-business industries in a process often accompanied by the development of new services (logistic, transport, electricity, telecom). Ultimately, over the medium term, the economy would see the contributions of the subsistence agriculture and secondary (mining) sector to GDP declining, as it becomes less reliant on natural resources, in contrast to rising contributions from manufacturing and services sectors. As seen in Chapter II, Niger's simultaneous progress accross the ladder has been modest in terms of products intensity (first step), more visible in term markets expansion (second step), still embryonic, albeit promising piloting emerging products (third step) as seen in Chapter V, and slow but positive on structural change (fourth step) as explored in the next section.[2]

There is little evidence that significant structural change has underpinned Africa's recent growth as previous studies rather find no structural change happening in SSA countries. McMillan et al. (2014), in an analysis covering the period between 1990 and 2005, coincide on a shift of workers from sectors with above-average productivity into sectors with below-average productivity for Sub-Saharan Africa.[3] Furthermore, they document that a lower share of natural resources in exports contributes to growth-enhancing structural change. Timmer et al. (2012) also note that expansion of employment into manufacturing has been meager (at about one-quarter of one percent during that 15-year period).

[1] A review of the stages of diversification is found in Imbs and Wacziarg (2003) and an operational overview in Chandra (2016).
[2] An important caveat is that this section does not explore the prospects of diversification of its existing oil and minerals extractive industries. Its focus is rather concentrated on the potential of new products, mainly agricultural-based, and services.
[3] On the contrary, Asian countries experienced productivity-enhancing structural change during the same period. In light of these findings, the authors argue it would be difficult to attribute Africa's (and Latin America's) poor growth performance solely to globalization or other external determinants. They rather make the case that Asia has outshone the other two regions not so much in productivity growth within individual sectors (where performance has been broadly similar), but instead, in ensuring that the broad pattern of structural change contributes to, rather than detracts from, overall economic growth.

The paragraphs below explore the main trends underlying structural change analysis in Niger: output, employment, and labor productivity patterns since 1990. They highlight changes in the levels, growth and composition of production, employment and sector-based labor productivity. The ten key sectors discussed include agriculture (including hunting, fishing, and forestry); mining and quarrying; manufacturing; public utilities (including electricity, gas and water); construction; commerce (including whole sale and retail trade, hotels and restaurants); transport (including storage and communication); finance (including insurance, real estate and business services); community, social and personal services; and government services. The analysis uses data from 1990 to 2015, focuses on trends over the whole period (1990-2015), as well as breakdowns between 1990-2000, 2000-2010, and 2010-2015; and explores trends in production, employment and labor productivity by sectoral composition, with a focus on growth trends. Once this is done, the following section addresses structural change.

In real terms, Niger's total GDP gross value added (GVA) increased nearly three-fold between 1990 and 2015. Its main patterns are displayed in Table A1.1.

Agriculture, and to a lesser extent commerce, were the main contributors to GVA in this period. Agriculture contributed with 45.8 percent of total GVA in 2015, and experienced a non-negligible average yearly growth of 4.8 percent during the entire period. Commerce grew by 3 percent yearly during the same period, while it declined slightly in its contribution to total GVA from 16.1 percent to 12.9 percent.

- The largest increase in output was witnessed between 2000 and 2010, which accounted for a 32 percent overall increase, equivalent to an average 5.8 percent annual growth. Among sub-sectors, driven by the expansion in transport services and technological improvements in the telecom sector, the one on transport, storage and communication witnessed the highest growth rate, with 5.7 percent annual growth over the full period; although this was coming from a low base and only accounted for roughly 7 percent of total GVA by 2015. This growth was likely
- Looking more recently at the 2010 to 2015 period, mining and quarrying experienced the highest average growth (17 percent), followed by government services (10.9 percent) and a mildly reinvigorated manufacturing (10 percent). However, and despite their dynamism, these three sectors still did relatively minor contributors to GVA representing 4.7 percent, 10.9 percent, and 6.5 percent respectively, in 2015.

While overall demographic trends showing a widening youth population, with persons less than 14 years of age making up more than half of the population in 2015, only a mild demographic shift occur from rural to urban populations, with the majority (80 percent) remaining in rural areas and thus confirming the big challenge of employment creation centered in agriculture. Main features on sectoral composition of employment and growth rates follow in Table A1.2.

- Total formal employment increased from 3.3 million to 4.5 million between 1990 and 2015, amounting to an annual increase of 1.2 percent per year. The growth in formal employment was outpaced by population growth, which grew at an average annual rate of 3.8 percent. However, based on official ILO estimates, the unemployment rate during the same period remained relatively flat – hovering between 5.0 percent and 5.1 percent. This suggests data issues, with actual unemployment (and under-employment) rates being much higher.

Table A1.1. GDP: GVA by sector

	GVA by Sector (Billions of CFA, constant 2006 prices)				GVA by Sector (% of Total GVA)				GVA by Sector (Compound Annual Growth Rate)			
	1990	2000	2010	2015	1990	2000	2010	2015	1990 - 2015	1990 - 2000	2000 - 2010	2010 - 2015
Agriculture, Hunting, Forestry, and Fishing	398.46	556.96	1041.37	1301.68	36.84	40.82	48.57	45.83	4.8	3.4	6.5	4.6
Mining and Quarrying	67.17	35.99	60.49	132.63	6.21	2.64	2.82	4.67	2.8	-6.0	5.3	17.0
Manufacturing	73.57	87.40	115.32	185.53	6.80	6.41	5.38	6.53	3.8	1.7	2.8	10.0
Public Utilities (Electricity, Gas, and Water)	29.32	24.56	27.52	30.86	2.71	1.80	1.28	1.09	0.2	-1.8	1.1	2.3
Construction	29.72	31.82	61.02	76.35	2.75	2.33	2.85	2.69	3.8	0.7	6.7	4.6
Wholsesale and Retail Trade, Hotels, & Restaurants	174.27	224.38	311.91	367.35	16.11	16.44	14.55	12.94	3.0	2.6	3.3	3.3
Transport, Storage, & Communication	49.34	102.62	145.70	196.58	4.56	7.52	6.80	6.92	5.7	7.6	3.6	6.2
Finance, Insurance, Real Estate & Business Services	37.40	57.16	95.43	119.01	3.46	4.19	4.45	4.19	4.7	4.3	5.3	4.5
Community, Social, & Personal Services	59.01	84.45	101.34	121.31	5.46	6.19	4.73	4.27	2.9	3.6	1.8	3.7
Government Services	163.45	159.10	184.12	308.63	15.11	11.66	8.59	10.87	2.6	-0.3	1.5	10.9
Total	**1081.7**	**1364.5**	**2144.2**	**2,839.9**	**100.0**	**100.0**	**100.0**	**100.0**	**3.9**	**2.3**	**4.6**	**5.8**

Source: Daki and Lopez-Calix (2017)'s estimates.

Table A1.2. Employment by sector

	Employment by Sector (in thousands)				Employment (% of total)				Employment by Sector (Compound annual growth rate)			
	1990	2000	2010	2015	1990	2000	2010	2015	1990 to 2015	1990 to 2000	2000 to 2010	2010 to 2015
Agriculture, Hunting, Forestry, and Fishing	2,777.95	3,044.76	3,391.38	3,599.33	82.9	81.9	80.6	79.9	1.0	0.9	1.1	1.2
Mining and Quarrying	7.65	7.65	12.35	19.83	0.2	0.2	0.3	0.4	3.9	0.0	4.9	9.9
Manufacturing	52.68	69.60	92.34	106.25	1.6	1.9	2.2	2.4	2.8	2.8	2.9	2.8
Public Utilities (Electricity, Gas, and Water)	3.20	3.89	7.00	9.43	0.1	0.1	0.2	0.2	4.4	2.0	6.0	6.2
Construction	14.09	19.04	23.38	27.03	0.4	0.5	0.6	0.6	2.6	3.1	2.1	2.9
Wholesale and Retail Trade, Hotels, and Restaurants	352.26	384.88	421.70	441.85	10.5	10.3	10.0	9.8	0.9	0.9	0.9	0.9
Transport, Storage, and Communication	27.49	39.47	59.08	68.43	0.8	1.1	1.4	1.5	3.7	3.7	4.1	3.0
Finance, Insurance, Real Estate and Business Services	29.00	39.15	55.74	63.27	0.9	1.1	1.3	1.4	3.2	3.0	3.6	2.6
Community, Social, and Personal Services	79.47	103.55	135.07	154.94	2.4	2.8	3.2	3.4	2.7	2.7	2.7	2.8
Government Services	5.54	7.44	10.00	13.28	0.2	0.2	0.2	0.3	3.6	3.0	3.0	5.9
Total	**3,349.34**	**3,719.42**	**4,208.03**	**4,503.65**	**100.0**	**100.0**	**100.0**	**100.0**	**1.2**	**1.1**	**1.2**	**1.4**

Source: Daki and Lopez-Calix (2017)'s estimates.

- While in absolute terms, agriculture created the largest number of jobs, in terms of total employment, its share declined slightly from 82.9 percent in 1990 to 79.9 percent in 2015. This was offset by relative increases across the board in the share of total employment for all other sectors, with the exception of commerce, which also fell slightly from 10.5 percent of total employment in 1990 to 9.8 percent of total employment in 2015.

- Average growth rates in employment varied by sector, with agriculture having one of the lowest rates (1 percent average per year), mining and quarrying having the highest rates--grew by an average of 3.9 percent over the full period (and of 9.9 percent between 2010 and 2015)—and public utilities growing at an average of 4.4 percent over the full period (and 6.2 percent between 2010 and 2015). Likewise, government services employment grew by an average 3.6 percent over the full period (and 5.9 percent between 2010 and 2015). Transport, storage and communication, and finance, insurance, real estate and business services grew by 3.7 and 3.2, respectively, over the full period, with fairly similar average growth rates across all periods.

Previous figures allow to estimate trends in labor productivity and show that overall labor productivity nearly doubled between 1990 and 2015, with an average yearly growth rate of 2.7 percent.

- In absolute terms, over the entire and most recent, 2010-15 periods, with the exception of government services, mining and quarrying had the highest labor productivity, followed by public utilities and

construction; whereas agriculture had the lowest labor productivity. This finding is typical of a resource-dependent Dutch disease-prone economy.

- In relative terms, however, over the entire period, agriculture labor productivity followed by wholesale and retail trade (informality) had the highest average growth rates, even though modest and coming from very low bases. In contrast, public utilities, mining and quarrying and government services had lowest (and negative) average growth rates. These findings point to bloated and inefficient public services. Only in the period 2010-15 labor productivity in mining and quarrying, and government services showed some improvement (Table A1.3).

Table A1.3. Labor productivity by sector

	GVA per worker by sector (millions of CFA, constant 2006 prices)				GVA per worker by sector (compound annual growth rate)			
	1990	2000	2010	2015	1990 to 2015	1990 to 2000	2000 to 2010	2010 to 2015
Agriculture, Hunting, Forestry, and Fishing	0.1	0.2	0.3	0.4	3.77	2.46	5.32	3.33
Mining and Quarrying	8.8	4.7	4.9	6.7	-1.08	-6.04	0.40	6.43
Manufacturing	1.4	1.3	1.2	1.7	0.90	-1.06	-0.05	6.93
Public Utilities (Electricity, Gas, and Water)	9.2	6.3	3.9	3.3	-4.03	-3.64	-4.62	-3.62
Construction	2.1	1.7	2.6	2.8	1.17	-2.30	4.56	1.59
Wholsesale and Retail Trade, Hotels, and Restaurants	0.5	0.6	0.7	0.8	2.10	1.66	2.41	2.37
Transport, Storage, and Communication	1.8	2.6	2.5	2.9	1.90	3.78	-0.53	3.10
Finance, Insurance, Real Estate and Business Services	1.3	1.5	1.7	1.9	1.52	1.25	1.61	1.90
Community, Social, and Personal Services	0.7	0.8	0.8	0.8	0.21	0.94	-0.83	0.86
Government Services	29.5	21.4	18.4	23.2	-0.95	-3.16	-1.47	4.75
Total	**0.3**	**0.4**	**0.5**	**0.6**	**2.71**	**1.28**	**3.34**	**4.35**

Source: Daki and Lopez-Calix (2017)'s estimates.

Estimates of structural change are found as indicated below. Contribution to labor productivity growth can come from two sources, a within and an across sectoral components. The « within » component, also called sectoral productivity gains, reflects capital accumulation, technological change or reduction in factors misallocations. The « accross » sectors component reflects labor moves from low-productivity sectors to high-productivity sectors in the economy, i.e. structural change. The decomposition of total labor productivity can be expressed using the following algebraic formulation:

$$\Delta Y_t = \left[\sum_{i=1}^{n} \theta_{i,t-k} \;\; \Delta y_{i,t} + \sum_{i=1}^{n} y_{i,t}\, \Delta\theta_{i,t}\right]$$

Where Y_t *and* y_t are aggregate and sectoral labor productivity levels at year t, and $\theta_{i,t}$ refers to sector i's share (weights) of total employment at the beginning of the time period. The first term is the « within » component and the second term is the structural change component term. Labor productivity is measured as real output per worker in a sector. When changes in employment shares are positively correlated with productivity levels, as seen in Figure 1.8 in Volume I, this term will be positive and structural change will increase economy-wide productivity growth. The Δ operator denotes the change in productivity or employment shares between t-k and t.

Table A1.4. Reasons for migrating

	2011		2014	
	Freq.	Percent	Freq.	Percent
Seasonal work	332	10.3	319	9.6
Travel for work	288	9.0	407	12.3
Military service	7	0.2	3	0.1
Attended a ceremony	805	25.1	965	29.1
Other family reason/vacation	1,258	39.2	1,053	31.7
Health reasons	129	4.0	164	4.9
Temporarily called to help a household	20	0.6	10	0.3
Pilgrimage	78	2.4	80	2.4
Trip with animals o search pasture/water	48	1.5	77	2.3
Attending school	21	0.7	47	1.4
Other	227	7.1	195	5.9
Total	3,213	100	3,320	100

Source: The World Bank, 2017d.

Annexes - Chapter II

Annex AII.A

Table A2.1. Niger's composition of exports at HS 2-digit level

Description	Product Code	2009				2015			
		Trade Value in US$1000 - End Year 2008	% of Total - End Year	Compound Annual Growth Rate %	RCA	Trade Value in US$1000 - End Year	% of Total - End Year	Compound Annual Growth Rate %	RCA
Natural Uranium	2844	44456.7	22.7	10.4	198.1	603670.8	71.2	-82.2	818.0
Other oil seeds and oleaginous fruits, whether or	1207	56.5	0.0	205.2	1.4	119688.8	15.2	1272.5	517.1
Petroleum		101021.0	51.5	422.0	446.0	39253.0	5.0	13.5	122.2
Gold (including gold plated with platinum) unwroug	7108	0.0	0.0	-75.0	0.0	28897.9	3.7	0.0	2.4
Natural rubber, balata, gutta-percha, guayule, chi	4001	307.5	0.2	9872.1	1.3	2787.6	0.4	-42.1	3.8
Articles of jewellery and parts thereof, of precio	7113	947.5	0.5	-26.1	1.8	2479.7	0.3	29.1	0.8
Manioc, arrowroot, salep, Jerusalem artichokes, sw	714	361.4	0.2	101.7	18.4	1917.3	0.2	-77.6	10.8
Pharmaceutical goods specified in Note 4 to this C	3006	0.0	0.0	47011.7	0.0	682.2	0.1	0.0	1.0
Tanned or crust hides and skins of other animals,	4106	0.0	0.0	346.6	0.0	517.5	0.1	0.0	17.9
Tanned or crust skins of sheep or lambs, without w	4105	86.5	0.0	-5.0	13.2	279.6	0.0	-68.1	10.4
Sugar confectionery (including white chocolate), n	1704	0.4	0.0	10418.2	0.0	193.1	0.0	40400.0	0.4
Plants and parts of plants (including seeds and fr	1211	12.4	0.0	-15.5	0.5	183.0	0.0	1309.4	1.2
Collections and collectors' pieces of zoological,	9705	60.8	0.0	-27.3	5.4	113.0	0.0	183.3	0.5
Other breathing appliances and gas masks, excludin	9020	41.3	0.0	736.9	3.1	105.0	0.0	185.6	1.6
Starches; inulin.	1108	0.0	0.0	49.6	0.0	61.1	0.0	0.0	0.4
Clasps, frames with clasps, buckles, buckle-clasps	8308	0.0	0.0	-75.4	0.0	55.1	0.0	0.0	0.4
Bells, gongs and the like, non-electric, of base m	8306	9.6	0.0	-32.4	0.3	47.2	0.0	-45.6	0.4
Buttons, press-fasteners, snap-fasteners and press	9606	0.0	0.0	-10.3	0.0	33.0	0.0	0.0	0.6
Flour, meal and powder of the dried leguminous veg	1106	2.3	0.0	10.2	0.8	28.4	0.0	-56.2	1.1
Wallpaper and similar wall coverings; window trans	4814	0.0	0.0	793.7	0.0	22.8	0.0	0.0	0.4
Raw skins of sheep or lambs (fresh, or salted, dri	4102	0.0	0.0	-59.9	0.0	22.1	0.0	0.0	0.6
Lac; natural gums, resins, gum-resins and oleoresi	1301	315.2	0.2	-51.2	47.8	16.4	0.0	486.9	0.4
Carpets and other textile floor coverings, knotted	5701	50.6	0.0	-74.5	2.7	14.1	0.0	1.0	0.3

Source: Benjamin and Pitigala (2017)'s estimates using WITS.

Table A2.2. Changes in tariffs under the CET at the country level

	Import-weighted Tariff (%)	
	Tariff	New CET
Benin	15.7	18.5
Burkina Faso	10.4	11.4
Cote d'Ivoire	6.6	7.0
Ghana	8.9	9.5
Guinea	9.9	10.3
Mali	10.4	10.9
Niger	10.6	11.3
Nigeria	10.0	10.5
Senegal	8.7	9.3
Togo	14.1	16.0
simple average of weighted tariff	**10.5**	**11.5**
weithted average of weighted tariff	10.1	10.9

Source: Gourdon and Maur (2014). Estimating the poverty impact of the ECOWAS Common External Tariff, WB mimeo.

Table A2.3. Tariffs – simple and weighted, and global regions vs. ECOWAS

Region	Product Name	Simple Average	Weighted Average
EAC	Raw materials	9.64	3.58
EAC	Intermediate goods	8.75	5.35
EAC	Consumer goods	17.07	7.72
EAC	Capital goods	4.97	4.48
ECOWAS	Raw materials	13.42	19.11
ECOWAS	Intermediate goods	9.96	9.37
ECOWAS	Consumer goods	18.36	13.78
ECOWAS	Capital goods	7.69	7.79
SADC	Raw materials	4.37	0.65
SADC	Intermediate goods	4.49	2.26
SADC	Consumer goods	11.96	8.71
SADC	Capital goods	2.82	2.16
UEMOA	Raw materials	17.76	25.38
UEMOA	Intermediate goods	10.7	11.5
UEMOA	Consumer goods	17.51	14.47
UEMOA	Capital goods	7.94	7.76

ANNEX ii TARIFFS	Product Name	Partner	MFN (2015)	Effective ROW	Effective ECOWAS (2014)
1	LIVE ANIMALS		8.38	0	14.29
2	MEAT AND EDIBLE MEAT OFFAL		31.36	35	10
3	FISH AND CRUSTACEANS, MOLLUSCS AND OTHER		15.05	14	4.11
4	DAIRY PRODUCE; BIRDS' EGGS; NATURAL HONEY;		18.63	10.75	7.08
5	PRODUCTS OF ANIMAL ORIGIN, NOT ELSEWHERE SPEF		5	5	0
6	LIVE TREES AND OTHER PLANTS; BULBS, ROOTS AND		13.44	5	0
7	EDIBLE VEGETABLES AND CERTAIN ROOTS AND		19.33	17.5	7.45
8	EDIBLE FRUIT AND NUTS; PEEL OF CITRUS FRUIT OR		19.55	20	6.8
9	COFFEE, TEA, MATÉ AND SPICES		18.46	19.29	9.41
10	CEREALS		5.58	7.86	2.12
11	PRODUCTS OF THE MILLING INDUSTRY; MALT;		11.67	15	5.63
12	OIL SEEDS AND OLEAGINOUS FRUITS; MISCELLANEOUS		5.42	5	3.08
13	LAC; GUMS, RESINS AND OTHER VEGETABLE SAPS AND		5	5	5
14	VEGETABLE PLAITING MATERIALS; VEGETABLE		5	0	0
15	ANIMAL OR VEGETABLE FATS AND OILS AND THEIR		14.27	14.07	6.28
16	PREPARATIONS OF MEAT, OF FISH OR OF CRUST		23.66	30	5
17	SUGARS AND SUGAR CONFECTIONERY		12.65	19.17	5.71
18	COCOA AND COCOA PREPARATIONS		23.18	35	4.29
19	PREPARATIONS OF CEREALS, FLOUR, STARCH OR		21.36	20.83	8.08
20	PREPARATIONS OF VEGETABLES, FRUIT, NUTS OR		19.28	19.63	9.36
21	MISCELLANEOUS EDIBLE PREPARATIONS		15.82	17.1	4.44
22	BEVERAGES, SPIRITS AND VINEGAR		20.68	20.39	3.08
23	RESIDUES AND WASTE FROM THE FOOD INDUSTRIES;		10.33	7.5	3.33
24	TOBACCO AND MANUFACTURED TOBACCO SUBSTI		14	20	7
25	SALT; SULPHUR; EARTHS AND STONE; PLASTERING		6.65	8.57	12.26
26	ORES, SLAG AND ASH		5	5	5
27	MINERAL FUELS, MINERAL OILS AND PRODUCTS OF T		5.25	6.3	5.12
28	INORGANIC CHEMICALS; ORGANIC OR INORGANIC		5.06	6.11	5.13
29	ORGANIC CHEMICALS		5.01	5.14	5
31	FERTILISERS		1.74	5	1.15
32	TANNING OR DYEING EXTRACTS; TANNINS AND THEIR		8.79	10.83	10.22
33	ESSENTIAL OILS AND RESINOIDS; PERFUMERY, COS		16.55	18.44	14.15
34	SOAP, ORGANIC SURFACE-ACTIVE AGENTS, WASHING		21.41	24.46	12.32
35	ALBUMINOIDAL SUBSTANCES; MODIFIED STARCHES;		10	10.63	8.33
36	EXPLOSIVES; PYROTECHNIC PRODUCTS; MATCHES;		14.38	10	10
37	PHOTOGRAPHIC OR CINEMATOGRAPHIC GOODS		17.98	16.25	20
38	MISCELLANEOUS CHEMICAL PRODUCTS		9.23	7.5	7.17
39	PLASTICS AND ARTICLES THEREOF		9.96	14.75	11.98
40	RUBBER AND ARTICLES THEREOF		11	13.37	14.13
41	RAW HIDES AND SKINS (OTHER THAN FURSKINS) AND		8.78	10	7
42	ARTICLES OF LEATHER; SADDLERY AND HARNESS;		18	17.31	18.82
43	FURSKINS AND ARTIFICIAL FUR; MANUFACTURES		9.58	0	0
44	WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL		11.6	14.63	11.47
45	CORK AND ARTICLES OF CORK		9.64	0	0
46	MANUFACTURES OF STRAW, OF ESPARTO OR OF OTHER		20	0	15
47	PULP OF WOOD OR OF OTHER FIBROUS CELLULOSIC		5	0	5

48	PAPER AND PAPERBOARD; ARTICLES OF PAPER PULP, OF P	11.34	13.4	8.91
49	PRINTED BOOKS, NEWSPAPERS, PICTURES AND OTHER	6.32	8.92	5.22
50	SILK	12.78	10	20
51	WOOL, FINE OR COARSE ANIMAL HAIR; HORSEHAIR YARN	11.05	0	20
52	COTTON	15.75	18.85	16.3
53	OTHER VEGETABLE TEXTILE FIBRES; PAPER YARN AND	9.78	0	11.67
54	MAN-MADE FILAMENTS; STRIP AND THE LIKE OF MAN-	13.79	19.17	17.5
55	MAN-MADE STAPLE FIBRES	14.07	16.67	19.23
56	WADDING, FELT AND NONWOVENS; SPECIAL YARNS;	15.92	12.08	10.5
57	CARPETS AND OTHER TEXTILE FLOOR COVERINGS	20	20	20
58	SPECIAL WOVEN FABRICS; TUFTED TEXTILE FABRICS; LAC	20	20	20
59	IMPREGNATED, COATED, COVERED OR LAMINATED TEXTIL	15.83	10	20
60	KNITTED OR CROCHETED FABRICS	20	0	20
61	ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, KNIT	20	20	17.95
62	ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, NOT	20	20	18.72
63	OTHER MADE-UP TEXTILE ARTICLES; SETS; WORN CLOTHIN	19.51	20	17.03
64	FOOTWEAR, GAITERS AND THE LIKE; PARTS OF SUCH ARTI	14.87	15.53	17.6
65	HEADGEAR AND PARTS THEREOF	15	16.67	16
66	UMBRELLAS, SUN UMBRELLAS, WALKING STICKS, SEAT-STI	16.67	20	10
67	PREPARED FEATHERS AND DOWN AND ARTICLES MADE OF	20	20	20
68	ARTICLES OF STONE, PLASTER, CEMENT, ASBESTOS, MICA	16.84	15.45	10
69	CERAMIC PRODUCTS	17.93	20	19.31
70	GLASS AND GLASSWARE	17.46	14.53	17.14
71	NATURAL OR CULTURED PEARLS, PRECIOUS OR SEMI-PRE	10.66	16.88	17.33
72	IRON AND STEEL	8.47	11.5	10.88
73	ARTICLES OF IRON OR STEEL	16.06	17.83	14.7
74	COPPER AND ARTICLES THEREOF	11.6	10.5	12.5
75	NICKEL AND ARTICLES THEREOF	12.06	0	13.33
76	ALUMINIUM AND ARTICLES THEREOF	13.71	17.71	14.3
78	LEAD AND ARTICLES THEREOF	7.5	12.5	20
79	ZINC AND ARTICLES THEREOF	8.89	0	0
80	TIN AND ARTICLES THEREOF	11	0	20
81	OTHER BASE METALS; CERMETS; ARTICLES THEREOF	9.9	0	20
82	TOOLS, IMPLEMENTS, CUTLERY, SPOONS AND FORKS, OF B	14.58	14.87	16.39
83	MISCELLANEOUS ARTICLES OF BASE METAL	18.33	19.57	19.47
84	NUCLEAR REACTORS, BOILERS, MACHINERY AND MECHAN	6.54	7.16	9.54
85	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS	11.74	12.05	13.22
86	RAILWAY OR TRAMWAY LOCOMOTIVES, ROLLING STOCK	5	5	5
87	VEHICLES OTHER THAN RAILWAY OR TRAMWAY ROLLING	9.57	10.6	11.11
88	AIRCRAFT, SPACECRAFT, AND PARTS THEREOF	5	5	0
89	SHIPS, BOATS AND FLOATING STRUCTURES	9.17	7.5	5
90	OPTICAL, PHOTOGRAPHIC, CINEMATOGRAPHIC, MEASUR	8.29	6.61	5.69
91	CLOCKS AND WATCHES AND PARTS THEREOF	19.39	20	20
92	MUSICAL INSTRUMENTS; PARTS AND ACCESSORIES OF	10	10	0
93	ARMS AND AMMUNITION; PARTS AND ACCESSORIES	17.22	15	20
94	FURNITURE; BEDDING, MATTRESSES, MATTRESS SUPPORT	18.14	18.84	15.47
95	TOYS, GAMES AND SPORTS REQUISITES; PARTS AND ACCES	18.06	20	20
96	MISCELLANEOUS MANUFACTURED ARTICLES	19.43	18.75	16.19

Annex AII.B. TRIST Description

TRIST computes the partial equilibrium impact of a change in tariff based on a detailed dataset on tariffs, excises, VAT and other taxes levied at the border at the HS10 level. The underlying model assumes imperfect substitution between imports from various sources depending on their prices (the Armington assumption with different substitution elasticities) while the overall level of imports responds to the composite price of imports according to a demand elasticity. The demand elasticities are different by products and taken from estimates in Kee, Olarreaga and Nicita (2009).

A change in bilateral tariff affects not only the relative price of the different import varieties but also the overall price level of that good. Hence, it changes the aggregate level of spending on that good as well as the source composition of imports. Tariff revenue is affected directly through the change in their schedule, and indirectly through the resulting import response. Tax revenue are affected because of changes in imports and of their tax base (which is often duty inclusive). Source: Brenton, Hoppe and von Uexküll (2007)

Annex AII.C. Niger and the TFA

The TFA specifically addresses, in article 11, provisions related to the Freedom of Transit, providing a clear road map to reduce red tape and increase predictability in customs clearance (fees, formalities, transit) in transit countries. These provisions include prohibitions on the imposition of voluntary restraints on traffic in transit and states that goods cleared for transit should also not be subject to any further charges, delays, restrictions or the application of technical barriers to trade measures. The TFA also includes a transparency obligation requiring customs authorities to publish all information used to set guarantees. Finally, the article prescribes that convoys or escorts, carried out for instance by Togo, can only be required in high-risk cases. Article 11 also contains a series of "best endeavors" provisions which, while not binding if implemented, should further benefit transit of goods. These provisions cover the use of separate facilities for goods in transit, cooperation between customs authorities to enhance transit and appointment of a national transit coordinator.

In addition to these provisions specifically addressing transit goods, the TFA also contains several other provisions that should benefit Niger and facilitate trade along the key transit corridors. One of them calls for the expedited release of goods transported by air cargo. Another mandates customs authority to further facilitate trade – through less documentation and inspections, rapid release, and deferred payments – to selected authorized operators. The TFA also encourages the use of single window operations, i.e. the submission of documentation for import and export to a single electronic point. Another measure that should be of benefit to LLDCs like Niger, whose trade is mostly conducted by overland freight, is increased border agency cooperation. This should ensure cooperation and coordination between authorities and agencies responsible for border controls on issues such as alignment of working days, hours, procedures and formalities; joint controls and sharing of common facilities; and establishment of one-stop border post controls.

The TFA incorporates adequate flexibility to accommodate some developing countries like Niger that will be unable to comply fully with the TFA upon entry into force—a milestone that has now been reached. As such, WTO members must categorize TFA articles into three categories that provide an indication of the timeline and resources necessary to fully implement the agreement:

- Category A indicates that the WTO member will comply with the provision when the TFA goes into force;
- Category B indicates that the country needs additional time to implement the provision, but is able to do so out of its own resources;

- Category C indicates the member requires both time and donor assistance.

Niger's National Committee for Trade Facilitation submitted a report in April 2014, submitting the proposed categorization of the 12 main articles and 41 associated measures. It stated that, at the time, five measures had already been fully implemented, 9 were partially implemented, while 18 were not in conformity with the Agreement. Based on its analysis, the Committee initiated an attempt of re-categorization of the provisions according to categories A, B and C. These proposals would be still in the analysis phase and have not yet been the subject of a decision or an official notification to the Facilitation Committee of the WTO. It is expected Niger will notify the WTO of its categorization in the near future, including Category C (below) where it can garner donor support in their implementation.

- Article 1: Lack of availability of public portal on Customs and regulations
- Article 3: a) Advance Rulings: the regulation of the UEMOA in the matter, which in principle apply to office in each State, has apparently not been the subject of an application in Niger b) appeal procedures in general exist in the Customs Code, they are not known and not implemented in practice
- Article 5: Test Procedures at the border: There is no technical capacity to carry out such controls in a large majority of cases.
- Article 6: Fees and Charges to the import or export and Penalties: transit operations are also subject to royalties which is contrary to the TFA
- Article 7: a) Release and Clearance: Customs charges for separation between release and final determination. b) Risk management principles are not applied at the border
- Article 8: Cooperation among border agencies: - There is no organized cooperation between the different agencies present at the borders. There are two initiatives of monitoring, for example with the Burkina Faso and Benin, but they are not located on the territory of the Niger and are not yet operational
- Article 9: Movement of goods: the goods under special schemes are moving under Customs seals, plus any international movement of goods is subject to mandatory escort

Given its landlocked nature, Niger's connectivity to markets needs to be addressed from a broader trade, transport logistics, and associated institutional environment. The issues stemming from Niger's trade facilitation are the result of several factors which often have a cumulative effect on its trade. They principally reflect several areas of challenges, including a) the lack of 'soft' and 'hard' infrastructure; b) burdensome and costly customs and border control procedures; c) rent-seeking and associated road harassment and associated and d) poor logistics quality and compliance. Given that transit country measures are not favorable and below peers, Niger's landlockedness amplifies the need for interventions within its own sphere, while seeking regional and multilateral solutions to facilitate trade along its trading corridors

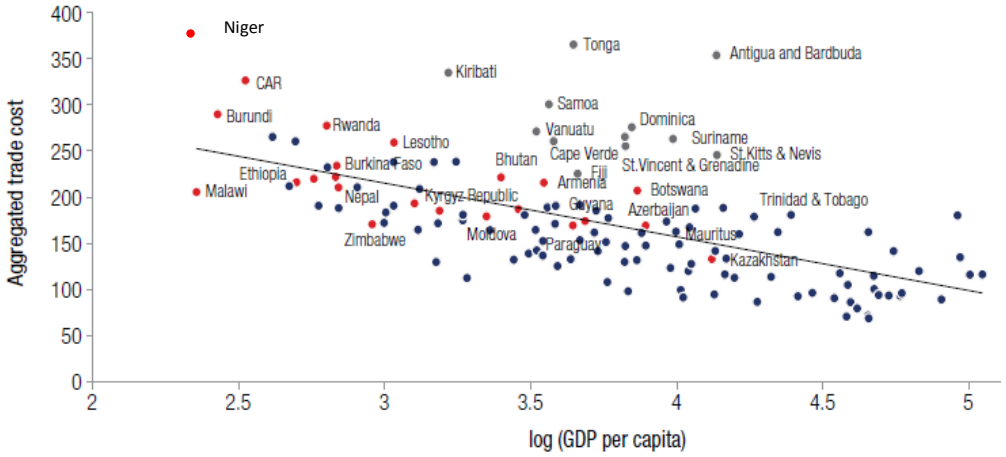
Annex AII.D. Trade Costs

An effective way to quantitatively describe the trade connectivity patterns of countries is to look at aggregate trade costs with major trading countries. The "trade cost is the price equivalent of the reduction of international trade as compared with the potential implied by domestic production and consumption in the origin and destination markets".[4] The exercise encompasses a number of elements facing exporters

[4] Arvis et. al (2010).

and importers which are converted to advalorem equivalents for ease of cross-country comparisons.[5] Trade costs are inversely correlated with the level of income (Fig.2.11), and landlocked developing countries have higher trade costs compared to transit coastal countries. The difference is not negligible—landlocked developing countries' trade costs are over 1.5-times those of the corresponding transit countries. Aggregate trade costs for Niger and Chad are among the highest in landlocked countries. Both Niger and Burkina Faso, the latter a coastal gateway for the former experienced a notable decrease in trade costs between 2004 and 2014, but remain high as compared to resource-scarce LDCs (Figure A2.1).

Figure A2.1. GDP per capita and aggregate trade costs



Source: World Bank (2014).
Note: Data for aggregate trade costs is for 2009. LLDCs are shown in red; Small Island Dev. States are shown in yellow.

[5] Trade Costs measure captures two main categories: The first entails bilateral factors of separation between the exporter and the importer, more dependent on exogenous factors than particular policy choices such as geographical distance, a rough proxy for international transportation costs. The 2nd includes endogenous trade costs, which measure the 'thickness' of two countries' borders and includes logistics performance–cost, delay and reliability–and trade facilitation bottlenecks, such as border control and transit systems with 3rd countries, and international connectivity, as the existence of regular maritime, air shipments.

Annexes - Chapter III

Annex AIII.A. The Niger 2017 ESs Data Set

Introduction. This annex provides additional information on the data collected in Niger between March 2017 and October 2017. The objective of the ES is to gain an understanding of what firms experience in the private sector. As part of its strategic goal of building a climate for investment, job creation, and sustainable growth, the World Bank has promoted improving the business environment as a key strategy for development, which has led to a systematic effort in collecting enterprise data across countries. The ESs are an ongoing World Bank project in collecting both objective data based on firms' experiences and enterprises' perception of the environment in which they operate. The ES currently cover over 155,000 firms in 148 countries, of which 139 have been surveyed following the standard methodology. This allows for better comparisons across countries and across time. Data are used to create statistically significant business environment indicators that are comparable across countries. The ES are also used to build a panel of enterprise data that will make it possible to track changes in the business environment over time and allow, for example, impact assessments of reforms. This report outlines and describes the sampling design of the data, the data set structure as well as additional information that may be useful when using the data, such as information on non-response cases and the appropriate use of the weights.

Sampling structure. The sample for 2017 Niger ES was selected using stratified random sampling, following the methodology explained in the ES Sampling Note.[6] Stratified random sampling[7] was preferred over simple random sampling for several reasons:[8] i)To obtain unbiased estimates for different subdivisions of the population with some known level of precision; ii) To obtain unbiased estimates for the whole population. The whole population, or universe of the study, is the non-agricultural economy. It comprises: all manufacturing sectors according to the group classification of ISIC Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I). Note that this definition excludes the following sectors: financial intermediation (group J), real estate and renting activities (group K, except subsector 72, IT, which was added to the population under study), and all public or utilities sectors; iii) To make sure that the final total sample includes establishments from all different sectors and that it is not concentrated in one or two of industries/sizes/regions. d. To exploit the benefits of stratified sampling where population estimates, in most cases, will be more precise than using a simple random sampling method (i.e., lower standard errors, other things being equal.) e. Stratification may produce a smaller bound on the error of estimation than would be produced by a simple random sample of the same size. This result is particularly true if measurements within strata are homogeneous. f. The cost per observation in the survey may be reduced by stratification of the population elements into convenient groupings.

Three levels of stratification were used in this country. Industry, establishment size, and two main urban centers of Niamey and Maradi since the sample size does not exceed 151 firms. Industry stratification was designed in the way that follows: the universe was stratified into manufacturing (ISIC Rev. 3.1 codes 15 - 37), and Services (ISIC codes 45, 50-52, 55, 60-64, and 72) industries which were further broken down into exporting and non-exporting firms. For the Niger ES, size stratification was defined as follows: small (5 to

[6] The complete text of the whole sample design and regions selected can be found at http://www.enterprisesurveys.org/~/media/GIAWB/EnterpriseSurveys/Documents/Methodology/Sampling _Note.pdf

[7] A stratified random sample is one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum. (Richard L. Scheaffer; Mendenhall, W.; Lyman, R., "Elementary Survey Sampling", Fifth Edition).

[8] Cochran, W., 1977, pp. 89; Lohr, Sharon, 1999, pp. 95

19 employees), medium (20 to 99 employees), and large (100 or more employees). Regional stratification was done across two main cities: Niamey and Maradi.

Sampling implementation. Given the stratified design, sample frames containing a complete and updated list of establishments as well as information on all stratification variables (number of employees, industry, and region) are required to draw the sample. Great efforts were made to obtain the best source for these listings. TNS Opinion was the main contractor and TNS Senegal was the subcontractor that implemented the Mali 2016 ES and Niger.

Main characteristics of exporting firms. A typical firm in Niger engaging in direct exports is almost 18 years old, has invested in fixed assets and has a slightly more experienced manager. Direct exporters have on average 19.3 years of experience and the average age of the firm is 17.6 years. Direct exporters tend to have greater rates of ownership of fixed assets: 54.1 percent of direct exporters indicated investing in fixed assets, compared to only 31.5 percent of non-exporters (Table A3.1). However, prevalence of foreign ownership, innovation and investment in R&D were not found to be higher in direct exporters. It is possible that due to the low export intensity in Niger, the firms in the sample do not provide conclusive results.

Table A3.1. Key differences between direct exporters, indirect exporters, & non-exporting firms

		Mean	Small	Medium	Large
Managers experience (average years)	Direct Exporter	19.31	17.93	19.23	/*
	Indirect Exporter	20.59	22.91	16.02	/*
	Non-Exporter	17.46	17.43	17.10	19.86
Age of Firm	Direct Exporter	17.58	16.74	16.40	/*
	Indirect Exporter	17.53	20.38	12.14	/*
	Non-Exporter	14.55	14.22	14.01	20.87
Foreign owned (% of firms with at least 10% foreign private participation	Direct Exporter	3.89	6.90	0.00	/*
	Indirect Exporter	0.00	0.00	0.00	/*
	Non-Exporter	8.27	7.26	9.25	17.36
Innovation: Introduction of a new or improved product or service in the past 3 years	Direct Exporter	31.37	28.03	39.18	/*
	Indirect Exporter	50.26	61.42	28.27	/*
	Non-Exporter	33.06	32.6	/*	/*
Investment in R&D (% indicating investment)	Direct Exporter	7.9	14.02	0	/*
	Indirect Exporter	7.74	0	23.69	/*
	Non-Exporter	7.85	6.94	4.93	32.81
Investment in Fixed Assets (% indicating investment)	Direct Exporter	54.13	65.07	34.13	/*
	Indirect Exporter	46.96	46.59	47.72	/*
	Non-Exporter	31.5	23.01	48.87	65.29

Source: Niger ES 2017.
Note: /* Less than 5 observations.

Annexes - Chapter IV

Annex AIV.A. Description of the Model

Static module

LINKAGE is a flexible framework that has been successfully applied in numerous developing countries. The model works recursively, explicitly modeling the year by year effects of a particular policy on the economy. This approach links a sequence of static equilibriums with a set of equations, which update dynamically, at every period, certain macroeconomic variables such as population, productivity and the capital stock. The model is calibrated on a SAM comprising 45 sectors, 7 factors, and a single representative household. Annex A, B and C provide the description of the static and dynamic components of the model, and a list of the sectors and factors of production identified in the model.

The standard CGE model used draws on the World Bank global model, "LINKAGE" (Van der Mensbrugghe, 2005).[9] The model is developed from the neoclassical structural modeling approach presented in de Melo et al. (1982).[10] The underlying assumptions are mainly those encountered in the standard CGE literature (de Melo and Tarr, 1992). Therefore, only four key aspects are laid out in this note: (i) the production function; (ii) the macroeconomic closure assumptions used; (iii) the modelling of household income and consumption; and iv) international trade to highlight substitutability between domestic production and imports, and the small country assumption in the treatment of tradable goods (i.e. Niger is a price taker).

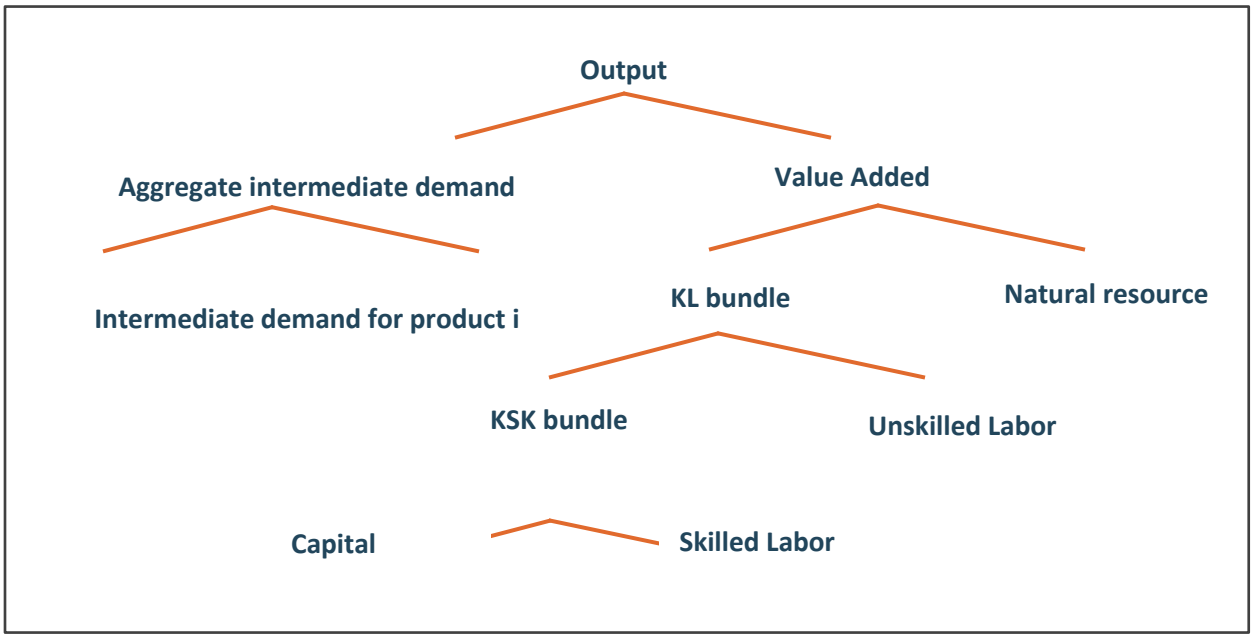
Production function

The model considers an economy with 45 sectors producing 45 commodities. All sectors are assumed to produce under conditions of constant returns to scale and perfect competition, implying that prices equal the marginal cost of output. Producers maximize their profits by minimizing their unit variable cost under the constraint of a multi-level production function (illustrated in Figure A4.1). At the top level, output is obtained by combining value added and the intermediate aggregates, following a Leontief production technology. Therefore, any policy affecting a particular sector would affect the sector directly but also indirectly the sectors using them as intermediate consumption.

[9] Interested readers can find the model's equation in this reference. The entire SAM is also available from the authors upon request.

[10] The theoretical framework relies on neoclassical assumptions considering a CRS and a perfect competition, where firms maximize profits to determine output supply and factor demands.

Figure A4.1. Nested structure of production



Factor markets

At the second level, the intermediate aggregates are obtained by combining all products in fixed proportions (Leontief structure), and total value added is obtained by aggregating the primary factors (capital, labor and natural resources) using a nested structure. First capital and skilled labor are combined into a bundle (KSK bundle), then this is combined with unskilled labour (KL bundle). Finally, the capital-labour bundle (KL bundle) is combined with the natural resource to produce value added. In agriculture sectors, the natural resource refers to land, while in mining sectors it refers to the extractive resource (e.g. uranium or crude oil). The full structure of production nests is shown in Figure 1 below.

Factor markets are assumed to be in perfect competition. The labor market is segmented between skill types and location. There are two skill types: skilled workers have secondary education or higher, whilst unskilled workers have lower than secondary education. There are two locations, urban and rural, which gives four types of workers in total: skilled urban, skilled rural, unskilled urban and unskilled rural. Unskilled rural workers refer to those that work in the agriculture sectors. Each type of labor is perfectly mobile across the different sectors of production, and without wage gaps across sectors, this implies a uniform wage across all sectors. The wage is set according to supply and demand of labor in each segment; flexible wages clear the markets for the four labor segments. The capital stock is fixed within each period, and is allocated across different sectors according to demand for capital in that sector; capital flows to sectors with high profitability. In other words, capital is fully mobile across sectors and the rate of return is the same for all sectors.

Household income and consumption

The model consists of a single representative household. Households supply skilled and unskilled labor and receive wages in return. The amount of labor supplied is exogenous to the model. Households also receive income and transfers from other agents, including the profits from asset holdings. Households use their earnings for consumption, savings and transfers. The consumption of a product by a household is determined by a Stone and Geary linear expenditures system (LES) utility function (Stone, 1954).[11] This

[11] See Van der Mensbrugghe (2005) for the functional form used in the model.

function decomposes consumption of a given product into necessities and discretionary consumption. In this configuration, the allocation of household consumption across products depends on relative price as well as income elasticities (commodity specific in this model).

Macroeconomic closures

Macroeconomic closures determine how macro balances are restored after a shock. Specifically, these closures specify how the model achieves (i) balanced government accounts, (ii) the macro equilibrium of the capital account, i.e. the investment and savings balance, and (iii) the macro equilibrium of the accounts with the ROW i.e. external balance. The closure rules adopted in the current version of the Niger model are discussed below. The government earns revenue mainly through taxation. All tax rates are fixed at base year levels. The ratios of government current and investment spending are also fixed as shares of real GDP. Hence, government savings (primary balance) is endogenous and adjust in response to policies and economic shocks. The gap between government investment demand and public saving is satisfied through foreign and domestic borrowing.

For the savings-investment balance, we assume a savings-driven closure. Aggregate investment—which together with an exogenous rate of depreciation determines the next period's capital stock—is flexible to ensure that the investment cost will be equal to the savings value. The volume of available savings is determined by an exogenous level of foreign saving, endogenous government saving and endogenous household savings. In this context, an increase in government revenue as results of a new source of tax revenue would also be reflected in higher public savings and therefore stimulate current investment and growth.

External balance ensures that the path of foreign liabilities are sustainable. For the external balance, closure is achieved through adjustment of the real exchange rate, while the current account is fixed by the available quantity of foreign saving. To maintain the current account constant, the real exchange rate adjusts domestic prices so as to generate appropriate changes in the volumes of imports and exports demanded. The main implication of this closure in the context of Niger is that an increase in uranium exports for example would generate an appreciation of real exchange rate, penalizing the competitiveness of non-mining sector. This is the manifestation of the classic "Dutch disease". Decreased uranium exports would have the opposite effect.

International trade

On the import side, this model follows the Armington assumption, there is imperfect substitution among goods originating in different geographical areas.[12] Import demand results from a nested CES aggregation function which aggregates domestic and imported goods. Export supply is symmetrically modeled as a Constant Elasticity of Transformation (CET) function; producers allocate their output to domestic or foreign markets according to relative prices.[13]

It is important to note that import demands and export supplies by Niger do not affect world prices; i.e. the small country assumption is used in dealing with international trade of this country with the ROW. Therefore, prices for goods and services traded (imported and exported) with the ROW are fully exogenous.

Dynamic module

The dynamic path follows the neo-classical growth framework (Solow-Swan growth model) implying that the long-run growth rate of the economy, g^y, is determined by three main factors: capital accumulation,

[12] See Armington (1969) for details.

[13] This model does consider however only one trade partner, the ROW. However the model code is flexible enough so that additional trading partners can be added.

labor supply growth, and increases in productivity (in the equation below λ is the productivity index for labour and capital). The stock of capital is endogenous, while the latter two are exogenously determined.

$$g^{y} = F\left(population, capital\ stock,\ \lambda^{l}_{ip,l}\ ,\ \lambda^{k}_{ip,k}\right)$$

Capital accumulation. The capital stock in each period is the sum of depreciated capital from the previous period and new investment. The formulation is as follows:

$$K_{t+1} = K_t(1-d) + INVTOT_t$$

where d is the annual depreciation rate of the capital, $INVTOT_t$ is the total investment in the current period (t). The capital stock is endogenous since investment is determined by the available savings from households, government and foreign sources in the previous period. The allocation of capital among sectors depends on the return to capital in each sector.

Labor supply. For each type of labor, the maximum stock of labor available in each period grows exogenously at the growth rate, ρ, of the working age population (ages 15-64), obtained from the World Bank population forecasts

$$LS_{t+1} = LS_t(1+\rho)$$

Productivity. For the final determinant of growth, the LINKAGE model assumes exogenous technical progress specific to sector and production factors. The change in productivity is derived by a combination of factors, but is also partially judgmental. The equation below shows how the labor productivity index $\lambda^{l}_{ip,l}$ evolves over time.

$$\lambda^{l}_{ip,l} = (1+\gamma^{l} + \chi^{l}_{ip,l})\ \lambda^{l}_{ip,l,-1}$$

Labor productivity grows thanks to γ^{l}, a uniform growth factor applied in all sectors to all types of labor and a sector- and skill-specific factor, χ. These parameters are exogenous to the model. Thus, in the simulations, the real GDP growth rate differs from the growth rate under the BaU scenario due to the policy or shock being simulated. Specifically, policies or shocks are able to affect the real GDP growth through its effects on accumulation of labor and capital, or the sector-specific productivity index for labor ($\lambda^{l}_{ip,l}$) and capital ($\lambda^{k}_{ip,k}$).

Baseline dynamics. Before running any simulations in a dynamic framework, it is required to define a reference baseline scenario e.g. a business-as-usual scenario (BaU). Unlike in policy simulations, when defining this baseline scenario, the growth rate of GDP is exogenous (g^{y} in the equation below, where RGDPMP refers to real GDP in market prices) and is set equal to growth trends from the MPO for the early years and the World Economic Outlook for medium term horizon. Then, this equation is used to calibrate the γ^{l} parameter, i.e. the growth rate of labor productivity. In other words γ^{l} is the channel used to achieve the targeted GDP growth rate. During the simulations, γ^{l} is given, and g^{y} becomes endogenous.

$$RGDPMP_{t+1} = RGDPMP_t\ (1+g^{y})$$

Data and calibration of the CGE parameters

The model has a base year of 2012. The key input into the model is a SAM, built on the basis of a SAM prepared by the National Bureau of Statistics (NBS), but with some modifications. A SAM is a comprehensive economy-wide data framework including both social and economic data for an economy. It presents in a

single square matrix the interaction between production, income, consumption and capital accumulation of domestic and external institutions. It is an essential database CGE modeling, as it sets an initial equilibrium where every agent's expenditure has to equal its receipt (in the form of equality between column and row sum). Therefore, as underlined by Arief (2006), an exercise using a CGE model, is basically comparing the initial equilibrium condition (the SAM), with other equilibria induced by introducing exogenous shocks or policy changes to the model.

Expanding the Niger SAM

The original SAM for Niger was developed by the Niger National Bureau of Statistics. The original SAM is expanded across several dimensions to enable simulations under an expanded and customised CGE model to be developed. The approach to expanding the SAM for Niger follows two broad steps. Firstly, the SAM is disaggregated to include additional detail for factors of production and households that is needed for the simulations. The output of the first step is an unbalanced SAM. In the second and final step the unbalanced SAM is balanced so that an inflow for a particular sector of the economy exactly matches an outflow for another sector (e.g. savings by household, government and foreigners match investment by the public and private sector). The balancing is done on a case by case basis. The remaining sections highlight the key data sources and assumptions used in the construction of the balanced SAM.

Data sources

The SAM is expanded by combining information from the establishment survey, household expenditure survey and GTAP database. The main sources of information employed were provided by the Niger National Bureau of Statistics (NBS). In general terms the following information were used:

- A 2012 survey of wages conducted by the University of Amsterdam (Tijdens et. al, 2012)
- Labor force data from the NBS on the number of employed persons.
- The 2014 Household Expenditure Survey
- The GTAP database includes a 2011 SAM for Central Africa that includes the Niger economy. This SAM is used to supplement data provided by the NBS.

Customizing the SAM

The following adjustments and additions were implemented to expand the original Niger SAM into a SAM that was suitable to use in the CGE model. Further detail on these adjustments can be found in Annex xxx.

- Increased labor's share of value added in the agriculture sectors so that it is more in line with values reported in other low income countries. This allows the model to better capture the contribution of labor in production.
- Separated the contribution of land and the extractive resource, in the agriculture and mining sectors, respectively. This allows the model to better represent the production technology used in the agriculture and mining sectors.
- Distinguished labor by region and skill, to capture the different skill sets between rural and urban workers.
- Other technical adjustments made for model consistency.

Information requirement for the dynamic module

Following the base year, the model is solved year-by-year from 2012 through to 2030. Hence, the model is also used to update the SAM from 2012 to 2016. Over this historical period, the projections from the model

are fine-tuned so that they match published data for key macroeconomic and fiscal aggregates such as: real GDP growth, composition of real GDP by expenditure, current account balance, government budget balance and debt.

For the projection period, certain assumptions have been made regarding the evolution of the model's exogenous variables. BaU (business-as-usual, or no-reform) growth has been calibrated using the World Bank's MPO for the short term and the IMF's World Economic Outlook in the longer term. For years beyond the projection period of these institutions (2022-2025), the underlying productivity assumptions are extended until 2025. Population growth is based on to the World Bank population projection.

Parameters of the model

Beside the SAM, some external parameters are necessary for the calibration of key behavioral functions governing consumer preferences, production technology, and commodity trade. The majority of these parameters are adopted directly from those provided by GTAP global model.[14]

Understanding the salient features of the structure of the economy

To better understand the scenarios proposed, it is important to review the structure of the Niger economy, as presented in the SAM. Like many developing economies, Niger relies on the agriculture sector, this sector contributed to nearly half of GDP at factor cost in 2012, as shown in Table A4.1 below. Notably, the majority of unskilled workers are employed in the agriculture sector. Hence, any policies which affect this sector would have a disproportionate effect on unskilled workers. The extraction of crude oil and uranium contribute three per cent and six percent to GDP, respectively. By construction, the use of the extractive resource is concentrated in the mining sectors. Skilled labor is mainly employed in public services, which includes public administration, health and education.

Table A4.1. Structure of production in Niger, 2012

	Skilled labor	Unskilled labor	Capital	Land	Extractive resource	GDP factor cost share
Agriculture	0	90	38	100	0	47
Crude Oil	1	0	3	0	36	3
Uranium	9	0	4	0	51	6
Other mining	2	1	1	0	12	2
Manufacturing	9	3	17	0	0	10
Public services	54	1	9	0	0	13
Other services	24	5	29	0	0	19

The factor intensities for each industry are shown in Table A4.2 below. As can be expected, manufacturing is a capital-intensive sector. Other services are relatively capital intensive because it includes the Construction and Transportation industries. As noted earlier, agriculture is intensive in unskilled labor whilst, public services are intensive in skilled labor. On the other hand, the extractive industries have low labor intensities.

Table A4.2. Factor intensities in Niger, 2012

	Agriculture	Crude oil	Uranium	Other mining	Manufacturing	Public services	Other services
Skilled labor	0	5	23	20	14	64	19
Unskilled labor	50	0	0	13	7	3	7
Capital	38	38	31	31	79	33	74
Land	12	0	0	0	0	0	0

[14] The GTAP elasticities appears to be consistent with the literature as the agriculture and food sectors registered lower elasticities compared to the service sectors.

	Agriculture	Crude oil	Uranium	Other mining	Manufacturing	Public services	Other services
Extractive resource	0	57	46	36	0	0	0

Source: 2012 Niger SAM.

The small size of the manufacturing industry means that Niger relies on imports for the supply of manufactured goods. As shown in Table A4.3 below, imports make up around half of the domestic supply of manufactures. Transportation services make up the bulk of service imports.

Table A4.3. Sources of domestic supply, 2012

	Agriculture	Crude oil	Uranium	Other mining	Manufacturing	Public services	Other services
Indirect taxes	0.7	0.0	0.3	2.8	7.2	0.3	4.4
Imports	6.1	0.0	0.0	11.7	50.7	0.0	24.0
Domestic production	93.1	100.0	99.7	85.5	42.1	99.7	71.6

Source: 2012 Niger SAM.

The majority of Niger's sectors **focus on supplying the domestic market.** In particular, the agriculture sector exports only 12 per cent of its output (Table A4.4). In contrast, the focus of the extractives sector is the global market.

Table A4.4. Demand for goods and services, 2012

	Intermediate inputs	Consumption	Investment	Government	Export
Agriculture	19	66	4	0	12
Oil	66	9	0	0	25
Uranium	0	0	8	0	92
Other mining	61	0	0	0	39
Manufacturing	24	26	48	0	3
Public services	4	14	0	83	0
Other services	36	38	24	0	2

Source: 2012 Niger SAM.

Annex AIV.B. Industries in the Niger CGE Model

Model industries
Rice
Mil
Sorghum
Cowpeas
Onion
Tomato
Pepper
Potato
Peanut
Income from other cultures
Cattle
Camels
Sheep
Goats

Model industries
Poultry
Milk
Manure
Other livestock products
Firewood
Fish
Other fishery products and forest
Crude oil
Uranium
Gold
Stone, sand and clay
Salt and soda
Other products from extraction
Food, beverages and tobacco
Products of textiles and leather
Paper, printing and publishing
Refined petroleum products
Chemicals and pharmaceuticals
Other manufacturing
Electricity, gas and water
Construction work
Sales and auto repair and motorcycle
Transportation and storage services
Accommodation and catering
Communications Services
Financial and insurance services
Real estate and business
Public administration services
Education Services
Health services
Other services

Annex AIV.C. Factors of Production in the Niger CGE Model

Factors of production
Rural skilled labor
Rural unskilled labor
Urban skilled labor
Urban unskilled labor
Capital
Land
Natural Resources

Annex AIV.D. Adjustments to the Niger Social Accounting Matrix

A key data input for the model is the 2012 SAM provided by the INS. Some adjustments were made to the original SAM so that it can be used in the modelling. The adjustments are discussed below.

Adjusted labour's share of valued added

The data for Niger shows that the contribution of labour to value added is relatively low compared with other low income countries (see table below). In the original SAM the contribution of labour is approximately 19% of value added for all industries and only 3.8% of value added in agriculture industries.

Table A4.5. Estimate of labour share from Penn World Tables

Income group	Total countries	Min	Mean	Median	Max
OECD	31	43.6	62.3	63.8	83.6
HI	20	17.5	47.5	50.3	75.4
UMI	36	9.0	48.2	49.8	86.4
LMI	26	25.0	55.4	54.2	91.7
LIC	14	16.4	59.4	62.5	85.2
All countries	**127**	**9.0**	**54.6**	**55.8**	**91.7**

Source: Barrot (2016) from Penn World Tables 8.1 and WB income classification.
Note: HI: high income countries, UMI: upper middle income countries, LMI: lower middle income countries, and LIC: low income countries.

This may reflect several factors including:

- the high returns to capital and land
- some returns to labour are included in gross mixed income, gross mixed income is a particularly important component when there is a high level of self-employment
- it may also reflect challenges in measuring labour remuneration/income in Niger, where there is a high level of subsistence farming

The labour share in agriculture activities was adjusted by reallocating some Gross Operating Surplus to compensation of labour. Following this adjustment, the labour share of value added increases to around 34% of value added. This allows the CGE model better to capture the level of labour used as an input in production.

Separated the contribution of fixed factors of production

Land in agriculture activities: Introduced land as a factor of production in agriculture activities to assist in modelling investment in irrigation and other agriculture-focused policies. Data on the share of land in agriculture value added is sourced from the GTAP database. In this database, for the 'Rest of West Africa' region, it is estimated that land constitutes 12% of value added in agriculture activities. This proportion is applied to the original SAM. The 'Rest of West Africa' region comprise of Cabo Verde, Gambia, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Saint Helena and Sierra Leone.

Natural resources in mining activities: Introduced natural resources as a factor of production in mining activities. The natural resource is treated as a fixed factor that is unique to each mining sub-activity. This allows the mining activity to have a more realistic production technology (e.g. uranium reserves is used only to produce uranium). It is assumed that 60% of the original level of gross operating surplus is a return to the natural resource for the Crude Oil activity, Uranium activity, Gold activity and Stone, Sand and Clay activity. For the Salt and Soda activity and the Other products activity it is assumed that 20% of the original

level of gross operating surplus is a return to the natural resource. Values are within the bounds of the GTAP database for 'Rest of West Africa' region (20-75%).

Distinguish labour types

In the original SAM labour is distinguished by their level of skill. However, rural unskilled workers may not have the same skills as urban unskilled workers. To allow for this in the CGE model, labour is further distinguished by region (rural versus urban) giving four types of labour: rural skilled, rural unskilled, urban skilled and urban unskilled. This split was based on data from the Household Expenditure Survey and a survey of wages.

Investment flows

Identify inventory investment: Negative entries in the investment column for Rice and Food, Beverages and Tobacco are reallocated to inventory investment. The CGE model separately identifies gross fixed capital formation and inventory investment. In the model, negative entries of gross fixed capital formation in the SAM creates an error, hence this adjustment is made.

Combine public and private capital: In the SAM, public capital is used by public administration services, while private capital is used by all other activities. The CGE model does not distinguish between public and private capital, so public and private capital (and hence its returns) are combined.

Tax revenue adjustments

Some small tax revenue adjustments were made for consistency. Millet shows a small level of import tariff (21 million CFA francs) even though there is no imports of millet in the SAM. This revenue flow is reallocated to other taxes on products.

The level of export taxes on fish (514 million CFA francs) is higher than the total value of fish exports (343 million CFA francs). This may be because the value of fish exports excludes the value of transport and trade margins. So, the level of export revenue is reduced by 400 million CFA francs and this revenue is reallocated to import taxes.

'Cosmetic' adjustments

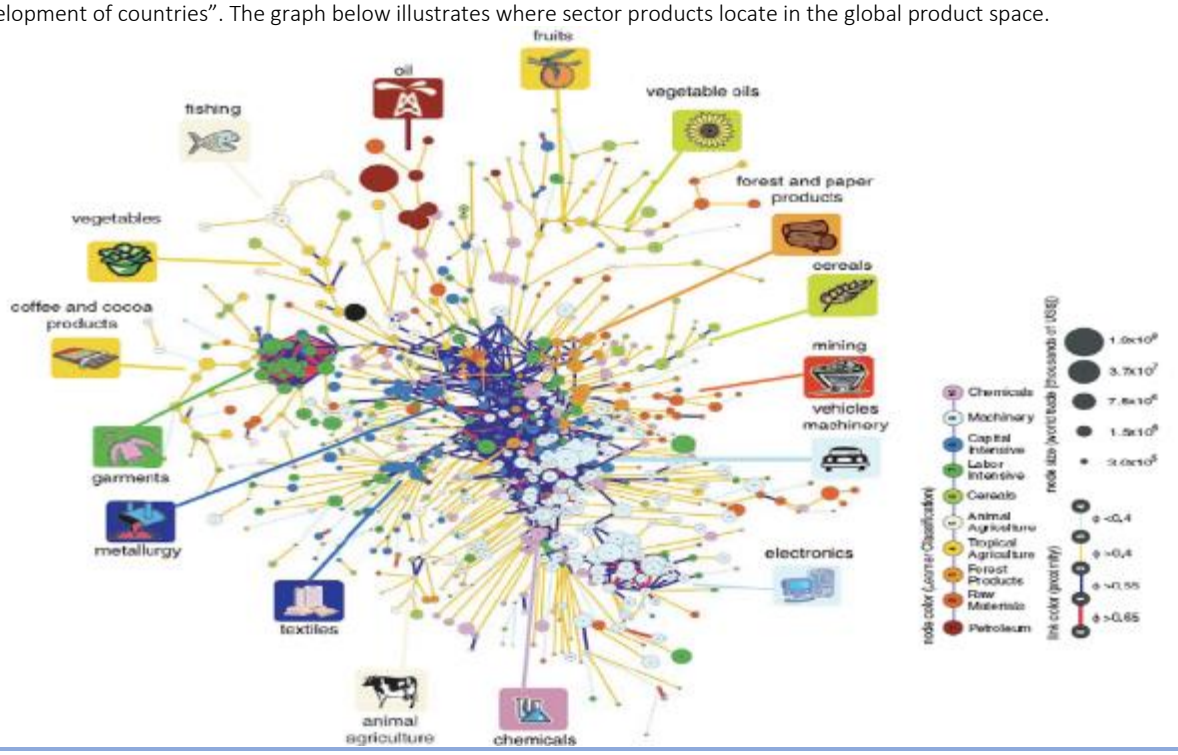
The following adjustments were made to the original SAM so that the codes used to calibrate the model would run correctly (e.g. introducing enterprises as a separate institution), or so that the model would be set up to the specifications of the project (e.g. aggregating trade partners into Nigeria and the ROW). The majority of these changes are 'cosmetic'; they do not affect the information contained in the original SAM.

- Separate income flows from trade flows in the Balance of Payments
- Aggregate trading partners into Nigeria and the ROW
- Aggregate foreign income flows into a single Balance of Payment account
- Introduce enterprise as an institution. Gross Operating Surplus is first paid to enterprises and then distributed to households.
- Introduce a space for margins, so that this data can be added easily if it becomes available.
- Split government interest payments into foreign and domestic interest payments. According to the IMF Country Report (CR1563), in 2012, expenditure on interest payments totaled 10.9 billion CFA francs (of which 6.9 billion CFA francs are for external debt).

Annexes - Chapter V

Annex AV.A. The Product Space of a Country

Analogy for the Product Space and capabilities approach:
"Think of a product as a tree and the set of all products as a forest. A country is composed of a collection of firms, i.e., of monkeys that live on different trees and exploit those products. The process of growth implies moving from a poorer (tree-isolated) part of the forest, where trees have little fruit, to better (more tree-populated) parts of the forest. This implies that monkeys would have to jump distances, that is, redeploy (human, physical, and institutional) capital toward goods that are different from those currently under production. Traditional growth theory assumes there is always a tree within reach; hence, the structure of this forest is unimportant. However, if this forest is heterogeneous, with some dense areas and other more-deserted ones, and if monkeys can jump only limited distances, then monkeys may be unable to move through some areas of the forest. If this is the case, the structure of this space and a country's orientation within it become of great importance to the development of countries". The graph below illustrates where sector products locate in the global product space.



Source: Atlas of Economic Complexity.

Annex AV.B. Data Sources

The analysis in this chapter is based on HS 1992 6-digit data from the BACI International Trade Database (BACI-Base Pour L'Analyse du Commerce International) spanning 1995-2014). BACI is the World trade database developed by CEPII. Based on the United Nations Statistical Division COMTRADE, database Updates conducted by BACI ensure more accurate reporting of bilateral trade flows by applying procedures such as reconciling exports with the corresponding imports. Services are added to our analysis using the IMF Balances of Payment (BoP) database and are available up until 2013.

Annex AV.C. Technical Specifications

A. Revealed Comparative Advantage:

The index for country *c* and good *i* is calculated as follows:

$$RCA(c,i) = \frac{x(c,i) \Big/ \sum_i x(c,i)}{\sum_c x(c,i) \Big/ \sum_{i,c} x(c,i)}$$

where *x(c,i)* is the value of the exports of country c in the *i'th* good. The index of revealed comparative advantage (*RCAic*) has a relatively simple interpretation. If it takes a value greater than unity, the country has a revealed comparative advantage in that product. Conversely, when *RCA*(*c,i*)<1 that country is not a competitive exporter of that product (Balassa, 1986).

B. Fitness and Complexity:

Fitness of *countries* and complexity of *products* are specified as a dynamical system as follows (Tacchella et al, 2012):

$$\tilde{F}_c^{(n)} = \sum_p M_{cp} Q_p^{(n-1)}$$
$$\tilde{Q}_p^{(n)} = \frac{1}{\sum_c M_{cp} \frac{1}{F_c^{(n-1)}}}$$

Where $F_c^{(n)}$ is the Fitness of country c at the n'th iteration of the algorithm. Conversely, $Q_p^{(n)}$ is the n'th iteration of the Complexity of product p. M_{cp} represents the matrix of binary RCA values that indicate whether country c is a competitive exporter of product p. At each step, F and Q are normalized.

Starting conditions for the algorithm are $F_c = 1$ and $Q_p = 1$.

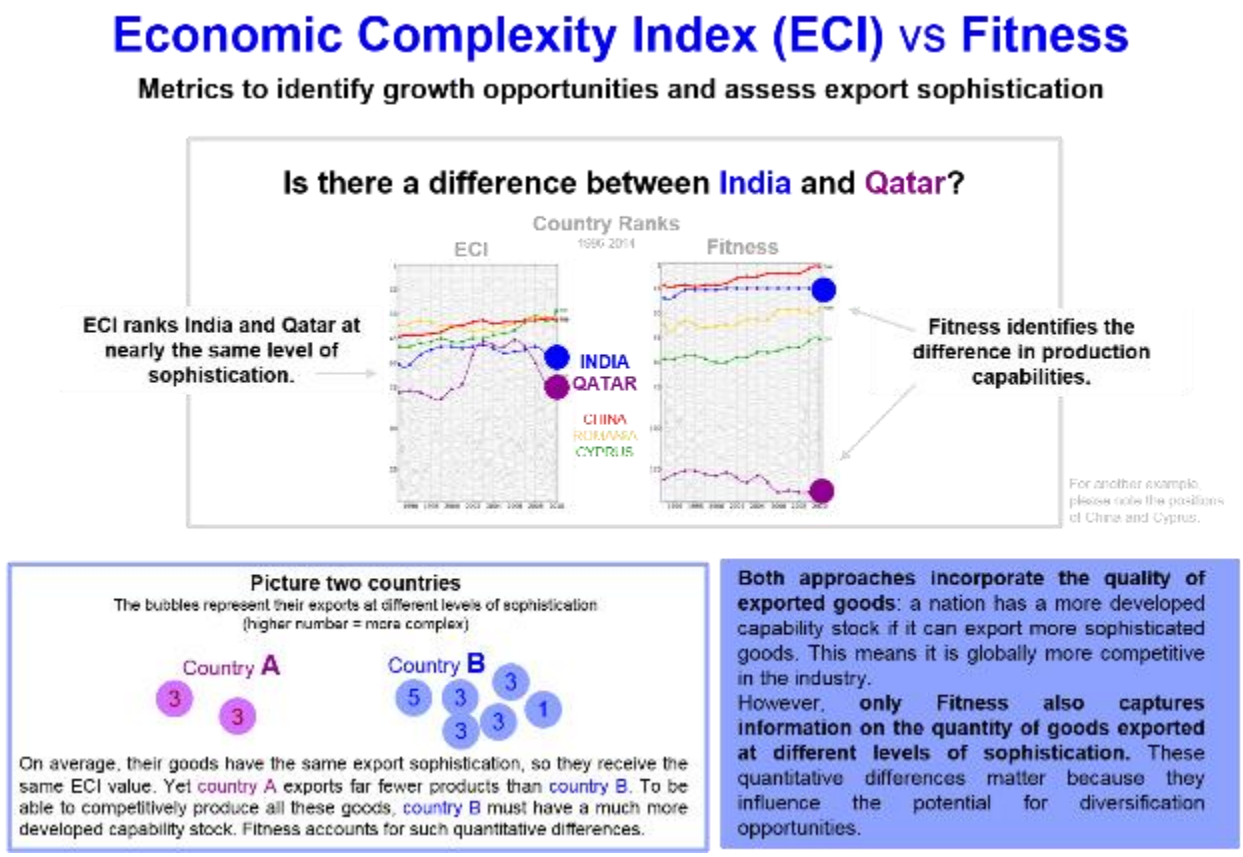
C. Product Space density

Density represents the average proximity of a new potential product j to a country's current competitive export (Hidalgo et al, 2007):

$$\omega_j^k = \frac{\sum_i x_i \phi_{ij}}{\sum_i \phi_{ij}}$$

Where ω_j^k is the density of good j for country k. ϕ_{ij} is the proximity between good i and good j, where proximity is defined as the minimum pairwise conditional probability of a country exporting good I given that it exports good j.

Annex AV.D. Benefits of Fitness Relative to ECI



Annex AV.E. List of Niger's Sectors with Economic Complexity, 2014

Table A5.1. Average normalized complexity per sector

	Complexity average for all goods in the sector	Complexity average for Niger's competitive exports (in 2014)
Animal products	0.3	0.1
Chemicals	0.7	0.4
Food	0.3	0.1
Metals	0.5	0.3
Minerals	0.3	0.1
Raw Hides and Leather	0.4	0.01
Stone and Glass	0.5	0.1
Textiles	0.4	0.2
Vegetable products	0.3	0.1
Wood products	0.4	0.1

Source: Authors' estimates.

Note: Estimates available upon request.

Annex AV.F. List of Niger's Exports with Revealed Comparative Advantage, 2014

261210	Uranium ores and concentrates	875.85
284410	Natural uranium and its compounds, etc	622.67
120740	Sesamum seeds	78.67
10420	Live goats	72.46
520852	Printed plain cotton weave, with >=85% cotton,	48.3
100620	Husked (brown) rice	27.77
630900	Worn clothing and other worn articles	25.88
151620	Vegetable fats and oils and their fractions, hy	22.14
71010	Potatoes, frozen	20.07
253090	Other mineral substances, nes	19.51
121299	Vegetable products used primarily for human con	16.56
190230	Other pasta, nes	15.65
70310	Onions and shallots, fresh or chilled	15.46
71490	Roots and tubers with high starch content, fres	15.45
10119	Live horses, other than for pure-bred breeding	11.86
80410	Dates, fresh or dried	11.2
10410	Live sheep	10.54
40291	Concentrated milk and cream, unsweetened (excl.	10.47
71333	Dried kidney beans, incl. white pea beans, shel	9.66
10600	Other live animals, nes	7.8
620329	Men's or boys' ensembles of other textiles, nes	7.56
410229	Skins of sheep or lambs, without wool, not pick	7.08
460199	Plaiting materials (excl. vegetable), in sheet	7.06
690710	Tiles, cubes and sim <7 cm rect or not etc, ung	6.99
90220	Green tea, nes	6.83
10290	Live bovine animals, other than pure-bred breed	6.38
370510	Photographic plates..., exposed and developed,	6.24
90210	Green tea in immediate packings	6.12
540784	Printed woven fabrics, <85% synthetic filaments	6.06
170191	Cane or beet sugar, containing added flavouring	5.9
410619	Goat or kid skin leather, (excl. further prepar	5.87
100630	Semi-milled or wholly milled rice	5.8
170199	Cane or beet sugar, in solid form, nes	5.57
732394	Table, kitchen or other household art & parts t	5.05
71339	Dried beans, shelled, nes	4.63
410519	Sheep or lamb skin leather, (excl. further prep	3.89
190219	Uncooked pasta, not containing eggs, not stuffe	3.71
60120	Bulbs, tubers... rhizomes in growth or flower;	3.35
340119	Soap and organic surface-active products in bar	3.28

271113	Butanes, liquefied	3.19
240220	Cigarettes containing tobacco	3.07
271390	Other residues of petroleum oils, etc	2.96
151190	Palm oil (excl. crude) and liquid fractions	2.93
210420	Homogenized composite food preparations	2.91
521225	Printed woven fabrics of cotton, >200g/m2, nes	2.88
711311	Art. of jewellery and pts thereof of silver w/n	2.86
711711	Imitation jewellery cuff-links &studs of base m	2.81
520851	Printed plain cotton weave, with >=85% cotton,	2.8
10210	Live pure-bred breeding bovine animals	2.73
151800	Animal or vegetable fats and oils... chemically	2.57
151590	Other fixed vegetable fats and fractions, nes	2.36
110620	Flour and meal of sago, roots or tubers of 0714	2.34
110710	Malt not roasted	2.29
71331	Dried beans, shelled	2.25
200290	Tomatoes, preserved otherwise than by vinegar o	2.2
284310	Colloidal precious metals	2.19
271000	Petroleum oils, etc, (excl. crude); preparation	2.08
410121	Whole hides and skins of bovine animals, nes, f	1.94
630510	Sacks and bags, used for packing goods, of jute	1.75
40299	Sweetened milk and cream (excl. in solid form)	1.61
521214	Colored woven fabrics of cotton, =<200g/m2, ne	1.6
271210	Petroleum jelly	1.58
610829	Women's or girls' briefs, etc, of other textile	1.47
780199	Lead unwrought nes	1.47
71022	Shelled or unshelled beans, frozen	1.44
130120	Natural Gum Arabic	1.35
630190	Other blankets and travelling rugs, nes	1.31
970300	Original sculptures and statuary, in any material	1.18
6907	Iron ingots	1.01

Annex AV.G: Best Practices in Export Diversification

Malaysia and Thailand. Malaysia and Thailand stand out as successful examples of both vertical and horizontal diversification. The governments of these two countries adopted a dual strategy to upgrade natural resource-based industries (such as palm oil and rubber products in Malaysia and agricultural and fish products in Thailand) and to encourage labor-intensive manufactured exports, most notably clothing and electronics. Agriculture played a key role in the industrialization process, making these countries a successful example of Newly Agro-Industrializing Countries (NAIC). The development of traditional (e.g. rice and rubber) and high-value, export-orientated agriculture stimulated the growth of agro-industry. In the case of palm oil and rubber, Malaysia set up specialized agencies to promote production and upgrading, and used the proceeds of production and export taxes to finance research and development investments. Both countries established EPZs and licensed bonded warehouses as a means of stimulating manufactured exports and attracting foreign investment. FDI came mostly from neighboring Asian countries (Japan and Asian NIEs). The development of natural resource-based sectors helped both countries to cope with the economic downturn after the mid-1990s, which affected manufactures exports most severely.

Kenya. The country has sought to diversify away from traditional commodities (i.e. tea and coffee) to processed products (such as preserved fruit and fish products), to the production of new types of niche products (such as "off-season" and "specialty fresh vegetables" or cut flowers) and to manufacturing (apparel, clothing accessories and leather products). Results have been mixed, however. While Kenya is now the largest African cut-flower grower and one of the biggest exporters of fresh horticultural produce, the country has been less successful in manufacturing. Notwithstanding initial positive achievements, the provision of incentives to export-oriented manufacturing firms failed to sustain export growth. Kenya had already emerged in the late 1960s as a supplier of "off-season" fruits and vegetables to the United Kingdom and then to other European markets. Besides the booming trade in fresh horticultural produce, Kenya started to develop cut-flower exports. This industry underwent a major transformation, thanks to foreign investment, in particular with the establishment of a Danish company which was granted attractive investment terms. The company brought in capital and expertise to generate considerable spin-offs. Several expatriate professionals left the company and started up their own small flower businesses. In the 1970s, the Horticultural Crops Development Authority managed an experimental program to train smallholding farmers in flower cultivation and to organize their harvest for export. The great expansion of the sector in the 1980s increased the demand for technical assistance, which gave rise to a technical support cluster of specialized service suppliers. Cut-flower exports took-off in the 1990s in conjunction with significant reforms in import procedures, foreign exchange and air freight sectors, improvements in infrastructure and active investment promotion. Historically dependent on foreign capital and expertise, the industry has increasingly seen the emergence of Kenyan players, with significant levels of expertise, to the point that the country is now largely self-sufficient in in-house knowledge and provides business services to other African countries

Uganda. The Lake Victoria fish industry exemplifies both opportunities and challenges with respect to commodity upgrading. Overall, this sector has experienced spectacular growth in recent years. Fishing activities have developed around the Lake since the 1990s, providing today some $200 million per year in export earnings and employing around 200 thousand people. Until that time, large fish stocks were almost unexploited for commercial purposes. Only about a tenth of the fish population of the Lake was sold un-processed on the local market. During the 1990s, responding to an increase in the European demand for fresh water fish, a few Ugandan companies started processing and airlifted fresh Nile Perch in the form of fish fillets. As soon as the sector expanded, problems of quality and phytosanitary standards emerged, due to inadequate chilling equipment, as well as environmental concerns as a result of fish processing waste. Low yields (due to high wastage in fish filleting) and the 1999 EU ban on Ugandan imports due to suspected fish poisoning — leading to a 35 per cent decrease in exports — risked undermining the viability of the sector. The Uganda Fish Processors and Exporters Association (UFPEA) played a critical role in obtaining technical assistance from donors and establishing a reliable fish safety assurance system in compliance with EU standards. UFPEA members have directly invested more than $100 million in the sector. The growth of the fresh fillet sector has spurred the development of side sectors — such as processing of wastage for producing animal feed and fertilizers — as well as downstream sectors — such as the packaging and freight and shipping companies — and upstream sectors with fishermen adapting their techniques to the new quality and organizational requirements set by the industry. The development of fish exports has also generated spillovers to other sectors, thanks to the improvement of cold storage and freight services. For instance, fish exporters joined forces with flower exporters' ground-handling firms to bring down freight rates and improve freight services at Entebbe Airport.

Sources: Reinhardt (2000) on Malaysia/Thailand, Glenday et al. (2000), Thoen (1999) on Kenya, Dijkstra (2001) on Uganda.

Annexes - Chapter VI

Table A6.1. Upgrading in bovine and onion value chains in select african countries

		Type of Upgrading	Chain Segment	What They Did to Succeed
Bovines	Ethiopia	Process	Inputs Production	Policies to improve animal health Private sector feedlots
		Product	Processing	Established private sector export abattoirs Allana, India's largest agro processor, is investing in bovine abattoirs to export to the Middle East Targeting animal health and slaughterhouse utilization to improve meat quality and leather
		Market	Marketing	Diversified export markets in Africa and the Middle East of live animals
	Namibia	Process	Inputs Production Processing	Policies target animal health and international standards Implemented traceability standards Improved private sector enabling environment and investments Chain is export and private sector oriented Developed services and feedlots Developed private meat board to upgrade
		Product	Processing	Meatco, producer owned slaughterhouse, is vertically integrated and meets international standards Entered higher value meat products segment
		Market	Marketing	Entered chilled, frozen and niche meat markets Diversified export markets to EU, USA, China and South Africa
Onions	Senegal	Process	Inputs Production	Strategic policies to improve and increase onion production Improved enabling environment to attract investment and industry organizations Started implementing international standards Producers started using ventilated burlap sacks
		Market	Marketing	Shifted from being an importer to a producer and exporter Barfoots, large UK producer, invested in onions and started exporting to British supermarkets
	Egypt	Process	Inputs Production	Implemented policies to increase exports Producers adopted international standards Producers improved water management and harvesting Producers switched to ventilated burlap sacks
		Product	Processing	Investment by Olam in higher value dried onions for domestic and export markets
		Market	Marketing	Private exporters with diversified markets in Europe, the Middle East and Africa

Source: Ahmed and Bonaventure (2017).

Table A6.2. Ethiopia: Key LMP policies

LMP Targets
Increase of public investment in rehabilitating range and pasture lands to improve feeding and animal management to complement genetic and health improvements
Improvement of cattle dairy through breeding, artificial insemination in dairy systems and in peri-urban milk sheds throughout Ethiopia
Improvement of productivity of local breed animals for meat and milk through investments in genetic selection and in animal health by implementing vaccinations and parasite control programs
Promotion of the imports of improved semi-scavenging poultry breeds by the private sector and/or through public-private partnerships, with improved capacity of private animal health services
Increase of specialized commercial production and adoption of new genetic, health and feed technologies
Rationalization of public and private sector roles in veterinary service provision, leading to the transition to the private provision of clinical services wherever feasible and public oversight
Expansion of private-sector flour and oil mills to encourage the production of additional feeds from agro-industrial by-products by introducing protective policies against flour and cooking oil imports
Removal of the double-imposition of VAT and excessive customs duties (currently 53%) on feed mill ingredients, as well as the introduction of quality control measures
Introduction of an affordable system of animal identification and traceability, as well as food safety and animal health programs through the monitoring of abattoirs and disease surveillance
Streamlining of regulations and procedures in order to attract and maintain substantial levels of private investment in livestock product transformation with higher value-added

Source: Shapiro, Gebru et al. 2015.

Table A6.3. Senegal's onion policies to improve production

- Maintain a managed import regime when local production is available and manage seasonal production of onions (limit onion import when local onion is available);
- Consolidate storage infrastructure and bulk transport programs;
- Raise awareness of index-based insurance schemes;
- Strengthen the organization of producers;
- Increase the quantity and the quality of the production;
- Develop a competitive price charter acceptable to both producers and consumers;
- Enable the development of onion processing into onion powder;
- Reform import declarations for food products, stipulating a date of validity and banning the reassignment of declarations to another party.

Source: Agritrade 2014.