INDUSTRIAL INCENTIVES IN NIGER: AN ANALYSIS IN TERMS OF DOMESTIC RESOURCE COSTS

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ABSTRACT: In this paper, we estimated the domestic resources cost coefficients (DRCC) to identify the major issues in terms of productivity in the manufacturing industry of Niger. The values of these indicators were, to a large extent, less than one (1) at the prevailing exchange rate between the CFA franc and the Naira during the study period. These results showed, all things being equal, that the range of the DRCC was not very scattered around the average, suggesting that it was possible to reallocate the factors of production more efficiently to better guide the firms towards their comparative and complementary advantages.

Key words: economic incentives, domestic resources cost coefficients (DRCC), market price, reference price, comparative advantage, complementary advantage.

JEL Classifications: D20, F12, F14.

INTRODUCTION

Domestic resource cost coefficients (DRCCs) are defined as the domestic resources expressed at their reference prices, required to save a net unit of currency from export or import substitution. These effectiveness and comparative advantage indicators are different from the indicators of incentives based on effective protection rates (EPRs). Industrial incentives in the form of protection or subsidies can generate disproportionate costs arising from the irrational use of factors (capital and labor). A country values its activities if it allocates fewer domestic resources in the production of a unit of currency. The values of the DRCCs, which reflect this fact, suggest the possibility of efficient reallocation of factors in order to better position firms towards their comparative and competitive advantages. Productive activity is generally discouraged when the allocation of equipment and human capital (scarce in poor countries) is inefficient and enhanced when efficiency prevails. The growth of the market economy, considered as more effective than the managed economy, assumes the existence of institutions that reduce the uncertainty of agents and make the economy more efficient by facilitating the flow of information (North, 1990). According to the founders of cliometrics, the failure of these institutions leads to an increase in transaction costs. Therefore, according to Grellet (2006), the

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division of labor does not yield the gains of specialization since market exchanges are limited to a few essential operations. When these operations function well, the market economy can potentially evolve over time. In this case, the DRCCs reflect an optimal allocation of factors that guide firms towards their relative advantages.

The institutions' dysfunction did not allow the lagging economies, like in the case of Niger, to benefit from the technological progress of the countries that have outstripped them. These economies have not been successful in the upgrading of specialty products. Their incentive policies have emerged as sources of excessive costs of domestic resources and trade distortions. This negative fact affects the development of the manufacturing sectors.

The external constraint relative to the application of the costs of the comparative law on which these countries do not have enough flexibility is the major challenge for their industrialization. The increased competitive disadvantages, in a system of increasing trade liberalization, lead to the polarization bias of countries.

Niger, a low-wage, low-technology country, is part of the group of Nations sheltered from competition. The protection of Niger's industries appears to reduce its trade dependence by the sacred mechanisms of the market. Indeed, the free trade has become problematic relatively to the real capacities to ensure an accelerated process of catching up the chronic backwardness for the process of industrialization. The Niger's choice for an incentive policy based on import substitution strategy was not enough to avoid its industrial underdevelopment. The DRCC provides a more comprehensive assessment of industrial productivity than EPR (effective protection rate) that measures price distortions to determine the structure of industrial incentives without addressing all aspects related to cost-competitiveness. The domestic resources cost model that corrects this inadequacy, distinguishes between existing obstacles due to incentives and, the international trade's obstacles relative to the cost of domestic factors. This model serves as a framework for the estimation and interpretation of the DRCCs of industrial units in Niger.

Thus, the question that arises is how to identify the firms that are efficient or have a comparative advantage. The objective of this analysis is to identify the Niger's firms that are efficient or have a revealed relative advantage using the DRCC's method. The approach used in this paper consists to present the theoretical framework, the empirical model and to interpret the adequacy between the facts and the results.

1. THEORETICAL FRAMEWORK AND METHOD OF ANALYSIS

The theoretical framework and the method of analysis will be discussed in the following sections.

I.1.The theoretical framework of analysis

The next subsection presents a brief review of the literature and shows how the DRCC is derived from the Ricardian theory of relative advantage.

1.1. Brief review of the literature

The existence of a tariff on imports increases the production cost of the sector and influences

the value added (Tower, 1992). This finding showed that nominal protection does not measure the extent of protection enjoyed by domestic producers. This depends on the nominal protection applied to the output and the inputs. In the same way, export production units are protected by subsidies and unprotected by export taxes. The relationship between the EPR (effective protection rate) and the DRCC has been the subject of numerous studies from both industrial and agricultural approaches [Greenway and Miner (1990), Scott (2007), Murat and Emin 2009 and Briones (2014)].

The DRCC has an apparent resemblance to the EPR. Although these two measurement instruments are often confused in the literature; they present fundamental differences in their measurement and significance [(Cockburn et al., (1999)]. The main difference is relative to the use of input prices in the calculation of the DRCC [Heckman (1974); Ruiz (2003)]. These "shadow prices" (Srinivasan and Bhagwati, 1978) correct market price distortions that imperfectly reflect the economic cost paid by consumers for using certain types of resources and the economic value of "common good" (Tirole, 2016).

The debate that took place in the 1970s concerning the distinction between the concept of effective protection rate and the concept of internal resource cost (Balassa and Schydlowsky, 1972) reappeared while taking into account market failures [Stiglitz and Weiss (1981); Tirole (2016)] and new theories of international trade [Helpman and Krugman (1985); Mucchielli (1997); Allegret and Merrer (2012)]. The DRCC can be considered as an effective protection only under specific conditions, particularly in the extreme case where all domestic products' prices, intermediate goods, inputs and assets, and the exchange rate are equal to their respective reference prices. If this condition was met, then the domestic value added was identic to the total domestic resource cost. The coefficient of the ratio between the reference exchange rate and the official exchange rate equals to one (1). And, the value of the DRCC is strictly equal to the value of the VSE plus one (1), [Lagos (1999); Anderson and Masters (2009)].

The hypothesis that enshrines equality between reference and market prices, is far from the reality of the markets. These market prices are affected by interactions between economic agents, uncertainties, contextual diversities and informational asymmetries [Akerlof (1970); Spence (1976); Stiglitz (1987)]. It is true that the DRRC may appear as an indicator of the effects of price distortions on the efficiency of productive activities as well as the EPR. But this assertion is true only if price distortions were the sole cause of economic inefficiency. This hypothesis is far from being true. There are, in fact, many factors other than prices that are the cause of various distortions. In short, the divergence between EPR and DRCC remains unchanged. The first measures jointly the price distortions of trade, while the second measures the efficiency and comparative advantage of industrial units in each country.

The computation of the DRCC requires the use of reference prices. These reference prices can be expressed as wages, interest rates, or exchange rates when it comes to compensate the factors of production in order to take in account their relative scarcity in the national economy. Indeed, the reference wage represents the economic cost of holding a job in an activity. It is heterogeneous like the workforce operating in a largely segmented market. In poor countries, skilled labor is a relatively scarce resource. The reference price is considered as the current wage paid to the employee. This assumption cannot be applied to unskilled labor because of

the existence of a large disguised high unemployment margin. In this case, the reference salary is lower than the salary shown on the payroll of employees. It is asymptotically close to the marginal productivity in the agricultural sector or the remuneration in the informal sector. The reference interest rate is estimated by the marginal productivity of capital in its various alternative uses. It's a different interest rate that is used as an approximation on the international markets for the reference interest rate because of the high mobility of capital in the search of better remuneration.

1.2. Sampling and survey procedures

The purpose is to specify the choice of industrial units and to explain the variables used in the estimation of the DRCCs. First, we chose the industrial units. The data were collected directly from the industrial units and the National Institute of Statistics (INS). The study aimed to cover all firms in the country. But this ambition was not reached because the data collected from some companies were unusable. Also, the choice of years 2005, 2010 and 2012 was relative to the availability of complete statistical information. Table 1 below shows that the contribution to manufacturing aggregates is high. These companies are concentrated on four branches in the following average proportions: Food industries (45%); Heavy Industries (22%); Chemical Industries (23%) and Textile Industries (10%).

Table 1: Sample weight in the manufacturing sector

	2005	2010	2012
Share in net sales	43	88,3	85,2
Share in value added	68	76	75,1
Share in payroll	56	70,4	73,4
Share of employment	48	76	64

Source: Author's calculations based on company survey data and NSI data (2005, 2010, and 2012).

Secondly, we explained the variables used to calculate the DRCCs. The expanded formula (VII)above was used to calculate the DRCCs of firms. The local producer's international value added (IVA) is estimated by deflating the value of domestic production (VDP) by the nominal protection coefficient ($1 + t_i$) and the value of exchangeable inputs (VEI) by ($1 + t_j$). It follows that IVA =   PO/ (1+ti) – VEI/ (1+tj) - PO / (1 + ti) is the value of domestic production deflated and, the tax on the output i, which gives the value of production expressed in the international price. VEI / (1 + tj) is the value of exchangeable inputs deflated and tj, the tax on the input j, which gives the value of the traded inputs expressed in the international price.

The IVA estimate required the use of the West African Economic and Monetary Union (WAEMU) data. The WAEMU has a Common External Tariff (CET). And, the trade between its eight (8) members is liberalized. The CET structure comprises four rates, depending on the nature of the categorized products. Overall, the tax is 2% for Category 0; 7% for Category 1; 12% for Category 2 and 22% for Category 3. The average tax rate is respectively 18% %, 10.5% and 8.3% for consumer, intermediate and capital goods (Cadot et al., 2013). These data were used to calculate the tariff coefficients applied to the inputs and outputs of the firms in the sample. The IVA was estimated on this basis.

The importance of trade with Nigeria and the continued appreciation of the Nigeria's

currency (Naira) during the period of study made a necessary priority to take into account the effects of the Naira rate on the DRCCs. It was well known that the CFA franc was highly demanded in Nigeria for its external purchasing power through the parallel market circuit. According to Amoussouga (1990), the parallel rate is considered to be fairly close to the equilibrium rate. Thus, the reference exchange rate is estimated using formula (VIII): $(e^r) = \dfrac{taux\ parallèle}{taux\ officiel}\ (VIII)$. This ratio is significant only from the point of view of the Nigerian economy where, in official transactions, the parallel market exchange rate is a reference rate. But in the relationship between both Niger and Nigeria, the exchange of currencies takes place in the informal market where the increase in the exchange rate increases the DRCCs of Niger's products. Correcting these facts by makes it possible to take better into account the effects of the naira rate on industrial incentives. Thus, at uncertainty, the coefficient of undervaluation of the CFA franc relative to the naira is 0.78; 0.75 and 0.91 respectively for the years 2005, 2010 and 2012 as shown in Table 2.

Table 2: CFA franc / naira exchange rate (uncertain)

Year	2005	2010	2012
Parallel rate	3,15	2,95	3,00
Official rate	4,05	3,34	3,29
Coefficient of overvaluation(Parallel rate / official rate)	0,78	0,75	0,91

Source:
-BanqueCentrale des Etats de l'Afrique de l'Ouest (BEAO) for official rates
- ECOBANK, BirniN'Konni Agency, for parallel rates.
- Calculations of the author for the coefficients of overvaluation.

The correction of the DRCCs by the undervaluation of the exchange rate affects precisely the IVA. The adjustment effect aims to amplify the estimation of these indicators based on the computation of the following variables:

- the reference price of the local labor force was estimated by the average income in the artisanal sector of production based on the assumption that the alternative to Niger is the labor of the industrial employment or informal activities. A distinction has been made between two categories of labor with two wage rates;

- the ratio between the reference price and the market price of the expatriate labor force has been estimated based on the accounting data of the companies. Indeed, a French engineer receives in Niger on average two (2) times the wage that he would receive in his country;

- The wage is expressed at the domestic market price ($W^r L$);

-The reference interest rate (R^r) is used in the direction of the option cost of capital use. Thus, we retained the rate that is applied to French treasury bills, taking into account the French nationality of the majority of foreign capital;

- The ratio between the reference exchange rate and the prevailing exchange rate (e^r) is estimated by comparing the parallel rate with the official rate;

- The value of the capital stock at the reference price is estimated using the formula:

$$K^r = \propto \frac{K}{1+t_m} + (1-\propto)K \ (IX),$$

Where,

- α is the proportion of tradable inputs in the value of the capital stock;

- K is the value of the capital stock at market price;

- t_m is the average nominal protection rate on the exchangeable inputs contained in the capital stock.

Formula (XI) shows that the proportion of non-tradable inputs used in the capital stock is separated from the value-added part and deflated by the average tariff (t_m) on tradable inputs. All calculations of the efficiency and comparative advantage indicators were performed with Excel.

II. THE PRESENTATION AND INTERPRETATION OF THE EMPIRICAL RESULTS

To illustrate the methodological analysis described above, this part of the paper presents the empirical results and their interpretations.

2.1. The presentation of the empirical results

The obtained results, followed by the computation of the mean and the standard deviation, are presented in Table 3.

Table 3: The domestic resource cost of 2005, 2010 and 2012

Business Name	DRCC 2005	DRCC 2010	DRCC 2012
National Office of Pharmaceuticals and Chemicals	0,89	0,39	0,90
Unilever Niger SA	0,80	0,61	1,07
Milk SA	0,74	0,60	0,82
Nigerian Cement Company	0,72	0,43	0,74
Moulin du Sahel	1,39	0,40	0,86
Niger Milk Company	0,52	0,39	1,09
Nigerian Textile Company	0,96	0,95	0,77
Society of Breweries and Gazeous Beverages of Niger	0,81	0,90	1,11
Industry Niger Moss	1,01	0,86	0,61
Tannery MalamYaro	0,96	0,41	0,70
Nigerian Foam Mattress Company	0,49	0,42	0,86
Pro Mousse SA	0,63	0,41	2,01
Niger Star SA	0,64	0,35	0,96
Mag Niger	0,63	0,40	0,65
Latex Foam Rubber Products SA	0,58	0,48	1,02
Duraplast	0,50	0,61	0,60
Food Processing Corporation	0,84	0,92	0,68
Niger Asie	0,72	0,40	0,71
Laban Niger	0,98	0,81	0,74
Average	**0,78**	**0,57**	**0,89**
Standard deviation	**0,22**	**0,21**	**0,32**

Sources: Author's calculations based on company survey data and INS data (2005, 2010 and 2012).

2.2. The interpretation of the results and the implications of industrial policy[1]

This sub-section interprets the results reported in Table 3 and then discusses their implications for industrial policy.

2.2.1. Compliance of the assumptions and limitations associated with the DRCCs

The interpretation of the results can lead to the proposition of a new and pertinent policy of incitement capable, if implemented by the Government, of boosting the Niger's manufacturing sector.

2.2.1.1. Compliance of the retained assumptions to the facts

Recall that the identification and the ordering of Niger's firms that have a comparative advantage based on the DRCC's method is the hypothesis being empirically tested.

Overall, the values of the Niger's DRCC could temper the pessimism that predominates considering the levels of nominal and effective protections.

Thus, the hypothesis concerning the selection of firms by the DRCC technique, even if it did not lead to relevant conclusions, had the merit, in a decentralized system of price, to provide information that could guide the resources' allocation towards their relative and competitive advantages. In other words, the DRCCs make it possible to select promising activities and to eliminate the activities that are not.

Information on inefficient firms shows the directions to avoid. When the DRCC is negative or higher than one (1), the cost incurred to earn a unit of currency exceeds the gain realized at the prevailing exchange rate. The productive activity in question is not economically viable and should be discouraged. Oppositely, if the DRCC was less than one (1), the activity considered was efficient. If, on the other hand, the DRCC was equal to one, the company did not earn or lose foreign currency; the company had reached the break-even point.

The Niger market is the main market for the nineteen (19) companies sampled. Table 3 shows that DRCCs are positive, less, close to, or greater than one (1) at the exchange rate prevailing on the Naira parallel market. In 2005, these DRCCs were all lower than one (1) except for two (2) companies. The DRCCs of all firms had values of less than one in 2010. On the other hand, in 2012, fourteen (14) companies had DRCCs with value less than one. One (1) firm had a DRCC close to one and, the DRCCs of the other four companies exceeded one (1). These results, that are essentially dependent on resource availability, productivity and production costs, provide, all other things equal, indications of the effectiveness of an increase in the rate of utilization of the firm's productive capacity.

The analysis of these results revealed that the range of DRCCs is not very dispersed around the average over the study period. Such dispersion seems to indicate the possibility of a more efficient reallocation of resources. On average, the 2005 DRCC was 0.78 expressing that the considered enterprises with a standard deviation of 0.22 were efficient. This gives the top (1.00) and the bottom (0.56) between which the DRCCs vary. This shows that at international prices, Niger uses more effectively the resources devoted to the production of goods. In other words, the distortion costs associated with public policies, the incentive system and the exchange

rate between the CFA franc and the Naira generate economic gains for the country.

Dynamic analysis shows that the business situation compared to 2005 had improved significantly in 2010 before deteriorating in 2012. Such instability is inherent in the nature and characteristics of firms operating in Niger held by traps with low industrial development. Overall, the investments appeared to be oriented towards niches that provided a higher return on the value of assets. Under these conditions, companies were able to generate economic surpluses for the national economy.

2.1.2. Limits associated with DRCCs

The firms' DRCCs should be examined carefully. By and large, Niger's industries are comprised of firms that are either monopolistic or oligopolistic. Despite being oversized these firms are relatively efficient. Moreover, this relative efficiency is attained in spite of inappropriate governmental incentive policies. A part of these firms' profits is rarely invested in Niger in order to renew the aging equipment or to develop the productive capacities of the production units. Nigerien Entrepreneurs are generally risk averse and are rarely engaged in the Schumpeterian process of creative destruction. This productive process of change depends on innovation. The monopolists are far from developing the business spirit and to extend supply in order to reduce the prices at the consumer level. Yet, to face an uncertain future in a competitive universe, the enterprises must innovate. These entrepreneurs must transform into innovators-entrepreneurs in the Schumpeter sense in order to advance technological frontiers. This change must come from breaking the existing equilibrium through organizational, methodical, and procedural innovations. This creative destruction process will likely lead to an increase in the value-added value of the manufacturing sector in order to push it asymptotically close to the technological frontier.

The DRCCs remains a powerful analytical tool even though an evaluation of the elements in its computation and the peculiar situation of Niger appear to reduce its efficacy. One of the reasons is relative to the distortions of the administered interest rates, the guaranteed interprofessional minimum wage, and the high segmentation of the markets. These facts affect the functioning of the labor and capital markets in Niger. They render difficult the determination of the option costs. The estimation of the reference price presents many difficult methodological problems that are not easy to overcome in Niger where the statistical data are not reliable. The other reason is the fact that the distortions costs coming from the inappropriate structure of the differentiated protection are reduced in nominal terms. This is because the economic gains generated by the values of the DRCC describe the overvaluation of the CFA franc over the Naira. This situation reflects the reality of the CFA franc that contributes to hide the counter-performances of the production units in the CFA zone.

Moreover, the protected Nigerien producers spend a great deal of time obtaining internal rents. This is because they do not want to be exposed to external competition. The lack of outward looking policies is the root of the inertia in the manufacturing sector. The anti-export biases keep the manufacturing sector in a passive role. Furthermore, they obstruct the gains of currencies from exports. In fact, only the gains of saved currencies from import substitution are utilized. This limitative option is the opposite of the option used by industrial Asia. Industrial

Asia was able to efficiently allocate the rare resources by an appropriate incentive structure. Asia used temporary protection tariffs to insulate the export sectors while at the same time developing selling networks abroad. These policies contributed to reduce the price distortions on the markets for products and factors. The careful use of these protection policies ensured the efficient utilization of rare resources. The flexibility of these policies in turn yields some gains from specialization. Thus, the Asian economies have been transformed through the diversification of the production of manufacturing goods destined for export. This strategy corresponds to the firms' orientation relative to their comparative and competitive advantages. Industrial Asia has been succeeded to control the import substitution. Thus, internal demand has been the principal determinant of its sustained growth.

2.2. Policy Implications

For the Niger's economy, whose industrial activities are not constrained by a foreign exchange constraint due to its membership to the CFA zone, the acquisition of external market share is paramount in relation with the objective of saving currency. However, the Asian trajectory was not followed by Niger. The theoretical breakthroughs validated by empirical tests of Niger DRCCs suggest regulating the market and to manage industrial units differently in the image of Asian countries. They have successfully pursued a two-fold competition policy: protection of sectors that are insufficiently equipped to face international competition and the promotion of branches that are known to be able to face foreign competition in terms of exports. The public intervention has been strong for the success of this strategy. The government has intervened to help the enterprises to get access to bank loans, either to reduce the imports' competition or to limit the entrance of new competitors into the domestic market, or   to implement institutional mechanisms of products sale for branches that are ready to sustain the exterior competition, or again to underestimate the local currency. Such a policy has enabled industrial Asia to adapt to a changing international environment by two major advantages: the instantaneous absorption capacity of exogenous shocks and the rapid change of the competitive and comparative advantages of firms.

The efficiency of the firms and the competitive advantages come from the rapid changes of specializations. Indeed, as soon as one branch is no longer competitive, the government incites the concerned enterprise to change its segment. This volunteer strategy allowed the specialization not only in the clothing production as the costs of the comparative advantages law and the factor endowments seem to condemn it, but in the tech industries especially in the production of machines with digital control. Moreover, the trade agreements allowed the optimization of production chains. During the last twenty years, these South-Asian countries had run in a race in terms of unilateral decrease of the tariffs before negotiating the preferential trade agreements with Japan in order to attract the direct investments. This allows the establishment of Asia-made labels.

This experience deserves to be tested in Niger. It will allow by using the optimal regulatory and competition management mechanisms, Niger policy-makers to better guide their actions in order to model structures, adapt methods, evolve the entrepreneurial culture by the emergence of business spirit. Such structural changes can be the sources of new wealth creation. They can favor the concordance between the competitive and comparative advantages of firms whose

products manufactured under satisfactory conditions of efficiency will create technological proximity. The price and cost competitiveness will be expressed in terms of lower production, transport and transaction costs. The profitability stimulated by the innovations will increase with the reliability of the means of communications and the reduction of the depreciation time of the installed equipment.

CONCLUSION

The DRCCs evaluate the relative benefit and effectiveness of an activity at a point in time. The values showed how to make more efficient use of the necessarily limited resources of a country. These instruments can address the concerns of companies and policy-makers in economically poor countries like Niger in agriculture and industrial sectors. However, the DRCC technique is not the focus of professional economists who advise governments in their choice of investment projects and in the policy-making process. However, these tools showed that market forces can lead to specialization according to the industries' comparative or competitive advantages even if the structure of industrial incentives that caused price distortions, information asymmetry and market imperfections could thwart this trend. The DRCCs are at the heart of the controversial economic debate on the regulation and competition of protected or exposed firms. They draw attention regarding price distortions in the administered economy as well as the disadvantages and benefits of competition. However, the rigorous analyses they generate are extremely rare, especially in countries with an unfinished industrial structure.

This study of the Niger case, despite its limitations, can help make progress towards a greater use of the DRCCs. It has the merit of showing that the savings of foreign exchange resulting from the import substitution is not enough to infuse a new dynamic to the protected manufacturing sector of Niger. The competitiveness of firms is being challenged by their retreat through the adoption of two-pronged policies inspired by the Asian experience: protection of industries with insufficient means to face international competition and promotion of sectors capable of competing in terms of export.

Notes

1.   It is necessary to note that, overall, only tentative judgments may be drawn from the empirical evidence reported in Table 3 given the suggestive nature of the findings

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