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MANUFACTURING COMPETITIVENESS AND THE STRUCTURE OF INCENTIVES IN MALI

Summary Report[*]

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Summary

Manufacturing activity in Mali remains relatively underdeveloped and lackluster despite several decades of intensive government intervention aimed at fostering its growth (especially the encouragement of import-competing industries). The poor performance of Mali's manufacturing sector indicates a lack of competitiveness and, more specifically, an inability to produce goods of equal quality at equal or inferior costs to foreign competitors. This is true both on the domestic market and, a fortiori, on export markets. In the past, government policy has concentrated on rendering local producers artificially competitive on the local market through protectionist trade measures and various explicit or implicit subsidies in the hope that they will increase productivity over time. This does not appear to have been the case. In the current context of trade liberalization, particularly within the region, we must examine the root causes of Mali's lack of competitiveness in order to inform and orient future industrial and trade policy reforms. This report constitutes a summary of a more detailed report available separately.

This report begins with a brief description of Mali's manufacturing sector and its economic environment: the labor and capital markets, the exchange rate, national infrastructure and government trade, fiscal and regulatory policy. Particular attention is paid to the analysis of the impacts of trade policy on the production, import and consumer price structure. We conclude from this analysis that the current tariff structure creates an anti-agricultural and pro-consumer goods bias in domestic protection. Although the average import tax rate is modest, there is considerable variation in tariff rates with particularly high tariffs on textiles and wood products. This global analysis puts into context the analysis of the impact of trade policy on the incentives offered to Mali's manufacturing sector which follows. An analysis of trade policy in Ivory Coast, where the principal competitors for Mali's manufacturing sector are located, shows generally similar characteristics but with a lower average tariff level.

The core of the study is composed of a detailed analysis of the degree and sources of competitiveness (or lack thereof) in the Malian manufacturing sector. We conclude that Mali has a general lack of comparative advantage in manufacturing. However, the textiles and sheet metal industries constitute exceptions and several other activities could show a comparative advantage with moderate efficiency gains: carton, printing, vegetable oil, flour and confectionery. Our analysis of comparative advantage indicates that, due to low wage rates, Mali has a greater comparative advantage in labor-intensive industries, despite distressingly low labor productivity. Indeed, its poor overall performance is partly due to a choice of capital- and, particularly, imported input-intensive activities. Comparative advantage does not guarantee competitiveness as firms must face numerous prices distortions, some of which benefit them. This is notably the case with domestic protection which renders nearly all the Malian firms we analyzed competitive or nearly so on the domestic market. In the current context of trade liberalization and regional integration, our analysis shows that Malian firms are very vulnerable to outside competition, particularly from Ivory Coast. On the other hand, trade liberalization would reduce input costs and, possibly, exchange-rate overvaluation thereby increasing the competitiveness of Malian exports. Only the textiles sector appears in a position to potentially exploit this export opportunity. The impact of regional integration on Mali's regional export opportunities is shown to be negligible. Finally, we point out the important role played by supplier credit, which is obtainable at low or no interest, in reducing production costs.

Résumé

Le secteur manufacturier malien demeure embryonnaire et fragile malgré des interventions étatiques multiples depuis les années soixante visant à encourager sa croissance. Cette performance décevante du secteur manufacturier malien signale des problèmes de compétitivité, et notamment une incapacité à produire des biens manufacturiers, de qualité équivalente, à des coûts inférieurs à ses concurrents étrangers. Ceci vaut pour le marché intérieur et, a fortiori, pour les marchés d'exportation. Les interventions étatiques ont été effectuées dans l'espoir que la performance des activités protégées s'améliorerait au fur du temps, ce qui ne semble pas avoir été le cas. Dans le contexte actuel de libéralisation commerciale, notamment au sein de l'UEMOA, il est urgent d'identifier les causes fondamentales de la faible compétitivité du secteur et ainsi informer les décisions de politique industrielle et commerciale qui s'imposent. Le présent rapport est une version abrégée du rapport détaillé disponible séparément.

Dans la première partie du rapport, nous brossons un portrait du secteur et de son environnement économique: les marchés de travail et de capital, le taux de change, l'infrastructure et les politiques commerciale, fiscale et industrielle. La deuxième partie de l'étude est composée de deux volets empiriques. Nous portons une attention particulière a l'analyse des impacts des politiques commerciales sur les prix à la production, à l'importation et à la consommation. Nous découvrons des biais anti-agricole et pro-biens de consommation marqués en termes de protection. Un taux moyen modeste des taxes à l'importation cache un énorme variabilité dans les taux individuels avec des taux particulièrement élevés sur les importations qui concurrencent des produits qui sont manufacturés localement. Une comparaison avec l'impact des politiques commerciales en Côte d'Ivoire, où se trouve la plupart des concurrents du secteur manufacturier malien, démontre des caractéristiques semblables avec toutefois un taux moyen de taxation plus faible.

Le coeur de notre analyse concerne le niveau et les sources de la compétitivité manufacturière au Mali. Nous découvrons que le Mali n'a d'avantage comparatif que dans les secteurs des textiles et de tôle. Toutefois, plusieurs industries pourraient présenter un avantage comparatif avec des gains modestes d'efficacité: carton, imprimerie, huile végétale, farine et confiserie. Notre analyse suggère que le Mali a un avantage comparatif marqué dans les activités intensives en travail. En effet, sa faible performance générale est attribuable en partie à l'adoption de technologies intensives en capital et en intrants importés. La compétitivité n'est pas déterminée uniquement par l'avantage comparatif compte tenu de la présence de nombreuses distorsions de prix au Mali. Certaines de ces distorsions avantagent les producteurs maliens. C'est le cas de la protection qui, sur le marché malien, rend compétitives ou quasi-compétitives presque toutes les firmes maliennes échantillonnées. Ainsi, dans le contexte actuel de libéralisation commerciale et d'intégration régionale, notre analyse suggère que les firmes maliennes sont très vulnérables à la concurrence extérieure, particulièrement de la part des producteurs ivoiriens. Par contre, la libéralisation commerciale contribue également à la réduction des coûts des intrants importés et, peut-être aussi à la réduction de la surévaluation du taux de change. Ces effets augmentent la compétitivité des exportations maliennes bien que seule l'industrie des textiles semblent être en position pour exploiter cette possibilité. L'intégration régionale ne semble pas affecter de manière significative la compétitivité des exportations maliennes.

1 Introduction

Manufacturing activity in Mali remains underdeveloped and lackluster despite several decades of intensive government intervention aimed at fostering its growth, especially the encouragement of import-competing industries. Agricultural, pastoral and, particularly in recent years, mining activities are the foundations of Mali's economy. The rural sector alone represents 44% of GNP, 80% of exports and 85% of total employment. Industry, primarily agro-industry, contributes only 6% of GNP and a negligible share of total exports.

In general, the poor performance of Mali's manufacturing sector indicates a lack of competitiveness, that is, an inability to produce goods of equal quality at equal or inferior costs to foreign competitors. This is true both on the domestic market and, particularly, on export markets. Government policy has concentrated on rendering local producers artificially competitive on the local market through protectionist trade measures and various explicit or implicit subsidies in the hope that they will increase productivity over time. This does not appear to have been the case. In the current context of trade liberalization, particularly within the WAEMU region, we must examine the root causes of Mali's lack of competitiveness in order to inform and orient future industrial and trade policy reforms.

We present the main results of this study in the present summary report. Complete results, including an in-depth product-by-product analysis of competitiveness, are contained in the detailed report available separately. The following section provides a description of Mali's manufacturing sector and its economic environment. This environment is comprised principally of the labor and capital markets, the exchange rate, national infrastructure and government trade and fiscal policy. Given the important role of trade policy in Mali, this presentation includes a global analysis of its impacts. Particular attention is paid to the impacts on producer prices which largely determine the incentive structure provided by government to local producers.

In Section 3, we briefly present the literature on competitiveness, the methodology adopted in the current analysis as well as our principal data sources and hypotheses.

Section 4 constitutes the core of the paper: a detailed analysis of the degree and sources of competitiveness within Mali's manufacturing sector. This analysis is accomplished through the calculation of various indicators of competitiveness and detailed cost-based comparisons with Ivorian producers, the main competitors for Mali's manufacturers. The principal determinants of competitiveness to be studied are: labor productivity and, more generally, factor productivity; wage, interest and exchange rates; and the prices of material inputs, public utilities and transport. We further separate out the roles of output, material input and primary factor price distortions, particularly when they are policy-based: fiscal or trade policy, price controls

(minimum wages, interest rate ceiling, etc.), public employment policies, labor and capital market regulations.

It is noteworthy that the principal type of output price distortions - tariffs on competing imports - provide protection to local producers, artificially enhancing their competitiveness on the local market. In the current context of globalization and trade liberalization, it is important to identify which activities are competitive independently of these measures of protection and areas where all activities may improve their performance. The ultimate objective of this study is to formulate policy recommendations to assist Malian decision makers in adopting trade and industrial policies favorable to development.

2 Manufacturing and its economic environment in Mali

After a brief description of Mali's manufacturing sector (2.1), its economic environment is surveyed by focusing on labor (2.2) and capital (2.3) markets, the exchange rate (2.4), infrastructure (2.5), fiscal (2.6) and trade policy (2.7). Given the importance of trade policy in determining manufacturing competitiveness, we extend our presentation of trade policy in section 2.7 with a detailed quantitative analysis of the impacts of trade policy on the sector. Information on non-manufacturing sectors and on the Ivory Coast is used for comparison.

2.1 Industrial production

Mali's manufacturing sector produced about 9% of GDP in 1995 and ranked third behind the rural sector (agriculture, fisheries and forestry) and services, which accounts for 50% and 31% of GDP, respectively. In terms of growth, however, it has recently outpaced all other sectors except construction (6.4%), expanding at an annual rate of 4.5% (in real terms) between 1992 and 1995, while the rural sector grew at only 2.4% and services actually shrank at -2.1%. Within manufacturing, the largest sub-sector, food industries, stagnated in this period, while the textile industry expanded at 16.3% and all other industries at an average rate of 5.9%.

Based on a 1994 repertory of 132 industrial enterprises, the average firm size is 75 employees and the only large enterprises (more than 500 employees) exist in the sugar, tobacco, vegetable oil and textile industries. In the remainder of the sector, average firm size is only 37 employees. Further information on the sector is provided in section 1 of the detailed report.

Given the small size of the sector, its range of products is also very limited. The principal manufactured goods produced in Mali are: cooking oil, batteries, cigarettes, printed fabric, flour, plastic shoes and carton. Import competition is very limited for manufactured goods where local production exists, representing less than 5% of domestic consumption of these goods. However, the low level of exports (less

than 2.5% of local manufacturing) suggests that this is primarily the result of protective barriers rather than from the inherent strength of the sector. Some exceptions are vinegar (40% exports), thread (33%) and carton (22%). The import and export ratios of the main industries are shown in the detailed report. Mali is thus an example of an inward-oriented country at an early stage of industrialization where incentives for infant industries are provided by governments in an attempt to set industrial activity into motion.

2.2 The labor market

Mali's labor market shows the typical characteristics of less developed country labor markets, i.e. segmentation into a large rural labor force (80%), and an urban labor force which is distributed between the modern (formal) sector and the informal one. The total labor force numbers approximately 2.8 million (World Bank, World Development Report 1995). According to recent government estimates, the ratio of temporary to permanent workers is strikingly high at 83.7% within the manufacturing sector. This may be due to the pressures of structural adjustment on most firms. Only 20% of the urban labor force is formally employed with the rest in the informal sector. The proportion of the formally employed is highest for technicians and highly skilled workers ("agents de maîtrise"), at 33%, and lowest for manual labor (16%).

The minimum monthly wage (SMIG) was 20,965 FCFA (about $42) in 1995 and virtually binding for temporary workers, but only one third of the average wage in industry. In spite of the low level of the minimum wage, we argue that it contributes to under-employment which is evidenced by the large number of temporary workers and the importance of the informal sector. This observation is crucial for our later discussion of the shadow wage in section 3.3.

2.3 The capital market

The financial sector in Mali is not very developed; the banking and insurance activities together represent only 1% of GDP. The manufacturing sector's access to credit is, not surprisingly, high proportional to its contribution to GDP (a ratio of 3.4 topped only by the financial sector's own ratio of 4), although this represents only 31% of total credit which is less than that of the wholesale and retail trade (36%). There are only seven banking institutions and the monetization ratio, broad money (M_2) to GDP, was 17% in 1995, one of the lowest in the world (International Monetary Fund, 1997). Given their credit requirements, Malian enterprises find it difficult to obtain credit for investment as is witnessed by the ratio of own to fixed capital (reported to be about 50%). The difficulty of obtaining credit is further highlighted by the fact that the proportion of non-performing loans is high and higher than in Ivory Coast. Bank credit is mainly short term;

less than one third is middle- or long-term. Enterprises often resort to supplier credit and the informal sector. In light of these observations, the cost of capital is expectedly high, as reflected by the average lending rate of 17%.

2.4 The market for foreign exchange

Both Mali and Ivory Coast are members of the West African Economic and Monetary Union (WAEMU) which is part of the Zone Franc. This membership has provided the countries with monetary stability and currency convertibility as well as with a guarantee of external balance by the French Treasury. The use of a common currency and a fixed exchange rate vis-à-vis the French franc implied, however, that the member countries could not conduct independent monetary policies. When the terms of trade of the region declined in the second half of the 1980s the FCFA became increasingly overvalued which led to a 50% (in foreign currency terms) devaluation in January of 1994. Since then the FCFA's convertibility is limited, but the devaluation has helped the member countries to strengthen their external competitiveness.

Mali's foreign asset position had been negative until 1998 but improved in the early 1990s with foreign investments in the mining sector and European financing of investments in the energy sector. While the country's trade balance and current account remained negative, it improved substantially with the devaluation. While prices had been fairly stable in the 1980s and even declining in the early 1990s, the devaluation led to a strong price hike of about 30% in 1994 which contributed to a degree of overvaluation even after 1994. This point is taken up again in the discussion of the shadow exchange rate in section 3.3.

2.5 Infrastructure

The various services provided by utilities and other public and semi-public organizations, such as water and energy, transport and telecommunications, and other services were often mentioned as obstacles to competitiveness by firm representatives. This is true to the extent that such services are either unreliable, expensive or not available at all. They seem to be generally scarce and expensive within the whole region, but in Mali some of them seem to be especially expensive. Given Mali's landlocked nature, transport costs play a particularly important role in determining the cost of imported inputs and the cost of exporting for Malian industries. In an attempt to better understand the impact of transport costs, a special transport cost analysis was carried out in our competitiveness analysis.

2.6 Fiscal policy

Government consumption accounted for 13.5% of GDP in 1995, but tax revenue for only about 10%. Needless to say, the Government relies heavily on official development assistance (22% of GDP), especially for public investment. The structure of taxation is typically heavy on trade taxes (36% in 1995), but they have diminished in importance since 1992 (52%). This shift from trade to other indirect taxes has resulted from the combined effects of trade reform and the devaluation. Direct taxes are still playing a relatively minor role (17%), whereas consumption taxes increase in importance (about 30% in 1995). Tax rates are similar to those in Ivory Coast, especially the corporation tax, but the TVA is slightly lower in Mali. For further information on the fiscal effort and structure the reader is referred to the detailed report.

2.7 Trade policy

Mali's trade policy regime had been inward-oriented and complex since the colonial period. In 1991, following agreements with the IMF and World Bank, the Government undertook substantial reforms that have led to a more open and transparent trade regime. The main changes include abolition of quantitative restrictions by quotas and import bans, elimination of reference prices (mercuriales) as a basis for import taxation, with the exception of hydrocarbons, elimination of specific (weight-based) taxes and price controls, and the reduction of the number of tax exonerations. The outcome of the reform is a regime that is still relatively complex; it includes four import taxes (droit de douane, droit fiscal d'importation, contribution pour prestation de services, prélèvement communautaire de solidarité), two internal taxes (taxe sur la valeur ajoutée, impôt spécial sur certains produits) and two temporary or conjunctural duties (taxe dégressive de protection, taxe conjoncturelle d'importation).

The present regime was established with the clear intention to protect existing industries, by strongly taxing imports of competing products such as cigarettes, confectionery, soft drinks, beer and pasta, and lightly taxing imported inputs. The existing regime also includes temporary admission and a warehouse system for imported inputs destined for use in export products.

The Ivorian import regime, for comparison, is similar to that of Mali although some differences in the structure and level of protection exist. The Ivorian regime is, however, more protective for wood products, metal products and non-metallic minerals and less protective for most other products. When WAEMU takes effect, these differences are supposed to diminish as intra-regional tariffs are to decline by 60%, non-tariff barriers are to be eliminated completely and a common external tariff is to be applied.

As trade policy plays a major role in determining Mali's manufacturing competitiveness, particularly for local sales, let us look in more detail at its impacts on the producer price structure as measured by nominal

and effective rates of protection (2.7.2). Trade policy affects producer prices by altering the prices of competing imports to which we will first give our attention (2.7.1). Trade policy also has important effects on government revenue (2.7.1) and consumer prices (2.7.3) which we also consider in order to put its protective effect into context.

2.7.1 Average tariff rates, sectoral biases and tariff revenues

Mali's trade policy is based primarily on the use of import tariffs and exemptions. Quantitative restrictions, export taxes and price controls have been practically eliminated. Thus our trade policy analysis centers on official and applied (after exemptions) tariff rates. Detailed tariff rates are shown in Appendix 2 for both Mali and Ivory Coast (Tables A1 and A2).

The economy-wide unweighted official tariff in Mali is 22.3%. The standard deviation is fairly high (13.5 percentage points) indicating substantial sectoral and sub-sectoral variations as we will see below. The import-weighted average, however, is nearly one third lower at 15.2%, and the average applied rate (i.e. based on collected tariff revenue) is less than half at 10.4%. The difference between the official and applied rates reflects the importance of tariff exemptions, which are still quite frequent and make the tariff structure less transparent. The weighted average applied tariff in Ivory Coast is slightly lower at 8.2%. We note the traditional escalation of tariffs with higher rates on consumption goods and lower rates on capital and intermediate goods. This escalation is due both to the structure of official tariff rates and the impact of exemptions.

At the **sectoral level** we find that mining has the highest applied rate (28%), followed by manufacturing (10.5%) and agriculture (5.6%), whereas at official rates, agriculture is second at 20.2% (versus 15.2% for manufacturing and 29.2% for mining). The high rate in the mining sector is explained by a high tariff (31%) on fuel oil which accounts for about 90% of that sector's imports. The low applied average for agriculture reflects the 1995 suspension of the tariff on wheat which accounts for three quarters of agricultural imports. The average manufacturing tariff (10.5%) equals the economy-wide level. Based on these sector averages, Mali's official rate structure shows a pro-agriculture (anti-industry) bias of 4.3%, which is reversed, however, to a 4.6% anti-agriculture bias in applied tariffs, due to the wheat exemption. Average applied tariffs on agricultural and manufactured imports are similar in Ivory Coast (7.4% and 9.6%, respectively), except for lower mining imports tariffs (0.3%).

At the **sub-sectoral level**, average tariffs are relatively high within the **agricultural sector** - livestock and fish (35.2%), cotton (28.5%), rice (25.4%), forestry (19.0%) and traditional agriculture (17.2%) - with

the notable exception of industrial agriculture (3.5%), again mainly due to the wheat exemption. The tariff on cotton, which is an export product and is not imported, may surprise; however, it has no real protective effect unless price discrimination is practiced. Similarly, the high average tariff for livestock and fish is derived from some limited fish imports as livestock is one of Mali's main exports.

In the **manufacturing sector** the sub-sectoral tariff rates vary mainly on account of differences with respect to the level of transformation. Since Mali's tariff code shows the typical escalation of rates from intermediate and capital goods to final consumption goods, the highest sub-sector averages are found in textiles and leather (22.6%) and food, beverages and tobacco (15.9%), whereas the lowest averages are those of chemicals and non-metallic minerals (both 7.7%), as well as of metal products and machinery (9.0%). Very similar results are observed in the Ivory Coast.

Analysis of the distribution of tariff rates **within the manufacturing sector** is presented in the detailed report. We note simply that sub-sectors with tariff rates significantly above the sectoral average include: tobacco (36%), wood products (18.7%), rubber products (16.3%) and ceramic products (35.9%). The Ivory Coast is characterized by much higher tariffs on garments, footwear, leather products, beverages, wood furniture, petroleum products and scientific equipment, and much lower tariffs on tobacco and transport equipment.

Tariffs generated 30 billion CFA francs (CFAF) of **revenue** on 288 billion CFAF of imports in Mali in 1995. Tariff exemptions represented close to 14 billion CFAF in lost revenue for the Malian government. In Côte d'Ivoire, tariff revenue was four times higher at 120 billion CFAF on total imports which were more than five times larger (1471 billion CFAF).

According to our simulations, Mali's integration into the **UEMOA** would have very little impact on average import tariff rates (5.3% reduction), tariff revenue (4.7% reduction) and import values (1.1% increase). Effects on the industrial sector would be even smaller (4.6% reduction in average tariff rates) as it is primarily agricultural imports which would be affected (18.6% reduction)[1]. However, these effects would be concentrated disproportionately on certain types of industrial imports: intermediate inputs (10.6% reduction in tariff rates), chemical products (14% reduction; essentially petroleum products and industrial chemicals) and printing (11.2% reduction). Most other types of imports are from outside the region and are therefore unaffected.

[1] We present only the simulated decline in tariff rates as import value effects are uniformly less than 1.5% and tariff revenue thus varies in roughly the same proportion as tariff rates.

2.7.2 Nominal and effective rates of protection

Applied NRP rates are quite substantial (above 20%) for the final consumption products (soap, confectionery, plastic shoes, plastic bags and printed fabric) of the sample, but modest (less than 20%) for the other products (cooking oil, wheat flour, paint, stationary, carton and sheet metal). Table 4.1.2 reveals that NRPs are not systematically higher in Mali than in Ivory Coast. However, food and wood products tend to be more protected in Ivory Coast whereas chemical products and textiles seem to be more protected in Mali.

To the extent that certain products are imported illegally, applied tariff rates overstate the effect of trade policy on producer prices. Under these conditions, it is preferable to directly compare (quality-adjusted) import and local producer prices in order to measure the distortionary effect of trade policy. This provides us with so-called "real" nominal rates of protection (NRP) as distinct from NRPs based on applied tariff rates. Data unavailability and variability and the difficulties in making appropriate quality adjustments have rendered such price comparisons possible for only eight products (Table A3 in Appendix 2).

Comparing real and applied NRPs suggests that in four cases the real rate is substantially lower than the applied tariff rate indicating the existence of smuggling. This is a well-known problem in textiles, but less so for soap, metal housewares and containers, where it may result from other circumstances, including estimation error. In one case, paint, the real rate exceeds the applied tariff substantially, which is difficult to explain, in the absence of quantitative restrictions. For plastic shoes and plastic goods, the real rate is approximately equal to the applied tariff. In the case of matches, the absence of imports and the inferiority of the real NRP relative to the official tariff rate, suggests that this tariff is prohibitive.

These are NRPs on local sales. Export NRPs are measured by the rate of export subsidy minus the rate of export taxation. However, there are no explicit export subsidies or taxes in Mali and only a very limited number of export taxes in Côte d'Ivoire so that export NRPs are almost invariably zero.

Effective rates of protection (ERPs) have been computed using the Corden method and, for comparison, also the Balassa method for each tradable branch distinguished in recent Malian and Ivorian input-output tables[2]. Import-weighted average tariff rates were used instead of production-weighted average NRPs in these calculations given the absence of sufficiently detailed production data. This can introduce serious errors of estimation when import and production weights differ significantly as may likely be the case. As tariffs tend to be high on imports competing with locally-produced goods, the bias is likely toward an underestimation of ERPs.

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[2] See Cockburn and Dostie (1994) for a description of the approach and software used.

The results are shown in Appendix 2 (Tables A4 for Mali and A5 for Ivory Coast). In Mali, effective protection must be qualified as modest, surely as a result of the recent trade reform. None of the rates exceeds 40%, which reflects the limited degree of rate escalation from intermediate input to final output rates. The highest levels of effective protection concern production of livestock, rice and textiles, followed by mining and forestry products as well as food, beverages and tobacco products. Export-oriented sectors (industrial agriculture, other manufactures and cotton) have extremely low or negative ERPs given the absence of export subsidies. Thus the anti-export bias reappears in terms of effective protection. In Ivory Coast the structure of ERPs is very similar. In both countries, the ERP structure simply amplifies the results observed in our NRP analysis introducing very few changes in ranking. Note that these are aggregate branch-level ERPs which disguise significant product-level variability as evidenced by our product-level calculations presented in the detailed report.

2.7.3 The implicit consumption tax

An often disregarded aspects of trade policy is the impact it has on household consumption. As we have seen, import taxation creates fiscal revenue for government while increasing the prices of local production. In traditional trade policy analysis, these are the welfare gains from import taxation. However, as import taxation results in an increase in the prices of imported and local products, consumers are the big welfare losers. Indeed, their welfare losses outweigh the producers' gains and government revenue, generating a net welfare loss. In reality of course producers and government are consumers themselves.

To analyze the consumption price effects, we calculate the trade-policy induced average implicit consumption tax rates for the principal categories of household consumption and overall household consumption using household consumption shares as weights (Table A6 in Appendix 2). The average implicit consumption tax on total household consumption of tradeable goods is 16.8%, higher than its explicit counterpart, the value added tax which is only 15%. This tax rate is even higher on essential consumption goods such as food (17.5%) and clothing (22.4%). Rates this high undoubtedly have significant negative welfare consequences in a country as poor and with as widespread malnourishment, particularly of children, as Mali.

3 Method of analysis and data used

The analysis of competitiveness is subject to a wide variety of approaches, concepts and indicators. The method chosen for this investigation has resulted from our earlier work on industrial and trade policy, in

particular on comparative advantage and social cost-benefit analysis. In the following sections we briefly survey the relevant literature, provide a short and non-technical description of the method, a more detailed description being relegated to Appendix 1, and discuss the nature and sources of the data, in particular the assumptions underlying our estimations of price distortions.

3.1 A brief survey of the literature

There is a considerable body of literature on the analysis of industrial and trade policy, on their reform, and on competitiveness. Arguments for and against government intervention abound: Bhagwati (1994), Dornbusch (1995), Krugman (1990) and Rodrik (1995) provide overviews of this issue. Feenstra (1995) presents an excellent summary of recent empirical methods for analyzing trade policy. Technical aspects of the methodology of computing the principal indicators of incentives, comparative advantage and competitiveness are presented in Baldwin (1991), Cockburn and Njinkeu (1993), Cockburn and Siggel (1995), Laird and Yeats (1990), Siggel, Cockburn and Dansereau (1993) and Siggel and Cockburn (1995). As to policy reform, Pritchett and Sethi (1993) analyze the repercussions of trade liberalization on government budgets in developing countries, taking into account the significant gap between official and applied tariff rates. Harmsen and Subramanian (1995) discuss the impact of recent GATT accords. Markusen (1992), Buckley et al. (1992) and McFetridge (1995) provide theoretical and methodological overviews of the analysis of competitiveness.

The impact of Malian trade policy on agriculture was analyzed by Stryker (1987), and on the industrial sector by Coulibaly (1994). Coulibaly's study, however, is limited to calculating traditional measures of incentives and comparative advantage for industrial firms. It does not delve into the analysis of competitiveness of the Malian manufacturing sector and its sources.

The methodology used in this study is the only approach, to our knowledge, which actually measures competitiveness and its sources. It allows us in particular to identify areas where producers are underperforming relative to their principal competitors, and areas where government policy reduces or enhances the competitiveness of local producers.

The term competitiveness is found in the literature in a confusing variety of meanings. Most authors use it in a microeconomic sense, referring to an advantage of firms or industries vis-à-vis their competitors in domestic or international markets. Some authors have extended the meaning to entire economies (for instance World Economic Forum, 1995; or Markusen, 1992; and Porter, 1990)), so that competitiveness is equivalent to strong performance of economies relative to other countries, where strong performance can mean economic growth, success in exports and increased well-being. We do not retain this macroeconomic notion of the term,

although we concede that a number of conditions such as generally high levels of education, productivity, natural resource endowment and business-friendly economic policies, can result in competitiveness of many firms and whole industries. We prefer to reserve the term for the competition between firms in specific markets.

At the firm or product level competitiveness has been identified with substantial or increasing market share (for instance Buckley et al., 1992), with an excess of attribute-related value over the selling price (Swann and Taghavi, 1992), or with a whole range of characteristics resulting in competitive advantage (for instance Porter, 1985). Our recent survey of the literature (Siggel, 1997) provides an overview and classification of a number of concepts and indicators.

3.2 The indicator of competitiveness and its sources

Our study is based on a new methodology for analyzing competitiveness which constitutes an extension to traditional analyses of comparative advantage and incentives[3]. This technique is based upon the principle that competitiveness, like comparative advantage, of local firms is defined by a cost advantage over foreign competitors. Competitiveness is measured in terms of market prices (the prices which producers actually face), while comparative advantage is measured in terms of shadow prices (economic opportunity costs) net of all price distortions. It is assumed that the producer having the lowest (quality-corrected) unit costs (uc) will be able to offer the lowest prices and thus dominate the market in question. Our approach notably makes it possible to quantitatively analyze the **sources** of competitiveness, as we will see below.

Our competitiveness criterion is thus: $uc < uc^*$ I.

where the asterisk denotes the reference competitor. Unit costs are generally defined in economic literature as total production cost (TC) per **physical** unit of production, what we will call physical unit costs (puc): puc = TC/Q, where Q is the quantity produced. As we are dealing with firms which often produce goods of different quality than their competitors, such a physical unit cost comparison would be inappropriate. To correct for this we divide each firm's physical unit costs by the retail price of their product, the consumer's evaluation of the product's quality:

$uc = puc/p = TC/pQ$ II.

As we can see, we are therefore simply measuring **monetary** unit costs, that is, in the Malian case, cost per CFA franc of production. To lighten the text, we use the term "unit costs" to refer to monetary unit costs in

[3] cf. Cockburn and Siggel (1995) and Siggel and Cockburn (1995) for a detailed presentation.

the rest of this paper, adding the term "monetary" in parentheses where confusion may arise.

Under the long-term perfect competition condition of zero profits, international producers will sell at cost, uc^* is simply equal to one and our competitiveness criterion becomes:

$$uc < 1 \qquad \text{III.}$$

Thus, an initial assessment of the **degree** of competitiveness (although, as will see, not the **sources** of competitiveness) can be made based solely on local firm data.

Given the existence of significant protection in many countries, it is also important to distinguish between domestic and international competitiveness. Given our monetary definition of unit costs - the ratio of total costs to production value - protection directly reduces unit costs by increasing the selling price and, consequently, production value. This is distinct from the possible impacts of protection on firm efficiency studied in the productivity literature. Defining unit costs on exports (uce) and domestic sales (ucd) as follows:

$$uce = TC/(pw\ Q), \text{ where pw is the international price,} \qquad \text{IV.}$$

$$ucd = TC/(pd\ Q), \text{ where pd is the domestic (protected) price,} \qquad \text{V.}$$

we can define international and domestic competitiveness criteria:

$$uce < 1 \qquad \text{VI.}$$

$$ucd < 1. \qquad \text{VII.}$$

Note that the traditional comparative advantage criterion is totally analogous:

$$ucs = TCS/(pws\ Q) < 1 \qquad \text{VIII.}$$

where TCS is total cost at shadow prices and pws Q is the shadow value of production.

The difference between TC and TCS is the net sum of all costs caused by distortions in factor prices, and the difference between pd and pws is the net sum of all distortions in output prices. While pw is the international price based on the official exchange rate, pws is based on the shadow exchange rate. These distinctions lead to the following accounting framework linking domestic competitiveness (financial profitability at domestic, protection-distorted prices) with international competitiveness (financial profitability at international output prices) and comparative advantage (economic profitability at shadow prices):

$$ucd = uce + dpd = (ucs + dfc) + dpd \qquad \text{IX.}$$

where dpd represents the distortions in domestic output prices and dfc represents the distortions in factor costs including the exchange rate.

Both on the domestic and export markets, the principal competitor for Mali's manufacturing sector is the Côte d'Ivoire. Consequently, after an initial analysis of the degree of comparative advantage and competitiveness of Malian firms (criteria (6) to (8)), we adopt our initial competitiveness criterion (1) to

measure the relative competitiveness of Malian and Ivorian competitors. We distinguish between their relative competitiveness on the Malian (domestic) market and on the Ivorian (export) market, taking into account the protection of local producers on each market. Our relative competitiveness criterion becomes:

$$ucm < ucm^{*} \quad \text{X.}$$

$$uci < uci^{*} \quad \text{XI.}$$

where ucm and uci represent unit costs for sales on the Malian and Ivorian markets respectively.

This bilateral approach also allows us to analyze the **sources** of competitiveness. Through a detailed comparison of each of the cost elements of Malian and Ivorian producers of similar goods, sources of competitiveness can be isolated and quantified. In particular, we compare labor, capital and intermediate (tradeable and non-tradeable) inputs costs, separating out the specific roles of differentials in observed prices (wage rates, interest rates, capital good and intermediate input prices) and quantity (labor and capital productivity and intermediate input consumption) differentials. Particular attention is given to analyzing the precise impacts of distortions, particularly policy-related distortions, affecting wage rates, interest rates, exchange rates, asset prices, intermediate input prices and output prices. Given Mali's landlocked situation, we also attempt to evaluate the impact of transport costs on input prices and the cost of exporting. Appendix 1 provides details on the technical aspects of the methodology.

Detailed cost analysis is crucial in obtaining a clear vision of the long-term feasibility of firms and activities and in orienting eventual policy interventions and firm restructuring toward areas in which the most substantial improvements can be made. For example, if a labor cost disadvantage can be traced primarily to wage distortions, the policy implications are much different than if labor productivity emerges as the culprit. Price distortion analysis provides valuable information for policy reform, particularly in assessing the likely impacts of trade reform on the survival and growth of existing firms.

This methodology has two basic limitations which should be made explicit. First, it is limited to the analysis of cost competitiveness. A firm may be cost competitive but lack the marketing know-how required to capitalize on its advantage. Quality differences are also often identified as a non-cost determinant of competitiveness however, our methodology takes them into account by comparing monetary unit costs where we divide total costs by the **value** of production. We assume that any quality problems will show up in the sale price thus reducing production value and increasing (monetary) unit cost. However, if a producer has difficulties ensuring on-time delivery of its products or inputs, this may undermine his cost competitiveness.

Second, the methodology in its current form is essentially static in that we compare costs at a given moment. With adequate data, it would be straightforward to reproduce the analysis for several years in order

to analyze the evolution of a producer's competitiveness and its sources. This would also limit the danger of drawing conclusions from the observation of a single year, 1995, which may have been a good or a particularly bad year for any one enterprise. In a forward-looking perspective, it would also be very useful to estimate the firm's production technology in order to simulate the impact of various modifications aiming to reduce technical, scale and allocative inefficiencies.

3.3 Data sources and hypotheses

In the global analysis the data are taken from various sources such as the National Accounts, the Tariff Code, and the Customs Administration, and require no specific comments. Firm-level data have been obtained directly from firms. From an original sample of 30 Malian firms, 12 firms producing ten distinct products were selected based on the quality of their data and the availability of data on Ivorian competitors producing these same products. The ten products chosen for analysis are: vegetable oil and derivatives; wheat flour; confectionery; plastic bags; plastic shoes; paint; printed fabric; carton; printing and sheet metal. Our sample firms should be representative of the whole Malian manufacturing sector as they produce more than half of total sectoral production. Data from a total of 17 Ivorian firms, one or more for each of the ten products, were used in the comparative analysis. Table A7 in Appendix 2 provides an overview of the sample detailing each firm's age, ownership, capacity utilization, size (in terms of equity capital, sales and employment), export share, location and product range. In the interest of respecting confidentiality, the firms are simply numbered within each product category.

Let us now look at our estimations of various prices these producers face and, particularly, the distortions which affect these prices. Sensitivity tests were carried out on our estimations of wage, interest and exchange rate distortions, the results of which are reported when significant. A more elaborate discussion of these various estimations can be found in the detailed report.

Domestic prices of output, tradable material inputs and assets are distorted by import tariffs. Given the existence of smuggling, we attempted to evaluate these distortions by direct price comparisons between import C.I.F. prices and local prices as explained in section 2.7.2. Adequate data for these calculations were available for only four of the ten goods produced by our sample firms: printed fabric, plastic goods, plastic shoes and paint[4]. While this analysis indicates that applied tariff rates greatly overstate price distortions for printed fabric (36% applied tariff versus 8.2% observed price distortion), they are fairly accurate for plastic

[4] Price comparisons were also carried out for soap, the principal vegetable-oil derivative. This analysis indicates that the applied tariff on soap (36%) overstates the true resulting price distortions (approximately 18.8%).

goods and shoes (approximately 36% applied tariffs and observed price distortions) and actually understate price distortions for paint (36% versus 50%). The latter result is difficult to justify and is probably due to differences in quality between imported and local paint. For all other products, tradable inputs and assets, applied tariff rates are used, potentially overstating the actual price distortions.

Unfortunately, we do not have a satisfactory method for estimating price distortions for non-tradable inputs (services, utilities, etc.) and we therefore assume that their values are undistorted in the comparative advantage analysis thus renouncing any attempt to assess the impact of non-tradable input price distortions on competitiveness. Given the strong government intervention and the imperfect market structures often found in the non-tradable sector, there likely are significant price distortions. We do however, separate out the impact of higher transport and electricity prices in Mali.

As to the **exchange rate**, it is well known that the FCFA was substantially overvalued in the years immediately preceding the devaluation in January of 1994. According to Devarajan (1997), overvaluation has been reduced from 39% (Mali) and 36% (Ivory Coast) in 1993 to 9% in both countries at the end of 1994. A rate of 9% is therefore used as a base estimate of the distortion. Since the equilibrium rate used by Devarajan is not a free-trade equilibrium rate, the overvaluation relative to a free-trade situation is likely to be higher. To capture this additional potential distortion, a rate of 20% is used in our sensitivity analysis.

The **cost of labor** was found to be only minimally distorted. In 1995, the minimum wage for unskilled workers equalled 20,965 FCFA per month in Mali as compared to an average rate in Mali of 31,975 FCFA in 1994. However, the fact that the minimum wage was not binding does not mean that it did not have a distorting effect. The higher wage which was actually paid can easily be explained as including a premium for higher than average productivity following the efficiency wage theory. For temporary workers the minimum wage seemed to be binding, so that their shadow wage was entered with a 25% discount. The rate of distortion on the total cost of labor varies therefore, depending on the relative importance of temporary workers. In nearly all cases, wage distortions amount to less than 2% of output value.

The **financial cost of capital** is the sum of two components, the interest paid on borrowed capital and the opportunity cost of own capital. The opportunity cost of own capital is evaluated at the market interest rate while interest paid is evaluated at the actual interest rate applied to the firm. The actual interest rate paid by the firm may be distorted relative to the market rate due to interest rate subsidies or access to low- or no-interest credit, particularly supplier credit. The market interest rate may itself be distorted relative to the shadow interest rate, which we consider to reflect the social (economic) opportunity cost of capital.

The **shadow interest rate** may be determined by using an international rate such as LIBOR plus an

expected inflation differential and a country-specific risk premium. For Mali and Ivory Coast in 1995, this was estimated to be 11.5%, midway between the money market rate and the market lending rate. Given a 1995 LIBOR of 4.7% for one-year SDR deposits, an expected inflation differential[5] of 3.1% between Mali and France, this rate implies a risk premium of 3.7%. The **market interest rate**, which is used as opportunity cost of capital, is 17.5% in both Mali and Ivory Coast and corresponds to the interest ceiling imposed by the BCEAO on commercial bank lending to the private sector in the region.

4 The findings on competitiveness and its sources

We begin our presentation of the main results of this study with an overview of the levels of competitiveness and comparative advantage in Mali's manufacturing sector, in particular relative to Ivorian competitors (section 4.1). To better understand these results, we attempt to identify the principal sources of competitiveness, distinguishing between the fundamental sources as measured by comparative advantage (section 4.2) and the impact of price-distortions, particularly policy-induced price distortions (section 4.3). Given the central role of trade policy in determining competitiveness and the extent of trade policy reform currently under consideration, notably in the context of the WTO and the WAEMU, a separate section is devoted to analyzing the likely impacts of trade liberalization and regional integration on Mali's manufacturing sector (section 4.4). We conclude with a brief presentation of product-level results (section 4.5). A more complete product-level analysis is presented in the detailed report.

4.1 Competitiveness and comparative advantage

Only three of the 12 Malian firms, producing two of the ten products analyzed (printed fabric and sheet metal), have a comparative advantage (ucs $\leq$ 1) as shown in Table 1[6]. However, Mali is close to having a comparative advantage in producing five of the eight

[5] Since the shadow interest rate for investments is of a longer-term nature, the expected inflation differential is taken to equal the average actual differential in the period of 1990 to 1995.

[6] Results for printed fabric were obtained using direct price comparisons. With the higher applied NRPs, shadow production value is estimated lower and shadow (monetary) unit costs are roughly 20% higher for the Malian firms and 8% higher for the Ivorians. Consequently, only one of the two Malian firms has a (slight) comparative advantage as shadow unit costs. Given the importance of textile smuggling in Mali, we prefer to use the NRPs calculated on the basis of direct price comparisons.

Table 1: The structure of comparative advantage in Mali and Ivory Coast

Industry	Malian Producers		Ivorian Producers		Malian Advantage
		ucs		ucs*	ucs*-ucs
Vegetable oil & derivatives	Mali 1	1.07	Ivory 1	1.05	-0.02
			Ivory 2	1.13	0.07
			Ivory 3	1.53	0.47
			Ivory 4	1.04	-0.03
	Mali 2	1.43	Ivory 1	1.05	-0.38
			Ivory 2	1.13	-0.30
			Ivory 3	1.53	0.10
			Ivory 4	1.04	-0.39
Wheat Flour	Mali	1.13	Ivory	1.14	0.01
Confectionery	Mali	1.17	Ivory	0.93	-0.24
Plastic Bags	Mali	1.45	Ivory	1.07	-0.39
Plastic Shoes	Mali	1.30	Ivory 1	1.03	-0.27
			Ivory 2	0.90	-0.40
Paint	Mali	1.35	Ivory 1	1.01	-0.34
			Ivory 2	1.05	-0.30
Printed Fabric (Textiles)	Mali 1	1.00	Ivory 1	0.97	-0.03
			Ivory 2	0.66	-0.35
			Ivory 3	1.05	0.04
	Mali 2	0.77	Ivory 1	0.97	0.20
			Ivory 2	0.66	-0.11
			Ivory 3	1.05	0.28
Carton	Mali	1.04	Ivory	1.05	0.01
Printing	Mali	1.06	Ivory	0.96	-0.10
Sheet Metal	Mali	0.90	Ivory	1.04	0.15

remaining products (vegetable oil (Mali 1), wheat flour, confectionery, carton and printing) as shadow-priced unit cost is less than 20% higher than shadow production value. Under pressure from increased competition, these firms may improve their performance sufficiently to show a comparative advantage. Within the vegetable oil and derivatives industry, note the scission between the clear comparative advantage of Mali's predominantly oil-producing firm (Mali 1; 62% oil production) and the strong comparative **dis**advantage of the soap-producing firm (Mali 2: 100% soap production). Finally, Mali is clearly lacking in comparative advantage in the three remaining industries, all in the chemical sub-sector: plastic shoes, plastic products and paint.

When we compare these results with Mali's principal competitors in Ivory Coast, we first note that where Mali has a comparative advantage in sheet metal production, Ivory Coast does not, although it is not far. Mali's performance is comparable to Ivory Coast in its other industry of comparative advantage, the printed fabric industry, suggesting that there will be strong regional competition in this industry under liberalization even if Mali has a comparative advantage. Among the five industries in which Mali is close to having a comparative advantage, Ivory Coast is also close to having a comparative advantage in three cases - vegetable oil (as distinct from soap) wheat flour and carton - with almost identical shadow unit costs[7]. Ivory Coast already has a comparative advantage in the other two cases: confectionery and printing. Thus, in these industries as well, regional competition will be tough for Malian producer even if they manage efficiency improvements. Finally, the Ivory Coast is close to having or already has a comparative advantage in the three industries in which Mali has a strong disadvantage (paint, plastic bags and plastic shoes), further worsening the prospects of these industries in Mali. In general, Ivory Coast appears to have a greater comparative advantage in manufacturing activities.

As discussed earlier, comparative advantage does not always translate into competitiveness as price distortions can substantially modify (monetary) unit costs. In general, nominal protection dominates all other price distortions on the domestic market, reducing unit costs (by raising production value) for local sales. In the export market, producers receive no protection and thus are affected only by the generally cost-increasing distortions in input costs.

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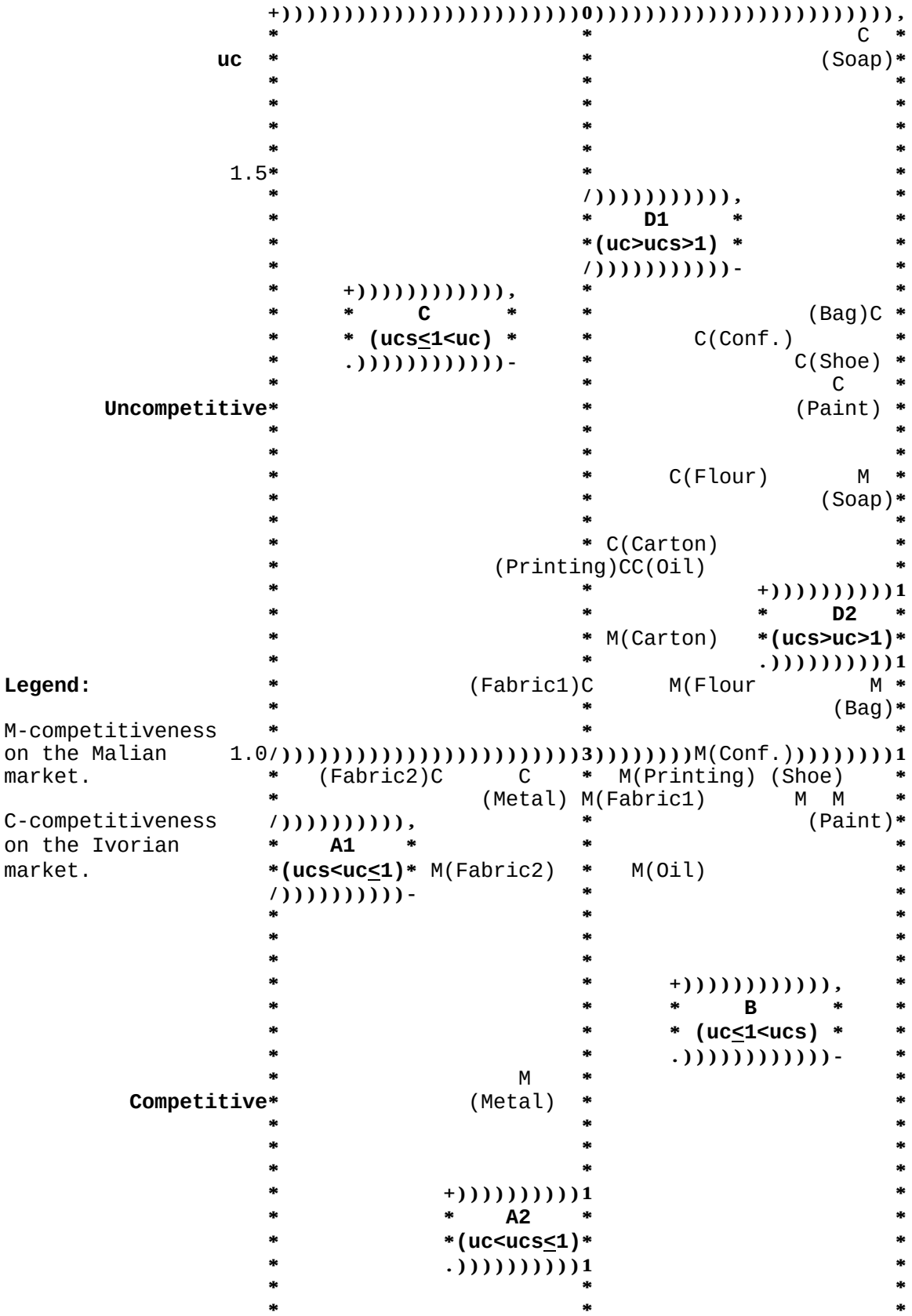
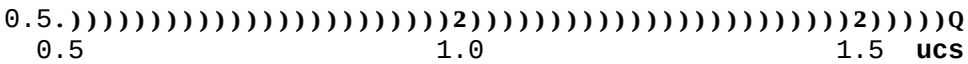
[7] Note that, Ivory 1, 2 and 4 are predominantly oil-producing (72.5%, 55% and 58%, respectively, of total production) whereas Ivory 3 is principally soap-producing (51%).

To illustrate these effects, in Figure 1 we classify our sample firms according to their comparative advantage and competitiveness on the Malian (points identified by an "M") and Ivorian (points "C") markets using the values presented in tables 1 to 3. The name of the product is identified immediately beside or below the corresponding points. The net impact of price distortions on sales in Mali is cost-reducing for ten of the 12 Malian firms in our sample. The extent of these distortions for a given product can be seen by the vertical distance between the diagonal line (uc=ucs) and the points M in Figure 1. Domestic protection is sufficiently high to render locally competitive five of the nine Malian firms which do not have a comparative advantage (case B: $uc \leq 1 < ucs$; oil, confectionery, plastic shoes, paint, printing), nearly competitive (uc=1.05) two others (case D2: $ucs > uc > 1$; flour and plastic bags) and somewhat closer to competitive yet another (also case D2; soap). The remaining firm lacking a comparative advantage, carton, is hit by cost-**increasing** price distortions on the domestic market which simply exacerbates its lack of comparative advantage (case D1: $uc > ucs > 1$). Of the three firms having a comparative advantage, all are also locally competitive although one faces cost-increasing price distortions (A1: $ucs < uc \leq 1$; the second printed fabric firm) while the other two firm's price distortions are cost-decreasing (case A2: $uc < ucs \leq 1$; the first printed fabric firm and sheet metal). In all, eight of the 12 Malian firms are locally competitive ($uc \leq 1$) and two others are nearly so. However, five of these eight firms rely on domestic protection for their competitiveness and are consequently vulnerable to the current wave of liberalization.

Relative to their Ivorian counterparts, Table 2 indicates that Malian firms are unambiguously competitive on the local market ($uc < uc^*$) with the exception of only three products: soap (Mali 2 in the vegetable oil industry), printed fabric and carton. Further, for the former two products, the Malian firms are competitive relative to at least one of their Ivorian competitors. Domestic protection offsets the comparative disadvantage ($ucs > ucs^*$ in Table 1) of five Malian firms (confectionery, plastic bags, plastic shoes, paint and printing) relative to their Ivorian competitors, rendering them locally competitive ($uc < uc^*$), while it reinforces the comparative advantage of two others (flour and sheet metal). Within the vegetable oil industry and the printed fabric industry, depending on the comparator firm chosen, protection either has one or the other of the above effects or it reduces the shadow-price cost disadvantage without inversing it. For the remaining firm (carton), cost-increasing price distortions render it locally uncompetitive.

Figure 1: The competitiveness and comparative advantage of Malian firms





Comparative advantage **Comparative disadvantage**

Table 2: The structure of competitiveness on the Malian market

Industry	Malian Producers		Ivorian Producers		Malian Advantage
		uc		uc*	uc*-uc
Vegetable oil & derivatives	Mali 1	0.89	Ivory 1	1.14	0.25
			Ivory 2	1.09	0.20
			Ivory 3	1.56	0.67
			Ivory 4	1.08	0.19
	Mali 2	1.23	Ivory 1	1.14	-0.09
			Ivory 2	1.09	-0.15
			Ivory 3	1.56	0.33
			Ivory 4	1.08	-0.15
Wheat Flour	Mali	1.05	Ivory	1.19	0.15
Confectionery	Mali	1.00	Ivory	1.11	0.12
Plastic Bags	Mali	1.05	Ivory	1.15	0.10
Plastic Shoes	Mali	0.97	Ivory 1	1.01	0.04
			Ivory 2	1.02	0.04
Paint	Mali	0.97	Ivory 1	1.14	0.17
			Ivory 2	1.08	0.10
Printed Fabric (Textiles)	Mali 1	0.98	Ivory 1	1.14	0.16
			Ivory 2	0.81	-0.17
			Ivory 3	1.20	0.22
	Mali 2	0.90	Ivory 1	1.14	0.24
			Ivory 2	0.81	-0.09
			Ivory 3	1.20	0.30
Carton	Mali	1.10	Ivory	1.05	-0.05
Printing	Mali	0.97	Ivory	1.14	0.17
Sheet metal	Mali	0.72	Ivory	1.24	0.52

On the Ivorian export market (Table 3), the situation is inversed as, in the absence of nominal protection, the net impact of the other price distortions is generally cost-increasing. Seven of the nine firms which do not have a comparative advantage face cost-increasing export distortions (case D2 in Figure 1: uc>ucs>1) while the other two face slightly cost-decreasing distortions (case D1: ucs>uc>1). All of the three firms having a comparative advantage face cost-increasing price distortions which, in the case of the first printed fabric firm, are sufficient to render it uncompetitive (case C: ucs$\leq$1<uc). While sheet metal exports and the exports of the second printed fabric firm are penalized by price distortions, this effect is not sufficient to offset their comparative advantage (case A2:ucs<uc$\leq$1). The extent of these distortions can be measured by the vertical distance between each point C and the diagonal line (uc=ucs).

Consequently, all but sheet metal exports and one of the two printed fabric firms are shown to be uncompetitive both absolutely (uc>1) and, as shown in Table 3, relative to their Ivorian competitors (uc>uc*). Further, these results do not take into account transport costs which, according to an exploratory transport cost analysis we carried out, are fairly high for exports to the Ivorian market, particularly sheet metal exports.

This said, five of the Malian firms (vegetable oil, flour, the other printed fabric firm, carton and printing) have an estimated rate of losses on exports under 25% of which approximately 10% is due to price distortions. Combined improved performance and reduction of factor-price distortions hold some hope of rendering these five firms export-competitive where transport costs are not prohibitive. Unfortunately, according to our transport cost analysis, this last condition is fulfilled only for printed fabric which emerges as the sole potential manufacturing export among our sample of products. This is particularly true for Mali 2 in this industry which is export competitive despite price distortions which increase costs by roughly 20%.

In conclusion, the Malian firms show a general lack of comparative advantage in manufacturing activities, although this situation could be considerably improved with some moderate efficiency gains. Despite this, these firms are generally competitive, or nearly so, on the local market due to heavy nominal protection. We can qualify this as an artificial competitiveness as it depends wholly on the prolongation of current protectionist policies. Thus, the Malian manufacturing sector appears vulnerable in the current context of trade liberalization and regional integration although our results

indicate that they may be in a position to face up to this

Table 3: The structure of competitiveness on the Ivorian market

Industry	Malian Producers		Ivorian Producers		Malian Advantage
		uc		uc*	uc*-uc
Vegetable oil & derivatives	Mali 1	1.17	Ivory 1	1.00	-0.17
			Ivory 2	1.05	-0.11
			Ivory 3	1.42	0.25
			Ivory 4	0.94	-0.23
	Mali 2	1.61	Ivory 1	1.00	-0.61
			Ivory 2	1.05	-0.55
			Ivory 3	1.42	-0.19
			Ivory 4	0.94	-0.67
Wheat Flour	Mali	1.23	Ivory	0.99	-0.25
Confectionery	Mali	1.35	Ivory	0.75	-0.59
Plastic Bags	Mali	1.38	Ivory	1.03	-0.35
Plastic Shoes	Mali	1.33	Ivory 1	0.78	-0.55
			Ivory 2	0.83	-0.50
Paint	Mali	1.31	Ivory 1	1.01	-0.29
			Ivory 2	0.95	-0.36
Printed Fabric (Textiles)	Mali 1	1.06	Ivory 1	0.96	-0.10
			Ivory 2	0.65	-0.41
			Ivory 3	1.02	-0.04
	Mali 2	0.98	Ivory 1	0.96	-0.02
			Ivory 2	0.65	-0.33
			Ivory 3	1.02	0.04
Carton	Mali	1.17	Ivory	0.95	-0.22
Printing	Mali	1.15	Ivory	1.02	-0.13
Sheet metal	Mali	0.98	Ivory	1.01	0.03

challenge by improving their efficiency. To study this possibility in more detail, let us now turn to an analysis of the sources of Mali's general lack of comparative advantage.

4.2 Sources of comparative advantage

The central goal of this research is to identify the sources of competitiveness (or lack thereof) in Mali's manufacturing sector. Let us first abstract from the various price distortions in order to focus on the more fundamental question of the sources of comparative advantage. The fundamental determinants of comparative advantage are the shadow-price unit costs of inputs, labor and capital which can be further separated into price and productivity components.

We have seen that only two of the 12 Malian firms have a comparative advantage while five others are reasonably close. Since tradable inputs account for the greatest proportion of total unit cost, usually around 50%, they can be expected to play a crucial role in determining competitiveness. We first note a correlation coefficient of 0.7 between tradeable input and total cost at shadow prices, indicating that firms which use tradable inputs more intensively tend to have higher total costs as they do not make compensating savings in primary factor costs.

Two possible explanations are: (1) a choice of product lines or technologies which use tradable inputs too intensively given their prices relative to those of primary factors (these activities may be technically efficient, but suboptimal in terms of factor proportions); (2) input wastage (technical inefficiency) in firms lacking comparative advantage. A detailed cost- or production-function analysis would be required to verify this affirmation. The first explanation suggests that Mali has greater comparative advantage in activities or technologies which use primary factors more intensively while the second denotes poor supervision and maintenance.

To delve deeper into this question, we compare our Malian firms' material input costs with those of their Ivorian competitors. For identical production technologies, higher input costs would indicate input wastage or higher input prices (due, possibly, to higher transport costs on imported inputs). However, it is also possible that higher input costs simply indicate the use of a different, more input-intensive, technology. We find that, while half of the Malian firms have both tradable and non-tradable input costs which are higher than their respective Ivorian competitors', the other half's input costs are lower. Thus, within these industries, it does not appear that the Malian firms have any

systematic input cost disadvantage relative to their Ivorian competitors, although in specific industries (particularly, paint, plastic bags and plastic shoes for tradable inputs and wheat flour, confectionery and carton for non-tradable inputs) they do as we will see in our product-level analysis (section 4.5 and, for a more elaborate discussion, the detailed report).

To examine the possibility that tradeable input prices are systematically higher due to their additional transport costs to landlocked Mali, we made some rough estimations of these additional costs[8]. This analysis indicates that transport costs on tradeable inputs represent less than 5% of production value for seven firms, less than 10% for a further three firms and more than 10% for only two firms. Thus input transport costs appear to play a minor, though non-negligible, role. Without an in-depth productivity analysis, we are unable to determine if the case where Malian firms have higher input costs are due to different techniques of production or to input wastage.

Given our preliminary conclusion that Malian firms have a comparative advantage in activities with low input usage, we would expect the correlation coefficients of primary factors to be negative. However, it is only the coefficient of labor input that bears the expected sign (-0.38), while capital's coefficient is positive (0.3). In spite of its small absolute contribution to the value of output (between 5 and 15%), labor consistently contributes to reducing unit cost. This suggests, as could be expected, that Mali has a comparative advantage in more labor-intensive manufacturing activities.

We should note that this result may appear surprising when we consider the extremely low labor productivity in our sample firms which have labor coefficients three and a half times those of the Ivorian firms. Wage rates are, however, four times lower in Mali. Consequently, only three of the 12 Malian firms have higher labor costs than their Ivorian competitors, while eight have higher capital costs. Higher capital costs are due almost exclusively to lower capital productivity as shadow interest rates are assumed to be the same in the two countries. Once again, without a detailed productivity analysis, we cannot confirm whether lower capital productivity is due to inefficiency or to the use of a more capital-intensive production technology. However, the former explanation appears likely given Mali's low capacity utilization rates.

In conclusion, Mali's weak comparative advantage appears to have several causes: a neglect

[8] We simply calculated additional input transport costs in Mali as the product of input weight, the cost of road transport in Mali by tonne/km and the distance from the port of Abidjan to Bamako.

for labor-intensive industries, which correspond more to its comparative advantage, in favor of capital- and material input-intensive activities; low capacity utilization; input transport costs; and, possibly, input wastage. In addition, within specific activities, attention should be paid to cost elements, particularly tradable and non-tradable input costs, which are conspicuously higher than those of the corresponding Ivorian competitors as pointed out in our product-by-product analysis (section 4.5 and, more elaborately, in the detailed report). Finally, although unit labor costs are generally lower in Mali, the labor productivity lag in Mali is nonetheless astounding and merits some deeper production- or cost-function based analysis.

4.3 Sources of distortions

As explained earlier, shadow-price comparative advantage does not guarantee market-price competitiveness. In this section, we examine the impacts on competitiveness of distortions in output prices (nominal protection), input and asset prices, wage rates, interest rates and exchange rates as well as direct taxes and subsidies[9]. Results are presented in Table 4.

The net impact of distortions is to reduce Malian unit costs for local sales by 15.3% on average. As we have seen in section 4.1, this is sufficient to render locally competitive five of the firms which are lacking in comparative advantage while cutting losses or increasing profits for five others. Only two firms suffer from net cost-increasing price distortions for local sales.

As could be expected, **nominal protection** is the main price distortion for local sales. On the Malian market, they inflate the production value and thereby reduce the (monetary) unit costs of Malian producers by an average of 23.1%. This has a dramatic effect on their domestic competitiveness relative to their Ivorian counterparts as the latter have no protection on the Malian market. On the Ivorian market, the situation is inversed as Malian producers as the Ivorian competitors experience an average 14.1% reduction in unit costs from nominal protection. This reflects the Ivorian government's less protectionist industrial policy (see section 2.7.2).

[9] Strictly speaking, direct taxes are not necessarily distortions as a "normal" direct tax rate is simply a payment for public services rendered. However, to avoid making a subjective estimation of these "normal" rates and in order to capture in one measure the overall impact of direct taxes on Malian versus Ivorian producers, we have treated all direct taxes as distortions.

Table 4: The impacts of price distortions on unit costs (in percentage)

	Nominal protection (sales in:)		exchange rate	input tariffs	wage rates	interest rates	o/w market rate	o/w credit subsidy	asset tariffs	net direct taxes	Total (sales in:)	
	Mali	Ivory Coast	Malian firms								Mali	Ivory Coast
oil	-26.3	0	2.5	4.9	1.9	-4.2	39.0	-8.1	1.4	2.3	**-17.5**	**8.8**
	-35.3	0	3.6	8.3	0	-1.0	0.5	-15.0	0.3	4.2	**-19.9**	**15.4**
flour	-17.8	0	1.7	4.3	0.5	0.4	1.2	-0.9	0	2.7	**-8.2**	**9.6**
confectionery	-32.7	0	6.1	5.1	0.8	-7.4	4.3	-11.7	0.1	10.2	**-17.8**	**14.9**
plastic bags	-33.9	0	3.8	6.7	1.0	-19.0	16.7	-35.7	0.5	0.5	**-40.4**	**-6.5**
plastic shoes	-34.7	0	3.5	1.8	0.9	-5.4	10.8	-16.1	0.2	1.6	**-32.1**	**2.6**
paint	-33.9	0	3.1	4.8	0.5	-17.3	8.9	-26.2	0	5.1	**-37.7**	**-3.8**
fabric	-7.6	0	5.9	1.8	3.0	-10.1	13.1	-23.2	0.5	3.8	**-2.7**	**4.9**
	-6.4	0	6.0	0.9	2.4	-0.2	3.3	-3.5	0	10.7	**13.4**	**19.8**
carton	-6.2	0	3.8	3.4	0.3	1.3	1.3	0	0.6	2.6	**5.8**	**12.0**
printing	-17.3	0	3.2	3.5	1.6	0	2.2	-2.2	0.2	0	**-8.8**	**8.5**
sheet metal	-24.8	0	1.0	4.9	0.4	0.2	0.2	0	0.1	0.4	**-17.8**	**7.0**
TOTAL	**-23.1**	**0**	**3.7**	**4.2**	**1.1**	**-5.2**	**8.5**	**-11.9**	**0.3**	**3.7**	**-15.3**	**7.8**
			Ivorian firms									
oil	0	-13.7	4.3	1.7	2.0	-2.5	4.1	-6.6	0.2	3.0	**8.7**	**-5.0**
	0	-3.5	2.5	2.8	0.1	-3.3	3.1	-6.4	0.2	-6.9	**-4.6**	**-8.1**
	0	-14.5	4.8	7.8	0.6	-10.6	8.6	-19.1	0.1	0.3	**3.0**	**-11.5**
	0	-13.9	2.1	3.8	0.7	-3.0	3.2	-6.1	0	0.3	**3.9**	**-10.0**
flour	0	-20.2	1.8	4.9	0.7	-2.8	3.6	-6.5	0	0.9	**5.5**	**-14.7**
confectionery	0	-33.1	4.3	5.4	1.2	-2.6	5.3	-8.0	0	9.6	**17.9**	**-15.2**
plastic bags	0	-11.9	3.4	4.1	1.4	-4.0	6.7	-10.7	0.3	3.6	**8.8**	**-3.1**
plastic shoes	0	-23.7	3.0	6.1	1.6	-11.8	7.9	-19.8	0.1	-0.7	**-1.7**	**-25.4**
	0	-18.1	2.4	8.9	2.6	-4.0	3.0	-6.9	0.8	1.5	**12.2**	**-5.9**
paint	0	-11.6	3.5	6.5	1.8	-1.9	4.9	-6.8	0	3.3	**13.2**	**1.6**
	0	-13.0	2.0	6.7	0.7	-5.4	4.1	-9.5	0.1	-1.8	**2.3**	**-10.7**
printed fab-	0	-7.0	3.8	4.7	1.9	-5.3	8.0	-13.3	0.1	0.9	**6.1**	**-0.9**
	0	-5.0	2.4	3.3	1.6	-3.5	3.9	-7.4	0.1	0.9	**4.8**	**-0.2**
	0	-8.0	4.1	3.9	2.6	-1.5	6.2	-7.7	0	-3.9	**5.2**	**-2.8**
carton	0	-10.4	2.4	2.7	0.7	-6.0	5.0	-11.0	0.1	0	**-0.1**	**-10.5**
printing	0	-10.9	3.0	16.3	-0.6	-3.7	4.4	-8.2	0	2.7	**17.7**	**6.8**
sheet metal	0	-21.0	2.2	9.3	0.2	3.0	3.6	-0.6	0	4.5	**19.2**	**-1.8**
TOTAL	**0**	**-14.1**	**3.1**	**5.8**	**1.2**	**-4.1**	**5.0**	**-9.1**	**0.1**	**1.1**	**7.2**	**-6.9**

The Malian firms' nominal protection on their local market is partly offset by the net impact of the other price distortions which increase the cost of local sales by 7.8% on average.

On their export market, Malian firms face only these other price distortions which raise their unit costs by 8.4% on average, seriously undermining their export competitiveness. The net impact of other price distortions are slightly less harmful for the Ivorian firms, increasing unit costs by 7.2% on exports to Mali and 6.6% on sales in the Ivory Coast.

With the exception of nominal protection, the impact of individual price distortions are similar, if somewhat greater, for export sales so we present only their impact on local domestic competitiveness in Table 4 (impacts on export unit costs are shown in parentheses below). Chief among these distortions are **interest rate distortions** which actually lower unit costs on average by a significant 5.2% (5.9%), although they do increase costs for some activities. This result, which essentially reflects the use of interest-free supplier credit, also shows up with the Ivorian firms - 4.1% (3.8%) cost reduction - although to a slightly smaller degree.

We can distinguish between the impact of market interest rate overvaluation and the extent of credit subsidies. As the **overvaluation of market interest rates** is assumed to be the same in the two countries, differences in its impact reflect capital intensity. In this respect, the Malian firms are more vulnerable: 8.5% (6.2%) cost increase versus 5% (4.7%). However, through a greater use of (supplier) **credit subsidies**, the Malian firms actually pay an interest rate which is substantially inferior to the estimated market and shadow interest rates (17.5% and 11.5%, respectively) providing a positive net impact of interest rate distortions.

Tradable input tariffs increase Malian unit costs by 4.2% (4.7%) on average. Ivorian competitors face an even higher input tariff impact which increases their costs by 5.8% (5.4%). Thus, lower input tariff effects appear to work slightly in favor of Mali's manufacturing competitiveness relative to the Ivory Coast.

Exchange rate overvaluation has the effect of lowering the domestic price of output as well as that of tradable inputs, which partially cancel out, so that the net effect raises unit costs by 3.7% (4%) on average. This effect, however applies only vis-à-vis products imported from countries outside the franc zone; costs relative to Ivorian competitors are little affected as the latter, facing an estimated equivalent exchange rate overvaluation, also see their unit costs increase as a result; by

3.1% (2.9%), on average.

Net direct taxes also add 3.7% (4.0%) to Malian unit costs. This effect reduces the Malian firm's manufacturing competitiveness moderately relative to their Ivorian competitors for whom direct taxes represent only 1.1% (0.9%) of unit costs on average. **Wage distortions** have a small impact (1% cost increase) on producers in both countries on account of the small proportion of labor cost. Finally, **asset tariffs** have a negligible impact on the absolute and relative (to the Ivorian competitors) costs of Malian producers.

In conclusion, Malian firms are moderately harmed by price distortions other than nominal protection, particularly input tariffs, the exchange rate and direct taxes. Relative to Ivorian firms, with the exception of nominal protection, none of these price distortions play a dramatic role. Direct tax policies appear to slightly undermine Malian competitiveness whereas input tariff policy and access to interest-free supplier credit moderately increase Malian relative competitiveness. The net impact of distortions is to enhance local competitiveness and diminish export competitiveness.

4.4 Trade liberalization and regional integration

Trade liberalization can the take the form of a reduction or an elimination of tariff barriers, and may or may not be accompanied by an exchange-rate realignment. As we have just seen, nominal protection plays a crucial role in determining the Malian firms' competitiveness on their local market. In effect, it compensates for the lack of comparative advantage and the cost-increasing impact of primary factor price, material input-price and exchange-rate distortions. Of course, trade liberalization also reduces or eliminates material input-price and exchange-rate distortions, which would partially compensate for reduced nominal protection. However, according to our estimations, under the extreme assumption of complete trade liberalization and exchange-rate realignment, the Malian firms would become extremely vulnerable. Indeed, local competitiveness would more closely reflect Mali's lack of comparative advantage in manufacturing as presented in Table 1. According to our figures, Malian firms would be rendered locally uncompetitive in the following industries: vegetable oil (18% increase in (monetary) unit costs), confectionery (21%), plastic shoes (29%), paint (26%) and printing (10%).

Partially offsetting this decline in local competitiveness would be an increase in export com-

petitiveness given the reduction or elimination of tradable input and asset tariffs and, possibly, exchange-rate distortions. The combined impact of these distortions currently lead to export unit cost increases of 5.5% (plastic shoes) to 12.2% (soap), levels which are fatal for the development of such a fragile potential export sector. There elimination would reduce export unit costs correspondingly. It is the printed fabrics industry which is most likely to be in a position to take advantage of trade liberalization as both firms become export competitive under this scenario. If these firms succeed, we would observe a restructuring of Mali's manufacturing sector more in line with its comparative advantage in labor-intensive activities, thus providing a more solid base for growth. However, the challenges in exporting printed fabrics, and indeed any manufactured good, from Mali are daunting beginning with the high cost of transporting their products even to regional markets. Great attention must be paid to ensure that these activities do not face unwarranted price distortions as identified in our product-level analysis.

The recent WAEMU accord for **regional integration** prescribes a 60% reduction on tariffs for trade within the region. If exporters within the region do not increase their (net of tariff prices) but rather pass this cost reduction on to consumers, domestic prices will decline proportionately. This will raise the (monetary) unit costs of local producers while leaving unchanged unit costs of regional exporters. This is most likely in activities where extra-regional imports are small. If, on the contrary, exporters simply pocket the tariff reduction leaving domestic prices unchanged, this will reduce the unit costs of exporters while leaving the unit costs of local producers unaffected. The actual result will probably be intermediate with an increase in the unit costs of local producers and decline in export unit costs. In any case, the competitiveness of local producers will decline relative to regional exporters. Thus Malian producers will experience a decline in their relative competitiveness on the domestic market where the vast majority of their production is sold. We assume that tradeable inputs and assets are imported from outside the region and thus their prices will be unaffected by integration.

In the extreme case of complete pass-through of tariff reductions to consumer prices, domestic nominal protection would decrease (in absolute value) by 60%. Our computations indicate that this would increase the unit cost of Malian producers for local sales by 2% to 14%. The oil, soap, confectionery and chemical (plastic bags, plastic shoes and paint) and printing industries would

be hardest hit with local unit cost increases over 10%. In this extreme case, integration would render locally unprofitable all but the oil, printed fabric and sheet metal industries in the absence of adjustment. If, on the contrary, regional exporters pocket the tariff cost reduction, their unit costs on exports to Mali would decline leaving Malian local unit costs unchanged. In either case, the confectionery, plastic bags and plastic shoe industries would all become uncompetitive on the Malian market relative to their Ivorian competitors, the most immediate threat to their survival. With the addition of the first Malian printed fabrics firm, we find that the same firms rendered locally uncompetitive by trade liberalization would also be rendered locally uncompetitive by regional integration: vegetable oil (roughly 16% increase in unit costs relative to Ivorian competitors), confectionery (20%), plastic shoes (21%), paint (20%), first printed fabric firm (5%) and printing (10%).

In partial compensation, Malian firms would experience an improvement in their regional export competitiveness. However, as initial tariff rates are much lower on the Ivorian market for our sample products and we assume that tradable input and asset prices, as well as the exchange rate, are unaffected, regional integration has a negligible affect on Mali's export opportunities. On average, Malian unit costs for sales on the Ivorian market decline by roughly 5% relative to the Ivorian competitors in our integration scenario.

4.5 Product-level conclusions

Mali's **vegetable oil & derivatives** industry is represented by one firm which produces primarily vegetable oil (62% of production), as well as soap (26%) and some minor products, and one firm that produce only soap[10]. The four Ivorian competitors in our sample also have mixed outputs with proportions shown in Table 4.2.1a in the detailed report. While Mali's firms sell exclusively on the domestic market, the Ivorian firms export between 19% and 41% of their production. Capacity utilization is high (78 to 100%) in all firms except Mali 2 where it is as low as 20%.

All six firms are lacking in comparative advantage yet Mali's predominantly oil-producing firm

[10] The salient features of our sample firms are presented in Table A7 of Appendix 2.

(Mali 1) is near as are Ivory Coast 2 and 4 (costs exceeding production value by 7%, 5% and 4%, respectively, at shadow prices). Significant domestic output protection, which reduce (monetary) unit costs by 26% for Mali 1 and 35% for Mali 2, renders Mali 1 highly competitive on the local market while cutting the losses of Mali 2. However, neither firm is competitive on the Ivorian market given the protection afforded to local producers and the cost-increasing (10 to 20%) impact of primary-factor and material-input price distortions, particularly input tariffs, and exchange-rate overvaluation. With moderate performance improvements and a reduction in the factor-price distortions, Mali 1 appears capable of surviving trade liberalization and WAEMU regional integration and may even be in a position to export if it can overcome apparently formidable transport costs. Mali 2 is currently uncompetitive and its situation will only worsen with trade liberalization and regional integration. Indeed, soap production is uncompetitive in both countries due, apparently, to the extremely high cost of material inputs. Note that for both Malian firms, extremely low wage rates are offset by equally low labor productivity. This is the case for all the Malian firms in our sample and bears some more detailed productivity analysis.

The **flour mills industry** transforms imported wheat into flour for domestic consumption. Exports are insignificant in both countries. Our sample consists of one firm in both countries, but the Ivorian mill is five times larger than the Malian mill, which is proportionate to the size of their respective markets. Capacity utilization is high (83% in Mali and 95% in Ivory Coast). The Malian firm is partly foreign-owned (34%) while the Ivorian firm is wholly foreign-owned.

Both firms are lacking comparative advantage in wheat flour production as, at shadow prices, their costs exceed production value by approximately 13%. This is probably due to their dependence on raw wheat imports which have high transport costs relative to flour. The principal policy intervention in this market is the nominal protection of local markets, which significantly reduces unit costs (18% for the Malian firm and 20% for the Ivorian firm) establishing the competitiveness of each producer on its respective local market. Trade liberalization and regional integration thus present a serious challenge to these fragile activities.

Factor-price and exchange-rate distortions increase costs by 5 to 10% for both firms which, combined with their lack of comparative advantage, render their exports totally uncompetitive. Divergences in net direct taxes and credit subsidies in favor of the Ivorian firm reduce the Malian

firm's relative competitiveness. Finally, our analysis shows that transport costs constitute an unassailable natural barrier for Malian wheat flour exports to the Ivory Coast.

Confectionery is the sole product of one Malian and one Ivorian firm in our sample. These two firms have an enormous age difference as the Malian firm was created in 1949 whereas the Ivorian firm was created in 1981. While exports by the Malian firm are insignificant (2%), the Ivorian firm exports 42% of its production, all within the region. Both firms are 100% private and foreign-owned. The Ivorian firm is running at near full capacity whereas the Malian firm is only at 34% of its productive capacity.

Comparative advantage clearly lies with the Ivorian firm (shadow costs equal to 93% of production value versus 117% for the Malian firm). The Malian firm's tenuous local competitiveness depends on significant nominal protection which reduce unit costs by 33%. In the current context of trade liberalization and WAEMU regional integration, the Malian firm appears very vulnerable to Ivorian competition. In attempting to redress the situation, particular attention should be paid to analyzing the extremely high unit cost of "other services" for the Malian firm (55% of production value versus 19% for the Ivorian firm) and to the likely effects of increased capacity utilization. Consideration should also be given to reducing factor-price and exchange-rate distortions, which increase costs by about 15%, in parallel with the reduction of nominal protection.

Our sample includes one Malian firm and one Ivorian firm which produce, almost exclusively, **plastic bags**, primarily for sale on their respective local markets (100% and 81% of sales, respectively). Both firms are privately owned and fairly new, being established in 1990 and 1986, respectively. The Malian firm is owned by local investors whereas the Ivorian firm is 45% owned by foreign investors. The Ivorian firm is operating at full capacity while the Malian firm is operating at 80% of its capacity.

Malian plastic bag production appears to be extremely inefficient and lacking in comparative advantage as costs exceed production value by 45% at shadow prices as compared to 7% for the Ivorian firm. Its near absolute competitiveness and clear relative competitiveness on the local market result solely from the considerable nominal protection and credit subsidies it receives which reduce unit costs by 33.9% and 35.7%, respectively. The competing Ivorian firm appears much more viable and would likely constitute a major threat, as would exporters from other countries, in the event of

any significant trade liberalization and regional integration. If an attempt is made to revive this activity in Mali, particular attention should be paid to its high tradeable input and capital costs.

Plastic shoes are produced by one Malian firm and two Ivorian firms in our sample. While the Malian firm sells only on its local market, the Ivorian firms export, respectively, 80% and 70% of their production primarily outside of the WAEMU region. The two Ivorian firms are operating at full capacity while the Malian firm is operating at only 60% of its capacity. The Ivorian firms are three to four times larger than the Malian firm as measured by total sales (2.9 billion and 4.2 billion CFA francs versus 914 million CFA francs). All three firms are privately owned and fairly new, being established in the mid-1980s. The Ivorian firms are wholly foreign-owned while the Malian firm is locally-owned.

The Malian firm is lacking in comparative advantage (shadow costs exceeding production value by 30%). It would not be able to compete locally in the absence of considerable nominal protection which currently reduce its unit costs by 34.7%. It has no hope of exporting without a considerable increase in factor productivity. Factor-price and exchange-rate distortions have a comparatively small impact on Mali's competitiveness, increasing unit costs by about 3%. Like its Ivorian competitor, the Malian firm avoids paying high local interest rates only through extensive use of supplier credit, which allows it to reduce its unit costs by 16.1%. Analysis of the impacts of greater capacity utilization and, given the low prospects of exporting, local market demand for increased local production is required as this may explain the Malian firm's low productivity. A more detailed productivity analysis would shed some light on the reasons for Mali's greatly superior labor and material input usage given relatively similar capital shares. The high cost of "other services" for the Malian also merits further analysis.

We have one Malian and two Ivorian firms in our sample which produce almost exclusively **paint**. Established in 1980, the Malian firm is approximately the same age as one of its Ivorian competitors (1979) and much more recent than the other (1962). The three firms are all 100% privately owned, however the Malian firm is owned by local investors whereas foreign investors own 71% of both Ivorian firms. The Malian firm is relatively small (sales of 541.5 million CFA francs and 17 permanent employees) compared to its mid-sized Ivorian competitors (over 3 billion CFA francs in sales and, respectively, 62 and 105 employees). None of the firms export.

The Malian firm is precariously competitive on the Malian market due to strong nominal protection (33.9% unit cost reduction) and supplier credit subsidies (26.2% unit cost reduction) and despite a significant lack of comparative advantage (costs superior to production value by 35% at shadow prices). It appears for the moment fundamentally uncompetitive on the Ivorian export market as costs exceed export production value by 30%). This firm would be unable to withstand any major trade liberalization or regional integration. Areas where its performance lags, and which are therefore promising for improvement, are chiefly in tradeable input usage, followed by transport and telecommunications and "other services" charges. Failing major improvements, this activity is welfare-reducing for Mali and will not likely survive. On the policy level, unit net direct taxes should be brought into line with the second Ivorian firm.

Our sample includes two Malian firms and three Ivorian firms who produce principally (100%, 98%, 60%, 100% and 44%, respectively) **printed fabric**. Secondary products are essentially composed of plain fabric. The Malian firms are much smaller in terms of sales (4.1 to 4.5 billion CFA francs versus 20.1, 19.9 and 12.7 billion CFA francs), although they have a similar level of employment (796 to 844 permanent employees as compared to 996, 594 and 1116 employees for the Ivorian firms). The Malian firms have smaller export shares (6 and 0% versus 25, 15 and 21%). All five firms are fairly or very old with establishment dates varying between 1921 for one Ivorian firm to the late 60s and early 70s for the others. Capacity utilization rates appear to be high. Public ownership in the two Malian firms were reduced to 20% in the context of Malian privatization as local investors, in the first case, and foreign investors, in the second case, bought up the balance of ownership in return for generous tax incentives. The first Ivorian firm is 48% publicly owned and 36% foreign-owned whereas the other two are 100% private with foreign ownership shares of 17 and 60%, respectively.

Our analysis indicates that Mali 2 has a significant comparative advantage and, consequently, great export potential. This is particularly the case if we estimate output price distortions based on our price comparison, in which case Mali 1 also appears to have some export potential. However, Ivory Coast 2 has an even better performance. This presents a serious threat for the Malian firms which may have to identify niche markets rather than directly competing with this firm. Further productivity analysis would be required to properly assess its efficiency and identify areas for

improvement. Particular attention should be paid to analyzing two interesting results: Ivory Coast 2 overall better performance and Mali 1's higher input and capital costs relative to Mali 2. It would also be useful to study separately the competitiveness in each specific product - yarn, thread, fabric, printed fabric and clothing confection - if analytical accounting data can be obtained.

On the policy level, domestic protection is apparently undermined by smuggling. Tariff rates appear to be unnecessarily high in any case given the Malian firms' fundamental comparative advantage. Input tariff and direct tax harmonization within Mali and relative to the Ivorian competitors is also desirable to ensure a fair environment for competition. Indeed these two factors alone increase unit costs by 10% (Mali 1) to close to 15% (Mali 2).

The two **carton**-producing firms in our sample are privately owned; the Malian firm by local investors and the Ivorian firm 87% by foreign investors. The Malian firm exports 21% of its production while its Ivorian competitor's export share is 64%. It is much smaller than the Ivorian firm in terms of sales (865 million CFA francs as compared to 21.6 billion CFA francs) and employment (77 permanent employees versus 245). Capacity utilization is lower with the Malian firm (31%) than with its competitor (60%).

Both firms are close to having a comparative advantage with costs in excess of production value by only 4% (Mali) and 5% (Ivory Coast). Non-tradeable input consumption, labor productivity and capacity utilization appear to be areas where the Malian firm could make improvements. On the policy front, given this firm's lack of access to low-interest credit and the high level of market interest rates, there may be some justification for a reduction in its relatively high direct and/or tradeable input taxes to allow it to capitalize on its comparative advantage. This is particularly true given the limited nominal protection it receives (6.2% unit cost reduction), the effect of which is insufficient to compensate for the 12% cost-increasing impact of other price distortions.

We have gathered data on one Malian and one Ivorian firm in the **printing** sector. Both were established in the mid to late 1970s. The Malian firm is much smaller than its competitor in terms of sales (175 million CFA francs versus 2.8 billion) and employment (26 permanent employees versus 80). Neither firm exports. The Malian firm uses 70% of it production capacity whereas the Ivorian firm operates at full capacity.

The Malian firm is not far from having a comparative advantage in printing as its shadow costs

exceed production value by only 6%. Domestic protection renders it competitive on its local market, reducing unit costs by 17.3%. While the Ivorian competitor has a clear comparative advantage (shadow costs inferior to production value by 4%), this edge is eliminated by heavy input taxation such that its local competitiveness depends entirely on its domestic protection.

The high cost of maintenance and "other services" would merit some analysis as would the extremely low labor productivity of this firm. On the policy front, the Malian firm is only moderately affected by price distortions although the net impact discourages exports, increasing their unit costs by more than 9%. Tax-free tradeable inputs for export production would be an appropriate compensation and a close eye should be kept on exchange-rate overvaluation.

A Malian firm and an Ivorian firm in our sample each produce **sheet metal** (96% and 93% of their total production, respectively). These two firms are of a similar age (1978 and 1982). Our sample information is incomplete but we know that the Ivorian is almost fully owned by private foreign investors. The Malian firm is running at only one half of its productive capacity with sales slightly superior to one-third of its Ivorian competitor and half the number of permanent employees. Only the Ivorian firm exports.

The Malian sheet metal-producing firm has a significant comparative advantage with its costs equal to less than 90% of production value. This is due to lower material input and capital usage and lower wage rates than its Ivorian competitor. It is further aided by the relatively low level of the input tariffs and net direct taxes and the small impact of interest-rate overvaluation. Under these conditions, the significant nominal protection it receives on the Malian market (reducing unit costs by 24.8%) is unnecessary, only creating additional profits for its owners. The Malian firm also appears to be export competitive. However our transport cost analysis suggests that this product is practically non-tradeable given its bulky nature. Under these conditions, the Malian firm is "naturally" protected from foreign competitors but, at the same time, prevented from developing an export market. Transport costs and labor productivity are the two areas which appear to merit deeper analysis in this case.

5 Policy conclusions

On the whole and to the extent that the sample firms are representative of Mali's manufactur-

ing sector and that applied NRPs do not overstate real NRPs, our analysis suggest that this sector currently has very little comparative advantage. The only products in which Malian firms show a comparative advantage are printed fabrics and sheet metal. However, Mali is close to having a comparative advantage in five other activities. These activities may be able to rise up to the coming challenge of increased competition through further trade liberalization and regional integration.

Vis-à-vis Ivorian firms, the main source of competition in the market for the types of manufacturing goods produced in Mali, the situation is slightly better as the Ivorian firms turn in a performance which is almost as poor. Indeed, Mali has approximately equal comparative advantage in producing vegetable oil, wheat flour, printed fabric and carton and greater comparative advantage in producing sheet metal.

Mali's comparative advantage appears to lie in more labor-intensive activities which tend to perform better than capital-intensive and, especially, input-intensive activities. This results mainly from the low cost of labor and despite low labor productivity.

Relative to their Ivorian competitors, the Malian firms' material input costs do not appear to be systematically higher, despite higher input transport costs. However, these costs are higher for some specific activities. This warrants further analysis as material input coefficients are generally expected to be fairly rigid, barring wastage due to poor supervision or maintenance, for a given product line. Capital costs, on the other hand, do tend to be higher in Mali, likely due to low capacity utilization rates and, perhaps, the adoption of inappropriately capital-intensive technologies. Finally, labor costs are inferior in Mali, despite much lower labor productivity, given the extremely low wages in Mali. The labor productivity gap between these two countries is remarkable and merits a deeper productivity analysis.

Despite their lack of comparative advantage, Malian firms are generally competitive in their local sales. This is almost entirely due to the substantial domestic protection they receive, protection which is likely to fall in the current context of trade liberalization and regional integration. However, in many activities, the Ivorian firms do not lag far behind and will probably constitute a major challenge for Malian manufacturers, a challenge which some of the Malian firms appear to have some hope of meeting. Malian manufacturing firms show little capacity to export with the possible exception of printed fabric. The latter, relatively labor-intensive, industry may indeed prosper in a

context of greater trade liberalization.

With the exception of nominal protection, government policy appears to have a moderate (roughly 8% of production value) cost-increasing impact on Malian manufacturing firms. Given these firms' lack of comparative advantage, this impact is debilitating for Malian exports and, in the context of trade liberalization, may also undermine their attempts to compete locally. Attention should be paid to reducing the most important of these distortions, input tariffs, concurrently with the reduction in nominal protection. Exchange-rate policy must carefully avoid overvaluation, the second most important source of cost increases in Mali. Malian firms also are extremely dependent on access to interest-free supplier credit, a situation which requires constant monitoring. Financial liberalization and deepening would contribute to lowering market interest rates and thus allowing Malian firms to turn to more formal sources of finance.

In terms of improving the underlying performance of Malian firms, it appears that the most fruitful results are to be expected from efforts to encourage the establishment or the expansion of labor-intensive manufacturing activities, perhaps through vertical integration. More sophisticated productivity analysis is required but it appears that labor productivity is an area in which Mali could make significant improvements. In general, it can be hoped that Malian firms reduce inefficiencies as they are increasingly exposed to competitive pressure. To the extent that WAEMU will add some regional competition this may help reduce such inefficiencies. The impact of transport costs on input prices, export opportunities and import competition appears to be significant and merits more analysis. It is possible that national or regional transport infrastructure investments could prove profitable in counteracting the negative effects of Mali's landlocked status.

In conclusion, the situation of Mali's manufacturing sector is worrying but not without hope depending on the capacity of local producers to improve their performance and the government's capacity to create a favorable industrial environment.

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Appendix 1: Detailed equations for distortion analysis

We adopt an indicator of competitiveness for a producer defined as the difference between his unit costs (uc) and those of his competitors, evaluated at market prices:

$$IC = uc^{*} - uc \tag{1}$$

The asterisk denotes the reference competitor and unit costs are defined as a portion of the **value** of production to correct for possible quality differences between the products of each competitor:

$$uc = TC/pQ \tag{2}$$

where TC is the total cost of production, p is the producer price of the final good and Q is the quantity produced. If IC > 0, the producer in question produces at lower cost than his competitor and is thus more competitive. Note that we include the opportunity cost of own capital in total cost and thus unit cost inferior to one indicates that the firm is making **pure** profits. To ensure comparability of these amounts all values are expressed in terms of the currency of the destination market. In this study, we are primarily interested in the competitiveness of Malian producers on their two main markets: the local Malian market and the Ivorian export market. As the CFA franc is the currency on both of these markets, all values are expressed in francs.

The comparative advantage indicator (ICA) is this same difference evaluated at shadow prices (ucs), i.e. net of distortions:

$$ICA = ucs^{*} - ucs \tag{3}$$

where ucs = TCS/(pwsQ), TCS is total cost at shadow prices and pws is the shadow world price of the final good. Siggel and Cockburn (1995) show the superiority of our comparative advantage indicator relative to the more commonly used Domestic Resource Cost ratio. We can further link our two indicators together to show that the competitiveness of an activity depends both on its comparative advantage and the relative impact of price distortions (IDP) on its production costs:

$$\begin{aligned} IC &= (ucs^{*} - ucs) + [(uc^{*} - ucs^{*}) - (uc - ucs)] \\ &= ICA + IDP \end{aligned} \tag{4}$$

To isolate the role of each of the many determinants of competitiveness, we decompose the indicators ICA and IPD into their constituent elements. To do this we begin by defining unit production costs in terms of shadow prices:

$$ucs = \frac{pws_j A + wsL + p_n An + (rs+d)\, pws_k K}{pwsQ}$$

$$= pws_j a + ws\, l + p_n an + (rs+d) pws_k k \tag{5}$$

where:

pws_j - shadow world price index of tradeable material inputs

A - Total volume of tradeable material inputs
a - volume of tradeable material inputs per unit produced [=A/(pwsQ)]
p_n - price index of non-tradeable material inputs
An - Total volume of non-tradeable material inputs
an - volume of non-tradeable material inputs per unit produced [=An/(pwsQ)]
ws - shadow wage rate
L - Total quantity of labor
l - quantity of labor per unit produced [=L/(pwsQ)]
rs - shadow interest rate
d - average rate of depreciation of total assets
pws_k - shadow world price index of capital goods
K - Total volume of capital
k - volume of capital per unit produced [=K/(pwsQ)].

If we now normalize the shadow world price indices of tradables inputs (pws_j) and capital goods (pws_k) to unity and substitute equation (5) into equation (3), we obtain the following definition of the indicator ICA:

$$ICA = (a^* - a) + (ws^*l^* - wsl) + (p_n^*an^* - p_nan) + [(rs^*+d^*)k^* - (rs+d)k] \quad (6)$$

We can further decompose this indicator to isolate the impact of price and volume/quantity differences in the following manner:

ICA	effect	
$= (a^*-a)$	tradeable inputs	
$+ \overline{ws}\ (l^*-l)$	labor-productivity	
$+ (ws^*-ws)\ \overline{l}$	shadow wage-rate	
$+ \overline{p_n}\ (an^*-an)$	non-tradeable inputs	
$+ (p_n^*-p_n)\ \overline{an}$	non-tradeable prices	
$+ (rs^*-rs)\ \overline{k}$	shadow interest rate	
$+ (d^*-d)\ \overline{k}$	average depreciation rate	
$+ \overline{rs+d}\ (k^*-k)$	capital productivity	(7)

where $\overline{\ }$ indicates simple averages of the corresponding values for the producer and his reference

competitor (e.g. $\overline{ws} = \frac{ws^* + ws}{2}$)[11]. From equation (7), we see that comparative advantage depends on the relative productivity of the firms in their use of material inputs, labor and capital, as well as on the opportunity cost of all factors used.

Now let us turn to the decomposition of our indicator of price distortions (IDP). Price distortions are not taken into account in the traditional theory of comparative advantage, but as producers compete at market rather than shadow prices, they can have a decisive impact on competitiveness. We can separate the total impact of distortions into the impact of final-good price distortions (dp) and factor-cost distortions (dfc):

$$\begin{aligned} uc - ucs &= \left(\frac{1}{pQ}\right)TC - \left(\frac{1}{pwsQ}\right)TCS \\ &= \left(\frac{1}{pQ} - \frac{1}{pwsQ}\right)\overline{TC} + \overline{IV}(TC - TCS) \\ &= dp + dfc \end{aligned} \qquad (8)$$

where dp and dfc measure, respectively, output price and input cost distortions on (monetary) unit costs, $\overline{TC}$ is the simple average of the shadow- and market-price total costs ((TC+TCS)/2) and $\overline{IV}$ is the simple average of the (inverse of the) shadow- and market-price values of production[12]:

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[11] Throughout our methodology, when decomposing a multiplicative difference of the form ($ab-a^*b^*$), we use simple averages of each variable for the two producers to assess the impact of the difference in the other variable:

$$ab - a^*b^* = \bar{a}(b - b^*) + (a - a^*)\bar{b}$$

where $a = (a+a^*)/2$ and $b = (b+b^*)/2$. Here are some alternative algebraically correct decomposition techniques:

$$\begin{aligned} ab-a^*b^* &= a(b-b^*) + (a-a^*)b^* \\ &= a^*(b-b^*) + (a-a^*)b \\ &= a(b-b^*) + (a-a^*)b + (a-a^*)(b-b^*) \\ &= a^*(b-b^*) + (a-a^*)b^* + (a-a^*)(b-b^*) \end{aligned}$$

By using simple averages, we avoid arbitrarily choosing the value of the variable for one or the other competitor to assess the impact of a given difference and complex interaction terms while ensuring symmetry of our results whether we adopt the producer's or his comparator's point of view. In particular complicated decomposition below, we identify the "a" and "b" components.

[12] Note that, like their predecessors in the comparative advantage analysis, these rather awkward simple averages are adopted with the objective of arbitrarily choosing to use shadow- or market-price values to measure the impact of a given distortion.

$$\overline{IV} = \frac{\frac{1}{pQ} + \frac{1}{pwsQ}}{2}$$

Final-good prices are affected by both nominal protection and exchange-rate distortions, the effects of which we can separate. Thus, the final good's market price (p) is equal to its market world price (pw) multiplied by (one plus) the nominal rate of protection (NRP):

$$p = pw(1+NRP) \tag{9}$$

We adopt the small country hypothesis whereby prices are determined on the world market and converted into local currency using the exchange rate. If this exchange-rate is overvalued, world prices in local currency must be deflated by (one plus) the rate of exchange-rate overvaluation (REO) to express them at shadow prices:

$$pw = pws/(1+REO) \tag{10}$$

Using these relationships, we can rewrite the final-good price distortions (dp) so as to separate the impact of nominal protection (dpp) and the exchange-rate distortion (dpe):

$$\begin{aligned} dp &= \underbrace{\left((1+REO)\cdot\frac{1}{(1+NRP)}\right.}_{a} \underbrace{-}_{-} \underbrace{\left.1\cdot 1\right)}_{b} \underbrace{-}_{-} \underbrace{\left(\frac{\overline{TC}}{pwsQ}\right)}_{a'b'} \\ &= REO\cdot\left(\frac{\frac{1}{1+NRP}+1}{2}\right)\cdot\left(\frac{\overline{TC}}{pwsQ}\right) + \left(1+\frac{REO}{2}\right)\cdot\left(\frac{1}{1+NRP}-1\right)\cdot\left(\frac{\overline{TC}}{pwsQ}\right) \\ &= dpe + dpp \end{aligned}$$

To isolate the impacts of the different types of factor-cost distortions, we first define total costs at market prices:

$$TC = p_jA + wL + p_nAn + (r+d)p_kK \tag{11}$$

where

- w - market wage rate
- r - market interest rate
- d - market average depreciation rate.

In the same way as final goods, tradeable input and capital good prices are affected by two types of distortions: nominal protection and the exchange-rate misalignment. We thus have:

$$p_j = pw_j(1+NRP_j) \quad (12)$$

$$p_k = pw_k(1+NRP_k) \quad (13)$$

and:

$$pw_j = pws_j/(1+REO) \quad (14)$$

$$pw_k = [(\alpha pws_k)/(1+REO)]+(1-\alpha)pws_k \quad (15)$$

where α represents the share of tradeable assets (machinery, equipment, etc.) and $(1-\alpha)$ the share of non-tradables assets (land, buildings, etc.). We assume that non-tradeable inputs and assets are without (accurately measurable) distortions whereas wage and interest rates are distorted.

We can now substitute equations (5) and (12) into the expression for factor-cost distortions in equation (8) to isolate the impacts of: the nominal protection of tradeable inputs (dp_j), the exchange-rate distortion on the cost of tradeable inputs and capital goods (dp_je and dp_ke), the wage rate distortion (dw), the nominal protection of capital goods (dp_k), the interest-rate distortion (dr) and the depreciation rate distortion (dd):

$$\begin{array}{lll}
 & a \quad b - a'b' & \\
dfc = & \overline{IV}\left[\left(\frac{1}{1+REO}\cdot(1+NRP_j)\right)-(1\cdot 1)\right]pws_jA + \overline{IV}(w-ws)L & \\
+ & \overline{IV}\left[\left((r+d)\cdot\frac{1+NRP_k}{1+REO}\right)-(rs+ds)\cdot 1\right]pws_kK & \\
= & \overline{IV}\left(\frac{\frac{1}{1+REO}+1}{2}\right)NRP_jpws_jA & \text{material-input price distortion } (dp_j) \\
+ & \overline{IV}\left(\frac{1}{1+REO}-1\right)\left(1+\frac{NRP_j}{2}\right)pws_jA & \text{material-input exchange-rate distortion } (dp_je) \\
+ & \overline{IV}(w-ws)L & \text{wage-rate distortion (dw)} \\
+ & \overline{IV}\left[(r-rs)\cdot\left(\frac{\frac{1+NRP_k}{1+REO}+1}{2}\right)\right]pws_kK & \text{capital-good price distortion } (dp_k) \\
+ & \overline{IV}\left[(d-ds)\cdot\left(\frac{\frac{1+NRP_k}{1+REO}+1}{2}\right)\right]pws_kK & \text{capital-good exchange rate distortion } (dp_ke)
\end{array}$$

$$+ \quad \overline{IV}\cdot\overline{(r+d)}\cdot NRP_k\left(\frac{\frac{1}{1+RE0}+1}{2}\right)pws_kK \qquad \text{interest-rate distortion (dr)}$$

$$+ \quad \overline{IV}\cdot\overline{(r+d)}\cdot\left(1+\frac{NRP_k}{2}\right)\left(\frac{1}{1+RE0}-1\right)pws_kK \qquad \text{material-input price distortion (dd)}$$

$$= dp_j + dp_je + dw + dp_k + dp_ke + dr + dd \qquad (16)$$

We can now rewrite the equation for our measure of price distortions, equation (h), combining the different effects of the exchange-rate distortion into the net impact of exchange-rate distortions (de):

$$\begin{aligned} \text{uc-ucs} &= dp + dfc \\ &= dpp + dp_j + dw + dp_k + dr + (dpe + dp_je + dp_ke) \\ &= dpp + dp_j + dw + dp_k + dr + de \end{aligned} \qquad (17)$$

Thus, our indicator of the competitive effect of price distortions (IDP) can be rewritten:

$$IDP = (dpp^*-dpp) + (dp_j^*-dp_j) + (dw^*-dw) + (dp_k^*-dp_k) + (dr^*-dr) + (de^*-de) \qquad (18)$$

Transport cost module

The data on transport costs supplied by the firm include only costs financed directly by the firm. Thus a firm which sells to an intermediary from the factory gate may artificially appear to have lower costs. What interests us is the cost of producing a good **and getting it to the market**. Even if Malian firms succeed in producing goods at lower costs in their factories, if the transport costs involved in getting their products to the Ivorian market are high, this may render them uncompetitive. However, to estimate transport costs, including the numerous formal and informal transit fees, is a difficult task. In our main analysis, we have chosen to exclude an in-depth analysis and have preferred to simply use the transport costs reported by the firms.

However, as an initial foray in this field we have included a separate transport cost module in our analysis. We are primarily interested here in calculation how much transport costs increase tradeable material input costs and reduce producer prices in landlocked Mali relative to coastal Ivory Coast. We assume that the consumer prices of these tradeable goods are equal to world prices plus the transport costs to the market. Thus, the consumer prices in Mali will be higher than in Ivory Coast by the amount of **additional** transport costs required to bring the product to Mali. Road transport costs from the Ivory Coast to Mali are estimated at 43 CFA francs per tonne-kilometer.

Using this rate (tct), estimates of input (kgj) and output weights (kgi) and the distance from Abidjan (Ivory Coast's principal port) and the to the producer (km), we have estimated, for each producer in our Malian sample, the share of material input costs which are attributable to the extra

transport costs by producers in Mali:

$$tcj = [tct*km*(\Sigma_j kgj_j)]/pQ$$

These costs are already included in our main analysis as input prices in Mali include any transport costs required to bring them to Mali. We are simply separating out these costs to analyze them separately.

Malian producers are also affected by transport costs when they attempt to export. As we assume that tradeable good prices are lower in coastal Ivory Coast (higher in landlocked Mali) by the amount of transport costs required to bring these products to the Malian market, Malian producers receive a lower price for their exports as compared to their local sales. In addition, they have to cover the transport costs required to export their products. Thus, the value of Malian exports is inferior to the value of the same production sold locally by **twice** the transport costs between Mali and Ivory Coast. We can calculate this transport cost effect for exports in the following manner:

$$tci = ucc - uc = [TC/(pQ-2*tct*km*kgi)] - (TC/pQ)$$

where ucc represents Malian unit costs corrected for the impact of transport costs on production value. This export transport cost is not included in our main analysis as it can be only considered as a rough estimation. We would therefore have to add this cost to our estimation of export unit costs to obtain the corrected unit cost value (ucc).

This analysis has three serious limitations. First, the hypothesis that tradeable good prices in Mali are systematically superior to those in Ivory Coast by the amount of road transport costs between the two countries is somewhat heroic and should be considered simply as an approximation of transport costs. A more in-depth analysis would be well warranted. Second, this estimation excludes the delays, bribes and other miscellaneous fees involved in transporting products from one market to another. Third, the data available on input and output weights was not always reliable. For these reasons, we have kept the transport cost module separate from the rest of the analysis. To the extent the approach and data is reliable, Malian unit costs for sales in Mali would be greater than those reported by the amount of tci.

Appendix 2: Tables

The following tables present, in slightly more detail, the principal results of the study.

Table A1: Tariff rates and revenues - Mali (1995)

(values in millions CFA)	Number of tariff lines	Import value	Share of imports	Official rate (unweighted)	Standard deviation	Official rate (weighted average)	Applied rate (weighted average)	Duties collected	Value of exemptions
Whole economy	5,436	287 995	100.0%	22.3%	0.1353	15.2%	10.4%	30 095	13 809
1. By origin									
Agriculture	326	3 371	1.2%	30.0%	0.1134	20.2%	5.6%	187	493
Industry	5,009	283 968	98.6%	21.7%	0.1351	15.2%	10.5%	29 724	13 308
Mine	101	656	0.2%	25.1%	0.1322	29.2%	28.0%	184	8
TOTAL	**5,436**	**287 995**	**100.0%**	**22.3%**	**0.1353**	**15.2%**	**10.4%**	**30 095**	**13 809**
2. By destination									
Capital goods	1,048	65 098	22.9%	14.3%	0.1153	12.6%	7.9%	5 140	3 034
Consumption goods	1,879	102 896	36.2%	29.8%	0.1040	18.3%	14.5%	14 958	3 868
Intermediate goods	2,082	115 973	40.8%	18.1%	0.1322	13.8%	8.3%	9 625	6 406
TOTAL	**5,009**	**283 968**	**100.0%**	**21.7%**	**0.1351**	**15.2%**	**10.5%**	**29 724**	**13 308**
3. Manufacturing									
Basic metal industries	390	16 019	5.6%	20.6%	0.1331	9.5%	8.9%	1 424	104
Chemical, petroleum, coal	1,080	101 734	35.8%	11.9%	0.1083	12.8%	7.7%	7 847	5 125
Food, beverage and tobacco	530	54 581	19.2%	31.1%	0.0996	18.1%	15.9%	8 694	1 197
Non metal. minerals	154	12 420	4.4%	27.0%	0.1273	10.7%	7.7%	954	381
Other manufacturing	192	1 017	0.4%	31.3%	0.1005	27.2%	21.6%	220	57
Paper, printing	146	4 793	1.7%	16.4%	0.1193	10.9%	8.7%	417	105
Textile, leather	912	11 992	4.2%	30.9%	0.0764	28.0%	22.6%	2 715	640
Wood, cork	77	1 739	0.6%	28.7%	0.0902	27.2%	14.2%	248	226
Metal products, machinery	1,528	79 672	28.1%	18.7%	0.1329	15.9%	9.0%	7 205	5 475
TOTAL	**5,009**	**283 968**	**100.0%**	**21.7%**	**0.1351**	**15.2%**	**10.5%**	**29 724**	**13 308**
4. Food industry									
Beverage	30	758	1.4%	32.0%	0.1037	21.5%	15.0%	114	49
Food manufacturing	494	50 692	92.9%	31.0%	0.0999	17.0%	14.7%	7 454	1 147
Tobacco	6	3 130	5.7%	36.0%	0.0000	36.0%	36.0%	1 127	0
TOTAL	**530**	**54 581**	**100.0%**	**31.1%**	**0.0996**	**18.1%**	**15.9%**	**8 694**	**1 197**
5. Textile and leather									
Apparel	141	2 684	22.4%	35.7%	0.0245	29.2%	18.7%	502	281
Footwear	26	1 734	14.5%	32.5%	0.0645	26.8%	23.7%	410	54
Leather products	48	259	2.2%	34.8%	0.0521	35.5%	24.8%	64	28

Textile	697	7 315	61.0%	29.6%	0.0802	27.5%	23.8%	1 738	277
TOTAL	**912**	**11 992**	**100.0%**	**30.9%**	**0.0764**	**28.0%**	**22.6%**	**2 715**	**640**

Table A1 (cont.)

(values in millions CFA)	Number of tariff lines	Import value	Share of imports	Official rate (unweighted)	Standard deviation	Official rate (weighted average)	Applied rate (weighted average)	Duties collected	Value of exemptions
6. Wood and paper									
Paper products	114	2 138	32.7%	15.6%	0.1113	11.1%	11.4%	244	- 6
Print, printing, publishing	32	2 656	40.7%	19.4%	0.1422	10.7%	6.5%	173	111
Wood, cork, and products	62	1 096	16.8%	27.2%	0.0926	22.9%	18.7%	205	46
Wooden furniture	15	643	9.8%	35.0%	0.0387	34.6%	6.6%	43	180
TOTAL	**223**	**6 532**	**100.0%**	**20.7%**	**0.1245**	**15.2%**	**10.2%**	**665**	**331**
7. Chemical products									
Other chemical products	254	20 261	19.9%	16.3%	0.1311	8.2%	5.5%	1 114	550
Petroleum and coal products	10	195	0.2%	21.6%	0.1443	15.7%	9.3%	18	13
Petroleum refineries	32	45 570	44.8%	11.6%	0.0744	17.0%	8.5%	3 892	3 873
Plastic products	75	2 140	2.1%	26.0%	0.1358	19.3%	10.6%	227	185
Rubber products	61	4 996	4.9%	20.2%	0.1236	22.7%	16.3%	813	319
Industrial chemical	648	28 572	28.1%	7.6%	0.0550	6.9%	6.2%	1 782	186
TOTAL	**1,080**	**101 734**	**100.0%**	**11.9%**	**0.1083**	**12.8%**	**7.7%**	**7 847**	**5 125**
8. Non-metallic minerals									
Ceramic products	15	212	1.7%	32.0%	0.1056	35.9%	23.5%	50	26
Glass products	55	1 131	9.1%	25.5%	0.1237	18.3%	12.1%	137	70
Other non met. min. products	84	11 077	89.2%	27.0%	0.1321	9.5%	6.9%	768	284
TOTAL	**154**	**12 420**	**100.0%**	**27.0%**	**0.1273**	**10.7%**	**7.7%**	**954**	**381**
9. Metal and machinery									
Electric machinery	263	13 444	13.9%	20.8%	0.1296	15.9%	8.6%	1 154	984
Iron and steel	217	15 041	15.6%	18.6%	0.1304	9.7%	9.1%	1 362	92
Non ferrous	173	978	1.0%	23.0%	0.1327	7.6%	6.4%	62	12
Other manufacturing	192	1 017	1.1%	31.3%	0.1005	27.2%	21.6%	220	57
Scientific equipment	211	3 327	3.4%	21.8%	0.1366	13.6%	4.2%	141	312
Transport equipment	231	21 706	22.5%	17.0%	0.1203	20.0%	12.6%	2 729	1 615
Metal products	305	9 936	10.3%	28.0%	0.1225	26.1%	10.7%	1 068	1 524
Non electric machinery	517	31 236	32.3%	11.5%	0.0988	10.1%	6.8%	2 112	1 039
TOTAL	**2,109**	**96 686**	**100.0%**	**20.2%**	**0.1351**	**15.0%**	**9.2%**	**8 849**	**5 635**
10. Agricultural branches									
1. Traditional agriculture	50	264	40.2%	26.5%	0.1401	17.3%	17.2%	45	0
2. Rice	6	4 012	611.2%	31.0%	0.1225	36.0%	25.4%	1 021	423
3. Industrial agriculture	151	2 998	456.7%	31.1%	0.1071	19.9%	3.5%	106	490
4. Cotton	4	0	0.0%	28.5%	0.1500	28.5%	28.5%	0	0
5. Livestock, fish	97	100	15.2%	33.3%	0.0860	36.0%	35.2%	35	1

6. Forestry	22	4	0.6%	16.9%	0.0684	19.9%	19.0%	1	0
TOTAL	**101**	**656**	**100.0%**	**25.1%**	**0.1322**	**29.2%**	**28.0%**	**184**	**8**

Table A2: Tariff rates and revenues - Côte d'Ivoire (1995)

(values in millions CFA)	Number of tariff lines	Import value	Share of imports	Applied tariff rate (weighted average)	Duties collected
Whole economy	4,104	1 470 632	100.00%	8.2%	120 152
1. By origin					
Agriculture	176	122 941	8.42%	7.4%	9 154
Industry	3,817	1 147 671	78.56%	9.6%	110 481
Mine	58	190 283	13.03%	0.3%	512
Total	**4,051**	**1 460 896**	**100.00%**	**8.2%**	**120 147**
2. By destination					
Capital goods	884	367 514	32.02%	7.6%	28 095
Consumption goods	1,491	366 182	31.91%	13.6%	49 974
Intermediate goods	1,442	413 975	36.07%	7.8%	32 412
Total	**3,817**	**1 147 671**	**100.00%**	**9.6%**	**110 481**
3. Manufacturing					
Basic metal industries	225	59 152	5.15%	9.5%	5 638
Chemical, petroleum, coal	853	317 838	27.69%	6.2%	19 744
Food, beverage and tobacco	399	166 247	14.49%	13.6%	22 670
Non metal. minerals	133	41 598	3.62%	13.3%	5 535
Other manufacturing	151	7 273	0.63%	20.8%	1 514
Paper, printing	118	64 267	5.60%	7.5%	4 791
Textile, leather	590	34 580	3.01%	22.9%	7 932
Wood, cork	47	1 405	0.12%	20.6%	289
Metal products, machinery	1,301	455 312	39.67%	9.3%	42 368
Total	**3,817**	**1 147 671**	**100.00%**	**9.6%**	**110 481**
4. Food industry					
Beverage	26	13 368	8.04%	46.7%	6 249
Food manufacturing	367	152 642	91.82%	10.7%	16 368
Tobacco	6	237	0.14%	22.3%	53
Total	**399**	**166 247**	**100.00%**	**13.6%**	**22 670**
5. Textile and leather					
Apparel	105	2 959	8.56%	34.4%	1 018
Footwear	25	2 916	8.43%	30.2%	882
Leather products	31	1 168	3.38%	31.4%	367
Textile	429	27 538	79.64%	20.6%	5 666
Total	**590**	**34 580**	**100.00%**	**22.9%**	**7 932**
6. Wood and paper					
Paper products	87	48 903	74.47%	7.6%	3 734
Print, printing, publishing	31	15 364	23.39%	6.9%	1 057
Wood, cork, and products	34	550	0.84%	14.6%	80
Wooden furniture	13	855	1.30%	24.4%	209
Total	**165**	**65 671**	**100.00%**	**7.7%**	**5 080**
7. Chemical products					
Other chemical products	215	94 612	29.77%	5.0%	4 754
Petroleum and coal products	7	293	0.09%	24.4%	71
Petroleum refineries	22	46 042	14.49%	2.2%	1 016
Plastic products	66	12 517	3.94%	13.8%	1 732
Rubber products	59	24 784	7.80%	13.5%	3 353
Industrial chemical	484	139 589	43.92%	6.3%	8 818
Total	**853**	**317 838**	**100.00%**	**6.2%**	**19 744**

Table A2 (cont.)

(values in millions CFA)	Number of tariff lines	Import value	Share of imports	Applied tariff rate (weighted average)	Duties collected
8. Non-metallic minerals					
Ceramic products	15	1 184	2.85%	28.7%	340
Glass products	47	9 490	22.81%	15.8%	1 498
Other non met. min. products	71	30 924	74.34%	12.0%	3 696
Total	**133**	**41 598**	**100.00%**	**13.3%**	**5 535**
9. Metal and machinery					
Electric machinery	242	54 375	10.42%	16.8%	9 109
Iron and steel	142	49 092	9.41%	9.1%	4 489
Non ferrous	83	10 061	1.93%	11.4%	1 149
Other manufacturing	151	7 273	1.39%	20.8%	1 514
Scientific equipment	175	17 869	3.43%	15.9%	2 838
Transport equipment	159	227 022	43.52%	4.9%	11 145
Metal products	278	43 659	8.37%	16.6%	7 262
Non electric machinery	446	112 252	21.52%	10.7%	11 995
Total	**1,676**	**521 603**	**100.00%**	**9.5%**	**49 501**

Table A3: Nominal rates of protection

	Mali			Côte d'Ivoire	
	Official	**Applied**	**Real**	**Official**	**Applied**
1. FOOD PRODUCTS					
Sugar (1701)	21%	20.7%	N/A	15%	0.2%
Cigarettes	36%	35.9%	N/A	30%	3%
Refined veg. oil	36%	14.5%	N/A	37%	36%
Confectionery	36%	36%	N/A	N/A	49.1%
Alcohol	36%	11.3%	N/A	N/A	107%
Soda	36%	36%	N/A	N/A	38%
Beer	36%	36%	N/A	N/A	24%
Milk	6%	5.9%	N/A	15%	10.54
Flour	21%	19.9%	N/A	22%	21.4%
Rice (10064)	36%	25.6%	N/A	12%	4.8%
Canned fruit (2208)	36%	23%	N/A	N/A	28%
Broth	6%	6%	N/A	N/A	37%
Pasta	36%	36%	N/A	28%	28%
2. TEXTILES					
Printed fabric	21%	21%	8.2%	25%	18.4%
Thread	21%	11%	N/A	15%	8.2%
Leather	36%	28.4%	N/A	N/A	23%
3. CHEMICAL PRODUCTS					
Whitener	36%	36%	N/A	N/A	7%
Plastic bags	36%	27.1%	N/A	20%	12.1%
Plastic goods	36%	27.7%	38.3%	20%	18.7%
Plastic shoes	36%	36%	36.2%	35%	22%
Soap	36%	35.6%	18.8%	N/A	17.1%
Paint	36%	30.2%	50.3%	25%	12.2%
Batteries	36%	10.9%	N/A	25%	25.5%
Matches	36%	No import	20.0%	N/A	75.8%
4. WOOD PRODUCTS					
Carton	21%	11%	N/A	25%	12%
Stationery	24.3%	19.2%	N/A	25%	23.2%
Wood furniture	36%	6.6%	N/A	N/A	24.4%
5. MINERAL PRODUCTS					
Tiles	36%	No import	N/A	N/A	23%
6. METAL PRODUCTS					
Metal houseware	36%	36%	14.1%	N/A	28%
Sheet metal	9%	6%	N/A	15%	14%
Nails	36%	35%	N/A	N/A	27.8%
Containers	36%	35%	13.3%	N/A	18%

Table A4: Effective rates of protection (in percentage) - Mali 1995

Branch	Average NRP	Average Input Taxation	ERP Corden Simple	Alternative ERPs		
				Balassa Simple	Corden Sophist.	Balassa Sophist.
Traditional agriculture	18.8	14.6	**18.9**	19.2	18.9	19.2
Industrial agriculture	3.1	7.6	**2.5**	2.7	2.4	2.6
Rice	32.4	16.1	**37.2**	48.3	37.7	48.0
Cotton	0.0	6.7	**-0.8**	-0.9	-0.8	-0.9
Forestry	20.2	7.9	**20.8**	21.0	20.8	21.0
Livestock and fish	38.7	29.1	**39.8**	43.5	40.0	43.4
Mining	19.1	7.9	**20.7**	25.4	20.8	25.2
Food and beverages	16.6	9.4	**19.7**	29.4	19.9	29.1
Textiles	23.1	11.8	**30.1**	73.4	30.8	72.0
Other manufacturing	4.4	8.7	**2.2**	4.6	2.0	4.0

Table A5: Effective rates of protection (in percentage) - Côte d'Ivoire 1995

Branch	Ave-rage NRP	Average Input Taxa-tion	ERP Corden Simple	Alternative ERPs		
				Balas-sa Simple	Corden Sop-hist.	Balas-sa Soph-ist.
Traditional agricul-ture	10.6	10.2	**10.6**	10.8	10.6	10.8
Export agriculture	-8.5	5.9	**-11.0**	-11.4	-11.2	-11.4
Forestry	-4.5	5.7	**-5.8**	-7.5	-6.5	-8.0
Fish	27.1	13.3	**30.4**	31.8	30.6	31.7
Mining	0.0	3.7	**-0.6**	-1.1	-1.8	-2.9
Grain processing	10.0	9.7	**10.4**	11.8	10.5	11.5
Meat/fish/coffee/cocoa processing	7.5	7.2	**8.0**	9.2	8.0	8.9
Beverages	61.9	16.0	**102.3**	193.6	112.3	189.7
Veg. oil products	2.6	2.6	**2.4**	2.7	2.3	2.5
Dairy/fruit/veg. ind.	13.3	4.5	**20.7**	24.8	21.3	24.3
Textiles and garments	18.4	8.7	**29.6**	36.5	30.6	35.9
Leather and footwear	31.8	9.6	**62.5**	80.8	65.3	80.0
Wood-processing	7.2	4.1	**11.5**	13.6	11.6	13.3
Refined petroleum	2.3	0.9	**3.4**	3.7	3.3	3.5
Chemical industries	6.2	6.0	**6.5**	7.5	6.4	7.2
Rubber industries	13.5	1.3	**38.1**	44.8	39.2	44.4
Construction material	12.8	11.5	**14.2**	18.4	14.6	17.8
Metal industries	9.9	9.6	**11.1**	25.7	11.5	22.7
Machinery	13.3	10.9	**14.2**	16.2	14.4	15.9
Transport equipment	4.8	8.1	**-0.7**	-0.9	-1.3	-1.7
Paper and printing	8.7	8.2	**9.5**	12.9	9.6	12.2

Table A6: Average implicit consumption tax rates - Mali 1995

Category	Consumption share	Average implicit consumption tax rate		
		Official rate (simple average)	Official rate (weighted average)	Applied rate (weighted average)
Food	86.2	27.6	25.9	17.5
Clothing	4.8	34.6	30.8	22.4
Other (furniture, houseware, books)	3.6	9.8	7.5	4.4
Petroleum	3.3	16.6	16.7	8.7
Medication	2.1	5.0	5.0	2.3
Total	100	26.5	24.7	16.7

Table A7: Sample description

Product	Country	Date of creation	Private Share (%)	Foreign Share (%)	Capacity Utiliza-tion Rate	Equity (millions FCFA)	Sales (millions FCFA)	Permanent Employees	Exports (%)	Location (city)	Principal products
1. Vegetable oil and derivatives	Mali #1	1981	60	6	80%	1,500	17,336	877	0	Bamako	oil (62%), soap (26%), animal feed (12%)
	Mali #2	1981	100	0	20%	25	1,050	133	0	Bamako	soap (100%)
	Ivory Coast #1	1973	90	24	100%	1,300	13,035	338	25	Bouake	oil (72.5%), soap (27.5%)
	Ivory Coast #2	1992	100	N/A	N/A	845	67,238	30	41	Abidjan	oil (55%)
	Ivory Coast #3	1977	100	3.34	80%	727	7,968	158	22	Abidjan	soap (51%), oil (22%)
	Ivory Coast #4	1970	100	90	78%	6,040	64,501	889	19	Abidjan	oil (58%), soap (29%)
2. Wheat flour	Mali	1982	100	34	83%	N/A	5,811	100	0	Bamako	flour (95%)
	Ivory Coast	1964	100	100	95%	2,000	33,647	272	1	Abidjan	flour (98%)
3. Confectionery	Mali	1949	100	100	34%	20	1,880	241	2	Bamako	confectionery (100%)
	Ivory Coast	1981	100	100	100%	100	1,305	49	42	Abidjan	confectionery (100%)
4. Plastic bags	Mali	1990	100	N/A	75%	100	570	46	0	Bamako	plastic bags (95%)
	Ivory Coast	1986	100	N/A	100%	208	861	25	19	Abidjan	plastic bags (100%)
5. Plastic shoes	Mali	1985	100	100	60%	100	914	81	0	Bamako	plastic shoes (100%)
	Ivory Coast #1	1984	100	0	100%	800	3,941	N/A	87	Abidjan	plastic shoes (81%) and bags (18%)
	Ivory Coast #2	1986	100	N/A	100%	161	2,794	275	73	Abidjan	plastic shoes (100%)
6. Paint	Mali	1980	100	0	81%	86	542	17	0	Bamako	paint (97%)
	Ivory Coast #1	1962	100	71	40%	1,006	3,624	105	0	Abidjan	paint (98%)
	Ivory Coast #2	1979	100	71.16	N/A	114	3,246	62	0	Abidjan	paint (100%)
7. Printed fabric	Mali #1	1972	80	0	86%	1,500	4,130	796	6	Bamako	printed fabric (100%)
	Mali #2	N/A	80	80	N/A	1,500	4,492	844	0	N/A	printed fabric (98%)
	Ivory Coast #1	1921	52	36	100%	2,999	20,102	996	25	Bouake	printed (60%)/plain (30%) fabric
	Ivory Coast #2	1969	100	17	100%	1,000	19,939	594	15	Abidjan	printed fabric (90%)
8. Carton	Mali	1979	100	0	31%	200	866	115	21	Bamako	carton (100%)
	Ivory Coast	1988	100	87	60%	1,200	21,619	245	4	Abidjan	carton (97%)
9. Printing	Mali	1978	100	0	70%	30	175	26	0	Bamako	printing (100%)
	Ivory Coast	1976	100	0	100%	250	2,853	80	0	Abidjan	printing (100%)

10. Sheet Metal	Mali	1978	N/A	N/A	50%	N/A	3,506	32	0	Bamako	sheet metal (96%)
	Ivory Coast	1982	100	99.9%	N/A	306	9,568	60	15	Abidjan	sheet metal (93%)