The Poverty Impact of Modernising Dar es Salaam Port[1]

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1. Introduction

This study assesses the likely impact of the modernization of the Port of Dar es Salaam on household welfare and poverty in Tanzania and neighboring countries. Trade volumes in Tanzania increased more than 10% per year in the last decade, and international trade has been one of the engines of growth in the country. However, the current state of Dar es Salaam port is a severe constraint on further growth. Increasing the efficiency of the port is a key challenge; container vessels have to wait an average of more than 10 days before berthing, and dwell times average another 10 days. The costs associated with the inefficiencies in the port are partially related to congestion. The situation is more critical for imports than for exports; the inefficiencies act as an implicit tax on imports and to a lesser extent as a tax on exports (Morisset, 2013).

We assume that port modernization would result in a reduction of 5% in border prices for bulk cargo, and measure the impact on the economy and on poverty in the short run. The analysis proceeds in two-steps: first, the extent of the transmission of border prices to retail and farm gate prices will be evaluated; second, these estimated price changes will be used to determine the welfare effects for different demographic groups, particularly the impact on urban versus rural households and on different income levels.

The study is organized as follows. The next section presents basic information regarding the planned infrastructure and operational improvements for the Dar es Salaam Port. Section 3 introduces the trade and poverty methodology based on the use of micro data, which enables the identification of the different channels through which trade may affect poverty. Section 4 describes trade and industrial policy and the structure of production and trade flows in Tanzania. Based on the findings of section 4 and on complementary information on market structure and infrastructure, section 5 estimates the expected impact of the port project on trade flows and prices. It covers a limited basket of goods which are a small proportion of the cargo going through the port, but make up a very large share of the consumption basket of poor households and are also an important source of their income. Section 6 presents a poverty profile for Tanzania. In particular, it describes consumption and income patterns for different levels of livelihood, distinguishing between rural and urban households. Section 7 combines the information on price changes (section 5) and the household data (section 6) to provide estimations of the short-term welfare impact. Section 8 concludes with some recommendations.

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2. Enhancement of the Dar es Salaam Port

Dar es Salaam Port handles approximately 90% of the country's international sea trade and serves as a transit port for landlocked countries Burundi, Democratic Republic of Congo, Rwanda, Uganda, Zambia and Malawi. The port has a rated capacity of 4.1 million (dwt) dry cargo and 6.0 million (dwt) bulk liquid cargo. It has a total quay length of about 2,000 metres with eleven deep-water berths.

As a consequence of inadequate investment and a deterioration in port management, the port suffers from insufficient capacity, frequent power cuts, high dwell time and exceptionally high port congestion. Bulk, RoRo and Container customers generally rely on their own operations. Dar es Salaam port is one of the least efficient in the world. Tanzania was ranked only 86th in UNCTAD's Liner Shipping Connectivity index, behind South Africa (31st), Ghana (64th) and Kenya (85th) on the African continent. The problem is further heightened by weak road and rail connectivity to and from the port. The poor performance of the port acts as an implicit tax on exports and imports, and constrains growth in Tanzania and the landlocked neighbors served by the port.

Trade has been one of the engines of growth in recent years in Tanzania. Since 2000 export volumes have increased 7.74% a year and import volumes 11.65% a year. In 2013 Dar Port handled a total of 13.5 million tons of cargo (compared to 12.1 million tons in 2012) and merchandise trade amounted to more than US$17 billon, almost 52% of Tanzania's GDP. Given the strategic role played by the port in the economy of the country and

the region, and the evident deterioration in its capacity to deal with increasing trade flows, the Tanzania Ports Authority, the Ministry of Transport and Trade Mark East Africa (TMEA) worked together to put forward a support program. The Government later agreed to partner with TMEA, the United Kingdom Department for International Development (DFID) and the World Bank to implement a series of reforms to increase the efficiency and handling capacity of Dar Port through improvements in port infrastructure and cargo clearance procedures so that it is better able to handle future growth in trade.

While there is a long-standing consensus among academics and policy-makers on the positive role of port infrastructure investments in fostering trade and growth, the link with poverty reduction is weaker. The trade literature emphasizes the gains from trade, but it also acknowledges that there are unavoidably winners and losers from trade. This creates a potential distributional conflict as well as potential adverse effects on equality. In what follows the research develops a methodology to estimate the welfare impact of the proposed improvement in the Dar es Salaam port, identifying the winners and losers from increased trade.

3. Trade and poverty methodology

There is no general framework that predicts the effect of trade on poverty. Globalization poses both risks and opportunities for developing countries and poor citizens of those countries. Access to new markets for exporting firms in developing countries potentially creates employment and increases the salary of workers in those sectors. Local firms can also access better inputs and technology, helping to close the productivity gap observed in most developing countries. However, in the presence of market failures it is not clear that the gains from trade will be observed. Moreover, trade could potentially increase unemployment, poverty and income inequality in the short and medium term, making it unsustainable socially, economically, and politically (Artuc et al., 2015; Artuc and Porto, 2016; and Dix-Carneiro, 2014). This suggests that the relationship between international trade and poverty is complex. The overall effect of globalization in a developing country may depend on the provision of complementary policies, institutions, and infrastructure, highlighting the importance of public policies.

Food is often the largest household expenditure for poor people, while much of their income will come from wages and, for rural households, from sales of agricultural produce. The modernization of the port should reduce delays, wastage and losses, and probably increase the level of competition in the logistics associated with trade. This will reduce the prices of imported goods (though the level of pass-through will depend on other complementary policies) and increase the level of competition with local producers. It will also provide enhanced export opportunities both for local producers and landlocked neighboring countries. All these changes will have distributional impacts.

The conceptual framework in this paper is organized around the two-step approach of the trade and poverty literature.[5] The first step involves an assessment of how the infrastructure project will affect trade flows and how these changes in trading opportunities will affect the prices of goods and production factors. This step will require an assessment of the effect of the reform on border prices and how those changes on border prices would be transmitted to retail and producer prices and potentially to wages. The extent of pass-through will depend, among many factors, on the trade and production structure, the existing trade and industrial policy, sectoral market structure (level of competition among importers and exporters) and the degree of market integration in Tanzania. The second step uses household surveys to assess the poverty impacts of those changes in trade. It will follow the standard first order effects approach, as in Deaton (1989, 1997). Using microdata from the household surveys, consumption and income shares derived from the production and consumption of different goods will be used to evaluate the consumption, income, and overall impacts of a given price change.

[5] See Chapter 1 of World Bank and World Trade Organization (2015) for the macroeconomic links between growth, trade, and poverty.

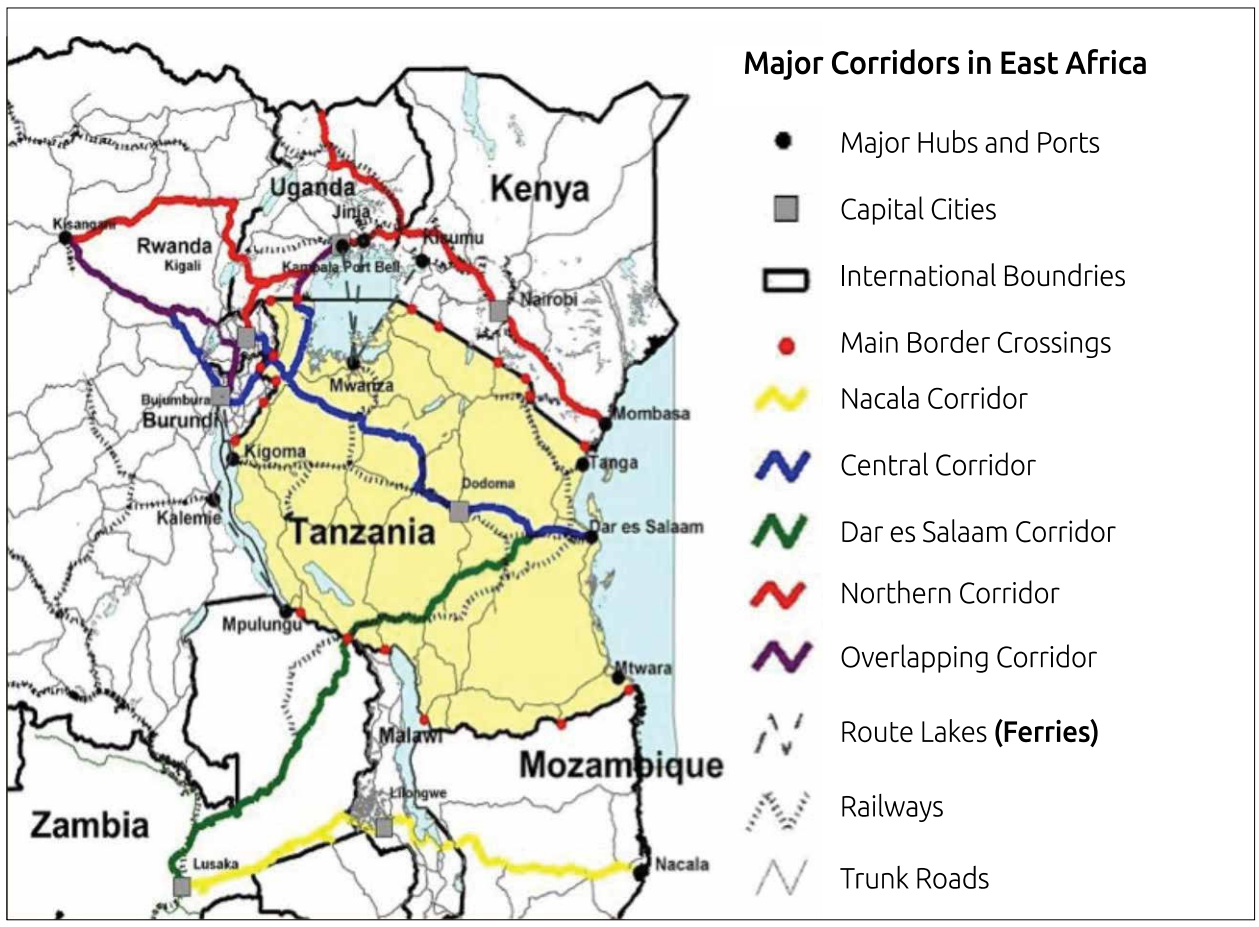
4. Production and trade patterns and policy in Tanzania

Tanzania experienced rapid economic growth over the past decade and a half. GDP increased on average 6.7% per year from 2000 to 2016, compared to 3% during 1990–2000. During the same period, the share of the agricultural sector, which employs 75% of the labour force, in GDP declined. In 2016 agriculture accounted for 31% of Tanzania's GDP, industry accounted for 2%, and services for 42%.

An analysis of the impact of trade on poverty in Tanzania needs to take into account several trade and industrial policy issues. First, while external trade tariffs have fallen sharply in Tanzania over the years and tariffs on trade with neighbors have been mainly eliminated through its membership in the East African Community Customs Union, non-tariff barriers (NTBs) remain major impediments to trade and business development in the EAC. In addition, poor transport infrastructure and the pattern of specialization of the involved countries severely limit regional exchanges. Finally, sectoral policies that affect trade in key commodities can have an important impact on poverty. These include food export bans and import quotas for rice and sugar, among others.

The most important trade partners of the country are in Asia and Europe. Trade with neighboring countries is growing but is still small, except perhaps for Kenya. Dar es Salaam port provides transit services for neighboring landlocked countries, but faces competition from Mombasa (Kenya), Durban (South Africa) and to a less extent Nacala (Mozambique) (see Figure 1).

Figure 1: Major trade corridors in East Africa



Understanding the agricultural sector is essential for estimating the poverty impact of the enhancement of the port of Dar es Salaam, as most families, and in particular most poor households, are involved in agriculture. Farming or livestock husbandry is the main occupation for the majority of the population in all regions except for Dar es Salaam and Mjini Magharibi. The main activity for 79.4% of the families in rural areas is farming, livestock husbandry or fishing, compared to 30.5% in urban areas (Tanzania, 2012).

In the agricultural sector, production is dominated by food crops and livestock. The main products include meat (US$783 million), bananas (US$711 million), dry beans (US$685 million), maize (US$668 million), milk (US$578 million), cassava (US$571 million) and rice (US$482 million). Tobacco, cotton and cashew were the largest cash crops for the export market (FAOStat, 2015).

Tanzania's three main import products in terms of value are wheat, oil palm, and refined sugar. The three products are mainly imported through Dar es Salaam port. However, as will be seen in the household data, these products do not account for a large share of the consumption basket of households under the national poverty line (mostly rural households). These products are more important for urban households, including those below the international poverty line of US$3 per day. Cost reductions from port improvements may not be passed to consumers of these three products, for a number of reasons. Imports of sugar are controlled by the Sugar Board of Tanzania, and the price is kept artificially high to encourage investments by local producers. Imports of wheat are dominated by one firm (SSB), which accounts for almost three quarters of the market. Palm oil competes with other sources of edible oil produced locally (sunflower, seeds, and cotton).

The main agricultural export products are coffee, tobacco, and cashew. Food crop exports are very low. Between 2000 and 2011, the configuration of Tanzania's top agricultural export items has not changed. Export growth has been important in the case of tobacco but disappointing for coffee and cashews. These are products that are exported with little domestic processing, and the required level of technology to produce them has not changed. The country could potentially increase its share in global markets for these and other cash crops, and a more efficient port could contribute to that.

5. The expected impact of the port project on trade flows and prices

This study assumes that the project's rearrangement of existing port infrastructure and improvements in administrative procedures would reduce border prices for bulk imports, and increase border prices for exports, by 5%. World Bank (2013) finds that the total cumulative cost of the delays and additional monetary costs for the Dar es Salaam port are equivalent to a tariff of about 5% on bulk imports. This figure was obtained by comparing the performance of Dar es Salaam with the port of Mombasa. The tariff equivalent was computed as the sum of the direct monetary costs, the cost of waiting at anchorage and the inventory cost, based on an average value of US$1,137 per ton for dry bulk imports. Interviews with several local stakeholders confirmed that this is a reasonable figure.

Estimating the impact on exports of port improvements is complicated. While an improvement in the efficiency of the port should increase the competitiveness of Tanzanian exports, producers in Tanzania face many constraints other than the inefficiencies of the port. According to the KPMG/World Bank (2013) "Pulse of the Tanzanian Economy" survey, the state of the port is a serious constraint for one third of the mid-size firms surveyed. In addition, 43% of the respondents cited corruption, followed by tax rates and regulations (29%) and access to finance (24%) as major constraints. Moreover, other surveys point to deficiencies in railways and road infrastructure, as well as unreliable energy supply, as important constraints on businesses. The lack of an adequately-educated force is also a severe constraint. Tanzania is ranked 131st out of 189 countries in *Doing Business 2015* (World Bank), somewhat better than position 145 in 2014.

To study the transmission of border prices to retail and farmgate prices, it is important to consider the level of competition in the value chains for the different products that are produced and traded in a country (Horn

and Levinshon, 2001; Porto et al., 2011; Swinnen and Vandeplas, 2010 and 2014). In Tanzania, international market conditions combine with domestic market configurations in shaping agriculture growth and poverty reduction. While the farming sector is composed mostly of smallholders, the lower layers of the value chains are usually dominated by a small number of firms. Farmers may suffer from the non-competitive behavior of other agents along the chain, or be constrained from selling output in markets because transport and other services are not available or are too costly.

This study uses a model developed by Depetris-Chauvin et al. (2017) to estimate the impact of the enhancement of the port of Dar es Salaam on poverty. This model explains the allocation of factors of production to various cash and food crops and how this allocation depends on competition along the supply chain and on the constraints faced by different types of farmers. The model describes the behavior of farms, exporters and importers in a simple partial equilibrium setting. There are different versions of the model to deal with the three basic scenarios that we face in our empirical work. That is, a first version of the model explores the case of cash crop production (mostly for exports). In the case of exported cash crops, farmers sell products to oligopsonies, which then undertake the international trading. This version can be used to study crops such as cotton, coffee, tea, tobacco, cacao, vanilla, etc. This model is then adapted to deal with the case of a country that is a net exporter of a food crop. In this case, there are oligopsonies in charge of exports, but there is also a domestic residual market of net-consumers of that crop. Food crop exports can include any relevant crop in a particular country, namely maize, rice, fish, livestock, etc. Finally, a different version of the model is developed for the case of a country that is a net importer of a food crop whereby excess demand is met via international trade, and net-consumers must purchase these agricultural goods from oligopolies. The three versions of the model share common elements, such as the structure of utility, the constraints on production and the market structure, but differ in the way the models are solved to account for exportable and importable prices.

The model traces how the allocation of factors of production to various cash and food crops depends on competition along the supply chain and on the constraints faced by different types of farmers. Farmers choose how to allocate their resources (land, labor) to the production of subsistence food for their own consumption, production of marketable food surplus, or production of cash crops for exports.[6] These activities offer different prices and entail different production costs. In equilibrium, because of risk and food security issues, all farmers produce for their own consumption. However, depending on farm-gate prices, costs, and other constraints (such as infrastructure, transport costs, risks), some farmers specialize in food production altogether, while others devote some resources to export products. We develop a game-theory model of supply chains in cash crop agriculture, where market structure is characterized by many smallholders and a few exporters. These exporters buy raw inputs from the farmers and sell them (perhaps after some processing) in international markets at given prices. Firms enjoy oligopsony power internally and set farm-gate prices.

The oligopsony game delivers the equilibrium farm-gate prices that the firms offer to farmers. In setting these prices, each exporter takes into account its own characteristics, the characteristics of other exporters, and the endogenous responses of the farmers (which in turn affect food and cash crop production). Once the equilibrium of the model is found, it is possible to perform comparative static exercises to study how farm-gate prices depend on various parameters of the economy, including the degree of imperfect competition and competition policies, household costs and constraints, and so on. In this study, the model is used to study how changes in border prices from a reduction in the cost of using the port affect domestic prices for a given level of market structure, based on key parameters that capture various household constraints and institutional access.

A 5% reduction in the implicit tax imposed by the port inefficiencies will increase the price of exportable crops (Table 1, first half). Farmers producing cotton receive 9.41% more for their cash crop in the current scenario

[6] The agricultural household model is based on the well-known models of Barnum and Squire (1979), Singh, Squire and Strauss (1986), de Janvry, Fafchamps, and Sadoulet (1991), Benjamin (1992), and Taylor and Adelman (2003).

Table 1: Effect of increased efficiency of Dar es Salaam Port on farm gate and retail prices

	Baseline	Perfect Competition
Increase of 5% in:		
Border Price for cotton	9.41	20.45
Border Price for cassava	5.79	6.89
Reduction of 5% in:		
Border Price for rice	-4.42	-4.12
Border Price for maize	-4.21	-4.33
Border Price for dairy	-3.80	-2.62
Border Price for wheat	-2.07	-16.39

Source: Model simulations.
Note: Figures denote percentage change.

but could receive up to 20.45% more if there were more competition in the supply chains for cotton. This estimation of the pass through is very high and takes into account the supply responses of the farmers in equilibrium. However, the supply response to an increase in the price of cotton and most other agricultural products is limited because of the many constraints affecting farmers in Tanzania. The impact on cassava farmgate prices is smaller than for cotton. This is because foreign markets play a very small role in cassava with most of the production consumed locally, often as own consumption or informally traded. Processors in cassava are very competitive, so the results for the simulation assuming perfect competition are similar to the baseline.

The price reductions for four imported food products are not fully transmitted to the domestic economy (second part of Table 1). For wheat, where imports are concentrated among a few importers and local production is a very small fraction of domestic consumption, more than half of the price reduction is captured by the importers. However, in the extreme case of perfect competition, the local price of wheat could fall more than 16% following a 5% reduction in border prices. The pass through to local consumers for dairy products, rice, and maize is less than 100%, but nevertheless significant. In these sectors local production satisfies a large share of the local demand, with imports being in most cases residual. In the three sectors there is already a healthy level of competition, so the results for simulations assuming perfect competition are not significantly different from the results for the status quo.

These results are more relevant for Dar es Salaam and neighboring regions than for the whole country. Infrastructure and logistics in Tanzania are poor, even by African standards. While Dar es Salaam has connections to all inland regions and neighboring countries through a series of trunk and regional roads, and in some cases railways and lake ferries, the state of the infrastructure is deficient. Most regions have very low densities of roads, and unpaved roads are not exploitable during the rainy season (Iimi et al., 2015). Thus, the degree of geographical market segmentation is likely very high in Tanzania. Moreover, according to the National Sample Census of Agriculture 2007/2008, the prices of otherwise homogenous goods differ by up to 50% between regions. For perishable goods the differences can be even higher, 400% in the case of milk. This confirms a high level of market segmentation within Tanzania, so that port modernization is likely to have little short-term significant impact on regions distant from Dar es Salaam, including the neighboring land-locked countries.

The methodological framework presented above does not take into account the impact of changes in prices caused by trade policy and trade facilitation on wages, for example in expanding sectors vis-à-vis contracting sectors. Also, the impact on the wages of skilled workers may differ from that on the wages of unskilled workers. Unfortunately, data required to estimate the wage impact were not available for this study. As the poverty profile in next section will show, wages actually make up only 16.2% of Tanzanian households total income, much lower in rural areas (8.9%) than in urban areas (47.7%).

6. Poverty profile of Tanzania

While poverty rates have fallen over the last 15 years, poverty remains high in Tanzania. Roughly 90% of the population live on less than three US$3 a day at 2005 PPP (2008/2009 Tanzania National Panel Survey). Poverty is more common in rural than in urban areas: using the national poverty line, one third of the households in rural areas live in poverty and approximately 90% of Tanzania's poor people live in rural areas.[7]

The household survey provides detailed information on income and consumption patterns, which are used in identifying the potential welfare effect of trade. For rural households, cash expenditures account for 59.2% of the total budget, while own consumption accounted for the remaining 40.8% (Table 2). By contrast, 93.9% of urban households' expenditures is cash spending. At the national level, 65.4% of households' budgets is allocated to food. This share is larger for rural households (69.6%) than for urban households (50.9%), because incomes are higher among urban households, who thus spend more on other goods and services than on food. Maize accounts for the largest share of household food consumption. On average, maize represents 15.7% of Tanzania's household expenditure (17.7% of rural expenditure and 8.6% of urban expenditure). Rice accounts for 4.8% of the budget, with slightly higher shares among urban households. Cassava accounts for 4.8% of expenditures in rural areas and for only 1.1% in urban areas.

Rural households' income comes mostly from own consumption, while cash income makes up only 32.4% of income (of which sales of agricultural products account for 16.9% points and wages 8.9% points) (Table 3). By

Table 2: Budget shares

Tanzania	Total	Rural	Urban
Total consumption per capita	**100.0**	**100.0**	**100.0**
Expenditures	66.9	59.2	93.9
Food	32.3	28.8	44.8
Manufactures	15.2	14.7	16.8
Services	19.4	15.7	32.3
Other	0.0	0.0	0.0
Own-consumption	33.1	40.8	6.1
Own-consumption food	33.1	40.8	6.1
Own-consumption other	0.0	0.0	0.0
Total food consumption	**65.4**	**69.6**	**50.9**
Total crops	39.4	43.2	26.2
Maize	15.7	17.7	8.6
Rice	4.8	4.4	6.4
Livestock	5.9	6.1	5.1
Cassava	3.9	4.8	1.1
Cowpea	4.4	4.9	2.7
Yam	0.3	0.3	0.1
Wheat	1.0	1.0	1.2
Groundnut	1.5	1.8	0.4
Sweet potato	1.9	2.3	0.5
Milk	1.9	2.1	1.1

Source: Tanzania National Panel Survey (2008/2009).

[7] The household data for our analysis come from the 2008/2009 Tanzania National Panel Survey. The dataset contains information on 3280 households. The sample is representative at the national level but not for each region. Thus, the study can only distinguish impacts between urban and rural areas but not among regions.

contrast, cash accounts for 78.4% of total income of urban households. Of that 78.4%, wage income accounts for 47.7% age points and enterprise (mostly informal) income 20.2% age points. Maize represents 20.7% of rural household income and 7.4% of urban household income. Rice (4.5%), livestock and milk (5.6 and 3.9%) and cassava (6.4%) are also important sources of income in rural areas, but not so much in urban areas. While important as a source of export revenue, cash crops such as coffee, tea, cotton, tobacco, and groundnuts do not on average generate a large share of income for Tanzanian households. This is because in general, smallholder farmers prefer food crops and when they do produce cash crops, they do not specialize. The data also shows that except for cotton, cash crops for the export market are mostly produced by farmers in households with incomes above the national poverty line.

7. The poverty impact of the port improvement

This section presents a discussion of the poverty impacts of the simulation results from section 5. It distinguishes three different levels of livelihood. Households below the poverty line in the National Panel Survey (NPS) are defined as poor, households above the NPS poverty line but below the US$3 a day (PPP) as vulnerable, and households above the US$3 a day line as non-poor. The analysis is done using the first order approximation analysis of Deaton (1989, 1997), which implies that the impact of a price change can be approximated using income shares and budget shares as measures of exposure.

The welfare impacts of the price changes from the port project are reported in Table 4 for six important cash and food crops in Tanzania. The Table reports average

Table 3: Income shares

Tanzania	Total	Rural	Urban
Total income per capita	**100.0**	**100.0**	**100.0**
Incomes	41.1	32.4	78.4
Food (agriculture)	15.1	16.9	7.2
Wage	16.2	8.9	47.7
Enterprises	8.0	5.2	20.2
Transfers	1.8	1.4	3.3
Own-consumption	58.9	67.6	21.6
Own-consumption food	58.9	67.6	21.6
Own-consumption other	0.0	0.0	0.0
Total food income and AC	**74.0**	**84.5**	**28.8**
Total crops	49.2	56.6	17.0
Maize	18.2	20.7	7.4
Rice	4.0	4.5	1.6
Livestock	5.0	5.6	2.4
Cassava	5.4	6.4	1.1
Cowpea	4.4	5.2	1.2
Yam	0.4	0.5	0.0
Wheat	0.8	1.0	0.0
Groundnut	2.6	3.0	1.2
Sweet potato	2.8	3.3	0.2
Cotton	1.4	1.7	0.2
Tobacco	0.7	0.9	0.0
Milk	3.5	3.9	1.6

Source: Tanzania National Panel Survey (2008).

results for the total population, the poor, the vulnerable, and the non-poor, for rural households and for those households that are producers of the crop for which the price changes. The tables show, for each demographic group, changes in the monetary income, expenditure and welfare attributed to each crop.

The income effects of price changes as a result of port modernization vary by commodity. The largest change in income is generated by the rise in the price of cotton, as total household income increases by 1.4% and the income of producer households by 17.1%. One reason is that raw cotton is only produced and not consumed directly by households, so affected households can only benefit from the price rise. By contrast, all income groups are on average net consumers of rice, maize, cassava, and wheat, so they will benefit from price reductions (cheaper imports) and will be hurt by price increases (more expensive exportable food crops). The opposite is true for households that are net producers. While on average households are net consumers of milk, in rural areas households are net producers.

For most crops, shocks, and affected populations, the welfare impacts of the simulations are less than 1% of total household expenditures. The only exception is the impact on cotton producers. These results are expected, given the nature of the exercise considered here, and they are comparable to other results in the literature on the topic (Lederman and Porto, 2013).

The results also point to the distributional impact of the port improvements. First, urban households benefit more than rural households do from cheaper imported food crops. This is expected, as urban households are mostly consumers of food while rural households are both consumers and producers. Moreover, monetary expenditures on food are typically higher for urban households, as an important share of the food consumed in rural areas is home produced, particularly among the poorest households. While the study does not take into account explicitly the reduction in cost of containerized imports, it is likely that this will benefit urban households more than rural ones, as urban households' propensity to consume imported manufactured goods is larger. The poor and the vulnerable benefit from the decrease in the prices of maize, rice, dairy and wheat and from the increase in the price of cotton, and are only hurt by the increase in the price of cassava. Overall, the poor and the vulnerable as a whole are likely to benefit from the improvements in the port. From the simulations it is hard to predict whether urban or rural poor will benefit most. However, given the high degree of market segmentation within Tanzania, it is likely that the poor and vulnerable households around Dar es Salaam will benefit the most. Finally, it is not clear whether poor, vulnerable or non-poor households would benefit more. However, the structure of Tanzania's imports and the structure of consumption of poor and non-poor households suggests that the reform will favor non-poor or vulnerable households more than those with incomes below the national poverty line.

Given the high degree of market segmentation within Tanzania, it is likely that the poor and vulnerable households around Dar es Salaam will benefit the most from port improvements.

Table 4: Welfare impact of port improvement (Baseline Scenario)

	Income	Expenditure	Welfare		Income	Expenditure	Welfare
Maize				Wheat			
Total	0.82	6.31	0.23	Total	0.02	0.49	0.01
Poor	0.69	4.29	0.15	Poor	0.02	0.57	0.01
Vulnerable	1.28	10.13	0.37	Vulnerable	0.02	0.42	0.01
Non poor	0.80	8.20	0.31	Non poor	0.01	0.32	0.01
Rural	0.98	6.01	0.21	Rural	0.03	0.31	0.01
Rural poor	0.91	3.79	0.12	Rural poor	0.03	0.31	0.01
Rural vulnerable	1.10	9.78	0.37	Rural vulnerable	0.03	0.31	0.01
Rural non poor	1.02	8.11	0.30	Rural non poor	0.02	0.31	0.01
Producers	4.99	3.66	-0.06	Producers	4.25	0.37	-0.08
Rice				Cotton			
Total	0.79	3.30	0.11	Total	1.40	0.00	0.13
Poor	0.66	4.00	0.15	Poor	1.65	0.00	0.16
Vulnerable	0.82	3.42	0.11	Vulnerable	1.33	0.00	0.12
Non poor	1.10	2.11	0.04	Non poor	0.23	0.00	0.02
Rural	0.93	2.45	0.07	Rural	1.71	0.00	0.16
Rural poor	0.83	2.90	0.09	Rural poor	1.89	0.00	0.18
Rural vulnerable	0.92	3.02	0.09	Rural vulnerable	1.66	0.00	0.16
Rural non poor	1.09	1.71	0.03	Rural non poor	0.45	0.00	0.04
Producers	11.45	1.07	-0.46	Producers	17.09	0.00	1.61
Cassava				Dairy			
Total	0.02	1.01	-0.06	Total	0.49	0.59	0.00
Poor	0.01	0.55	-0.03	Poor	0.55	0.70	0.01
Vulnerable	0.03	1.14	-0.06	Vulnerable	0.47	0.57	0.00
Non poor	0.05	1.65	-0.09	Non poor	0.36	0.39	0.00
Rural	0.03	1.04	-0.06	Rural	0.54	0.48	0.00
Rural poor	0.01	0.49	-0.03	Rural poor	0.63	0.54	0.00
Rural vulnerable	0.04	1.21	-0.07	Rural vulnerable	0.58	0.52	0.00
Rural non poor	0.05	1.50	-0.08	Rural non poor	0.40	0.42	0.00
Producers	6.88	0.05	0.40	Producers	12.79	0.23	-0.48

Note: Figures denote percentage change.

One argument of why the poor could benefit from the port reform and trade in general (World Bank, 2013) is through improved access to cheaper inputs, tools, and materials. For instance, rural poor would benefit from cheaper fertilizers and urban poor from cheaper construction materials. However, these effects are likely to be limited in Tanzania. Fertilizer is at the moment only imported, and in 2013/2014 the two largest companies (Yara and Premium Agro) accounted for 56% of the market (the five largest companies had 98.1 %). It is unlikely that they would pass much of the savings from lower fertilizer prices to farmers, as the recently-cancelled fertilizer subsidy program showed. Moreover, the fertilizer adoption rate among poor farmers is almost zero, as fertilizer is in general used by well off, medium-size farmers producing cash crops for the export market. In the case of construction material, besides the protection of the local cement industry, imports of clinker are also concentrated with one company (Maweni Limestone) accounting for 68.8% of the market. Most of this imported construction material is used in urban areas and therefore will not benefit much the households under the poverty line (92% are based in rural areas) but may benefit vulnerable urban households (incomes above the poverty line but less than US$3 a day).

8. Conclusions

This contribution assesses the poverty impact of proposed improvements to the Dar es Salaam Port. Currently, the port suffers from several infrastructure and operational deficiencies that increase the cost both for imported and exported goods. These costs partially reflect port congestion, where the situation is more critical for imports than for exports. These inefficiencies act as an implicit tax on imports and to a lesser extent as a tax on exports. An improvement in the operations of the port could reduce border prices up to 5% for bulk cargo.

The simulations of the short-term effect on selected bulk goods show that the pass through from border prices to retail and farm gate prices will be less than a 100%, limiting the potential impact of cheaper imports. This is due partially to importers' market power, which enables them to capture some of the cost saving. The effect of the port improvement would be geographically concentrated in Dar es Salaam, as inadequate roads and railways result in a high level of market segmentation.

The short-term impact on poverty of the port improvements is positive, albeit small. However, the reduction in poverty may be accompanied by an increase in inequality, as non-poor households are expected to benefit proportionally more than the poor and vulnerable ones. In the long run, a better functioning port could more significantly reduce rural poverty and raise agricultural productivity if complementary policies and infrastructure improvements (particularly for inland transport) were adopted to improve access of the poor to export opportunities and to cheaper imported food, tools and inputs.

The study does not consider the effect of the port project on wages. In general, in the short run, increased trade reduces wages in import-competing sectors and increases wages in export sectors. The port improvements are likely to increase imports but have little effect on exports in the short run. In the long run, cheaper manufactured imports may negatively affect the development of some labor-intensive manufactures, and this sector can have a positive impact on poverty reduction. However, more work is needed to understand this effect, especially given the very fast process of urbanization taking place in Tanzania. Besides the concrete impact on poverty and inequality, it also would be important to estimate the efficiency gains from the port improvements, and develop metrics that allow us to quantify any possible trade-off between efficiency gains and inequality or poverty.

Finally, beyond the concrete findings of this study, it is important to note that international trade has undoubtedly greatly contributed to the growth performance of Tanzania in the last ten years. While this high growth has not translated in drastic reductions in poverty for many reasons (Atkinson and Lugo, 2010), trade has contributed to the steady reduction in the poverty headcount and the poverty gap. The impressive growth in trade and the inadequate investments to keep up with this growth are why the port is currently suffering from severe congestion. Failure to significantly improve port operations could severely constrain Tanzania's exports and imports, jeopardizing one of the engines of growth and poverty reduction of the country.

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