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TRADE LIBERALIZATION AND LABOR MARKET ADJUSTMENT IN BOTSWANA

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**ABSTRACT**

We study the effects of domestic trade liberalization on labor markets in Botswana. South Africa is the dominant member of the Southern Africa Customs Union. As such, when South Africa liberalized trade in the 1990s, this induced large and plausibly exogenous tariff reductions for the other customs union members, including Botswana. Using labor force surveys from Botswana spanning a decade, we find that trade liberalization did not affect the relative size of industries in terms of employment. However, trade liberalization had effects within industries. We find an increase in the prevalence of working in an informal firm and self-employment, but mixed evidence of effects on unemployment. Hours worked decreased in response to trade liberalization, partially driven by the movement of workers to informal firms. Despite large increases in aggregate income, trade liberalization is associated with a reduction in monthly income, but the results are imprecise. Our results also suggest that a positive export demand shock, the 2000 African Growth and Opportunities Act, is associated with a reduction in employment in informal firms in the clothing industry.

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# 1 Introduction

To fully realize the gains from trade, workers must reallocate across industries and across firms within industries. However, reallocation is costly for workers (Dix-Carneiro, 2014; Artuc *et al.*, 2015). Evidence from various developing countries suggests that reallocation across sectors in response to trade liberalization is uncommon.<sup>1</sup> More recently, evidence from developing countries has emerged about additional margins of labor market adjustments, such as between formal and informal firms, into non-traded sectors, and out of the workforce.<sup>2</sup> These studies suggest that earlier attempts to look for the reallocation of workers across industries in response to trade liberalization in developing countries may have been missing additional margins of adjustment.<sup>3</sup>

Very little evidence, however, exists on labor market adjustments to changes in trade policy in Sub-Saharan African countries, with the exception of South Africa (Erten *et al.*, 2019). This is largely due to the lack of high quality data. Credible causal estimates of labor market adjustments to trade policy require representative and comparable data before and after a significant change in trade policy along with a viable identification strategy. These ingredients are generally missing within Sub-Saharan Africa.<sup>4</sup> In this paper, we overcome these problems by using repeated nationally representative labor force data from Botswana that spans a period of large trade liberalization.

Botswana is a member of the Southern Africa Customs Union (SACU). SACU's external trade policy has historically been determined by South Africa (Southern Africa Customs Union, 2017). Thus, Botswana experienced a large and externally imposed trade liberalization when South Africa embarked upon dramatic reductions in tariffs beginning in the middle of the 1990s. The tariffs faced by Botswana have been plausibly exogenous to events

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<sup>1</sup>See Revenga (1997) and Feliciano (2001) for Mexico, Attanasio *et al.* (2004) for Colombia, Currie and Harrison (1997) for Morocco, and Topalova (2010) for India.

<sup>2</sup>See Menezes-Filho and Muendler (2011) and Dix-Carneiro and Kovak (2019) for responses to Brazil's domestic trade liberalization in the late 1980s and early 1990s and McCaig and Pavcnik (2018) for within industry adjustment to new export opportunities in Vietnam.

<sup>3</sup>A related literature uses the region or local labor market as the unit of analysis and examines labor market adjustment to changes in trade policy in developing countries. See Topalova (2010), McCaig (2011), Kovak (2013), Dix-Carneiro and Kovak (2019) and Erten *et al.* (2019)

<sup>4</sup>Artuc *et al.* (2015) estimate that labor mobility costs are higher in Sub-Saharan African countries than in other developing regions.

within the country, making it an unusual case in which to study the causal effects of trade liberalization.

Botswana has been politically stable for many decades. It has experienced rapid growth and structural change since independence (McCaig *et al.*, 2017). We focus on the period of 1995/96 through 2005/06 due to the availability of nationally representative labor force survey data at the beginning and end of this period. There are no other labor force surveys. During this period, real PPP adjusted GDP per capita grew by 3.4% per annum.<sup>5</sup> This period of rapid growth was accompanied by a large increase in the size of the working age population, from 743 to 923 thousand individuals, stubbornly high levels of unemployment, and a significant increase in the rate of employment in informal firms within the manufacturing sector. However, there have been no studies exploring whether the large SACU trade liberalization influenced labor markets in Botswana during this period.

Our research exploits both the exogeneity of the tariff reductions as well as the large variation in tariff cuts across industries to estimate the effects of trade policy on the labor market in Botswana. From a theoretical standpoint, the impact of the tariff reductions on industry employment, informality, and unemployment is ambiguous. Tariff reductions by South Africa are expected to lower the price of imports and increase the demand for imports in both South Africa and Botswana. From Botswana's perspective, the increase in imports from third parties has benefits and costs.<sup>6</sup> Cheaper intermediate inputs are likely to raise labor productivity, providing a boon to both the traded and non-traded goods sectors. In addition, to the extent that businesses in the exportables sector were competing for scarce resources with the highly protected importables sector, the reduction in import tariffs could boost the production of exportables. At the same time, cheaper imports may also displace workers and shut down businesses, potentially affecting productivity, employment, and the diversity of goods produced in Botswana. Finally, because South Africa has been, and still is, the primary destination for most of Botswana's non-mineral exports, opening up to trade is likely to erode Botswana's market share in South Africa, possibly reducing the number of products Botswana exports to South Africa. The net effect of these competing forces

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<sup>5</sup>Based on output-side real GDP in PPP and population estimates from Penn World Tables 8.0.

<sup>6</sup>Of course, cheaper imports also benefit consumers but because we are using labor force survey data, a complete welfare analysis is beyond the scope of this paper.

will determine the impact of trade liberalization on industry employment, unemployment, informality, hours worked, and income in Botswana.

We use nationally representative labor force data from the 1995/96 and 2005/06 labor force surveys. These data cover urban and rural areas, the formal and informal sectors, and all industries. In this period, Botswana experienced an increase in the prevalence of informal work in aggregate and within manufacturing, the most exposed sector to the SACU trade liberalization.<sup>7</sup> Informality stood at 27% of the manufacturing sector in 1995/96 and rose to 31% by 2005/06. Additionally, the labor force surveys contain questions regarding the previous industry of employment for the unemployed, allowing us to examine the impacts of tariff cuts on unemployment. Unemployment is very high in Botswana, around 20% during this period. We match workers to SACU tariff cuts by industry to study the reallocation of workers across and within industries.

Between 1995/96 and 2005/06, SACU tariffs fell considerably. The average tariff within manufacturing fell from 25.0 to 11.7 percentage points. Importantly, the size of the tariff cuts varied across industries, a feature we exploit for our identification strategy. Clothing experienced the largest tariff reduction, almost 60 percentage points, whereas industries such as office, accounting, and computing machinery and printing and publishing experienced negligible tariff cuts. The variation in tariff cuts across industries allows us to compare differential changes in labor market outcomes across industries in relation to trade liberalization.

We find that SACU trade liberalization was associated with little to no net movement of workers across industries. This is consistent with a large number of studies examining the impacts of domestic trade liberalization on industry employment in developing countries.<sup>8</sup> These studies generally find negligible changes in the allocation of industry employment within the formal sector or overall.

We find mixed evidence of impacts on unemployment. We use two definitions of unemployment. Narrow unemployment includes individuals that are available to work and sought work. Broad unemployment further includes individuals that were available to work but did not seek work. The labor force surveys ask unemployed individuals about the industry they

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<sup>7</sup>See section 3.1 for a description of our definition of working in an informal firm in Botswana.

<sup>8</sup>See, for example, Currie and Harrison (1997); Revenga (1997); Feliciano (2001); Attanasio *et al.* (2004); Topalova (2010); Dix-Carneiro (2014) and surveys by Goldberg and Pavcnik (2007); Harrison *et al.* (2011).

were most recently affiliated with, allowing us to match the previous industry of employment with the industry tariff cuts. Our results suggest a decrease in unemployment within manufacturing and an increase in unemployment once mining industries are added to the analysis. Although the implied magnitudes are large, the estimates are not statistically different from 0. Among workers, we find that SACU liberalization was associated with an increase in the prevalence of working in an informal firm and in self-employment. Furthermore, workers experienced a reduction in hours worked, partially caused by the movement of workers into informal firms, and a decrease in income, although it is imprecisely estimated.

Within developing countries, labor force or household survey data that tracks the previous industry of employment is rare. Thus, most of the literature focusing on trade impacts on unemployment (or non-employment, which also includes not participating in the labor market) focuses on regional exposure to trade liberalization as unemployment cannot be directly linked to a specific industry.<sup>9</sup> Studying India’s trade liberalization in the 1990s, Hasan *et al.* (2012) are able to link the previous industry of employment to industry trade exposure. They report no increase in unemployment in Indian industries in response to domestic trade liberalization in the 1990s. The difference in industry-level unemployment responses between India and Botswana may be due to differences in overall labor market policies and institutions. In general, unemployment is much higher in Botswana, around 20 percent, than in India, suggesting that this is a more common labor market outcome and thus possibly a more likely labor market adjustment mechanism to trade liberalization.

Our definition of informal employment, which is based on the registration status and size of the business, differs from that used in most of the trade and informality literature. That literature has predominantly focused on workers in formally registered firms and defined informal based on failure to comply with labor legislation.<sup>10</sup> This approach has the drawback of implicitly ignoring workers in informal firms. Our definition more closely resembles that of McCaig and Pavcnik (2018) which defines informal employment based on the registration

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<sup>9</sup>Gaddis and Pieters (2017) and Dix-Carneiro and Kovak (2019) report that Brazil’s domestic trade liberalization was associated with a rise in non-employment (i.e., a rise in unemployment or non-participation). Erten *et al.* (2019) report similar evidence for South Africa.

<sup>10</sup>For example, in work on Brazil’s trade liberalization, Goldberg and Pavcnik (2003), Bosch *et al.* (2012), Menezes-Filho and Muendler (2011), Dix-Carneiro and Kovak (2019) focus on whether a worker within a formal firm has a signed work card, while Paz (2014) defines informal workers for whom payroll tax is not paid. Goldberg and Pavcnik (2003) rely on an indicator for the payment of social security taxes in Colombia.

status of a business in Vietnam. They find a decrease in informal employment within industries in response to changes in trade policy, but unlike our study, the trade policy changes are a reduction in tariffs in a foreign market (i.e., reduced exporting costs). Hence, our study complements the existing trade and informality literature by considering a definition of informality that is based on the status of the firm (i.e., does not focus only on workers in formally registered firms) in the context of domestic trade liberalization. This definition of informal employment is appealing due to the direct link to the high prevalence of informal firms in developing countries such as Botswana. Growing evidence suggests that there are large differences in productivity between informal and formal firms (La Porta and Shleifer (2008, 2014), Nataraj (2011), McCaig and Pavcnik (2018), Ulyssea (2018)). Hence, the SACU induced movement of workers away from formal firms to informal firms in Botswana may have lowered aggregate labor productivity, particularly within manufacturing as it was subject to the largest tariff reductions. Our results are robust to focusing on self-employment, which is strongly positively correlated with working in an informal firm.

In some ways Botswana's labor market resembles that of South Africa. Understanding these characteristics is useful for anticipating the margins of adjustment to trade liberalization in Botswana (Erten *et al.*, 2019). Unemployment is stubbornly high at around 20% and has been for decades. When we include discouraged workers, the unemployment rate rises to almost 30%. The reasons for high unemployment are varied but a combination of relatively high reservation wages, an underdeveloped private sector and generous social safety nets certainly contribute (World Bank, 2015). These relatively high levels of unemployment have stimulated entry into the informal sector (Siphambe, 2004). In 2005 roughly 18% of the non-agricultural labor force was employed in the informal sector. The rate of informality in Botswana is somewhat higher than it is in South Africa but significantly lower than it is in middle income Latin American countries where urban rates of informality reach as high as 70% (Maloney, 2004). By contrast, unemployment in Botswana is considerably higher than it is in middle income countries in Latin America but somewhat lower than in South Africa. Thus, apart from sectoral reallocations, we expect adjustment to trade liberalization in Botswana to potentially impact both unemployment and informality.

The remainder of this paper is organized as follows. In section 2, we describe SACU trade

liberalization. In section 3, we introduce the labor force surveys and present descriptive evidence on Botswana’s labor markets. In section 4, we explore the causal effects of the trade liberalization on industry employment size, unemployment, informality, hours worked, and monthly income. Section 5 concludes.

## 2 Trade liberalization in the Southern Africa Customs Union

Botswana has been a member of the Southern Africa Customs Union (SACU) since 1910 and SACU’s external trade policy has been dominated by South Africa (Southern Africa Customs Union, 2017). Prior to the end of apartheid in 1994, South Africa pursued a vigorous policy of import substitution (Edwards, 2005). In 1994, the process of trade liberalization gained momentum due to South Africa’s commitment to the GATT Uruguay Round. Between 1995 and 2006, import tariffs on all traded goods fell significantly. Levels of initial tariffs varied widely across industries, reaching over 90% in clothing. Subsequent liberalization saw the largest tariff cuts in the industries that had the highest initial tariffs.

Tariffs on trade with non-SACU members have been typically set by South Africa, with little or no input from Botswana. Thus, we use South Africa’s tariff structure to determine the level of trade protection for Botswana. We measure trade protection using tariffs (including ad valorem equivalents) plus surcharges for South Africa. Our data on trade protection, provided by Lawrence Edwards, spans the period 1990 to 2008 and is described in detail in Edwards (2005). This dataset comprises tariff rates (including ad valorem equivalents) and surcharges at the 8-digit HS level. To construct the industry tariffs that correspond to the industry classification in the labor force surveys, we construct a weighted average tariff within industries based on concordances available through the World Integrated Trade Solution (WITS).

The tariff declines experienced by Botswana are advantageous for causal analysis for a number of reasons. First, the tariff reductions were large as the mean tariff within manufacturing fell from 25.0 percent in 1995 to 11.7 percent in 2005. Second, the tariff reductions



varied significantly across industries. Figure 1 shows the change in industry tariff between 1995 and 2005 versus the level in 1995 across manufacturing and mining. Tariff reductions ranged from 0 to almost 60 percentage points and there is a strong negative relationship between the initial tariff level and the change. Third, the tariff changes are plausibly exogenous to Botswana. Botswana has been a member of the Southern Africa Customs Union since 1910. However, according to SACU’s website, Botswana did not have a role in setting external tariffs as South Africa retained the sole decision-making power over customs and excise policies and set the common external tariffs to benefit South African manufacturers following an import substitution strategy. Botswana continued to lack formal influence in setting common external tariffs until the 2002 SACU Agreement, which established an independent Secretariat and headquarters in Namibia. Hence, the level of tariffs prior to the end of Apartheid and the liberalization ushered in by South Africa are not likely to have been influenced by economic conditions within Botswana. In section 4.1 we use regression analysis to explore whether the tariff reductions are related to initial industry conditions in Botswana.

### 3 Labor force surveys and aggregate trends

#### 3.1 Labor force survey data

We rely on two labor force surveys conducted in 1995/96 and 2005/06. The labor force surveys were conducted by the Central Statistics Office of Botswana. These surveys aim to be a source of nationally representative information on the size, structure, and main characteristics of the labor force. They include information on employment in both formal and informal firms, as well as detailed categories of work status for both workers and those not working. Data for these surveys was collected throughout the 12 months of the duration of the survey. Both the 1995/96 and 2005/06 surveys asked virtually the same questions, with the 2005/06 survey adding some questions on child employment, so data from both surveys is comparable.<sup>11</sup>

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<sup>11</sup>The 2005/06 LFS sample included persons 7 years old and above while the 1995/96 only included persons 12 years old and above. Nevertheless, both surveys can be easily compared by controlling for age.

There are two main definitions of employment in the labor force surveys, each with its own time frame. The surveys ask about the main type of work the person has been doing in the past 12 months (usual employment) and the type of work the person did in the past 7 days (current employment). We focus on current employment during the past 7 days due to the more detailed questions asked about the current job as opposed to the usual job. Furthermore, we focus on employment outside of agriculture due to comparability issues introduced by seasonal agricultural work when using the past 7 days employment.

If the respondent worked during the past 7 days or was temporarily absent, she was asked about the occupation, industry, whether the work was paid or self-employment, and a series of questions to determine if the organization the individual worked for is formal or informal.<sup>12</sup> We follow the conventional definition of an informal sector business in Botswana. An informal business is identified by multiple characteristics, including “non registration of a company with the Registrar of Companies or legal professionals; informal accounts or none; 5 or less paid employees; expenditure not easily distinguishable from household ones; enterprise often temporary or mobile or in owner’s home” (Central Statistics Office, 2009). Under this definition, all workers in central and local government, parastatals, non-government organizations, private households, and private firms with more than 10 workers are defined as working in formal organizations. Workers in private firms with 10 or fewer workers are classified by the enumerator as either being in a formal or informal business based on four questions: location (permanent; on a footpath, street or open space; market; in someone’s home; or no fixed location), how many workers are paid versus unpaid within the firm, whether the firm is a registered company or is registered with a professional organization, and whether the firm keeps a complete set of accounts. This leaves some discretion for the enumerator as a firm may not keep complete accounts, but could be a registered company or the firm could not be registered but keeps complete accounts and most of its (10 or fewer workers) are paid employees.

For individuals that did not work or were not temporarily absent during the past 7 days, they were asked whether they were available for work during the past 7 days. We exclude

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<sup>12</sup>Both labor force surveys report industry of work using the Botswana Standard Industrial Classification (BSIC), which is adapted from the International Standard Industrial Classification, revision 3.

non-working individuals that reported being unavailable to work since the questionnaires did not ask these individuals about their previous industry of work and hence we have no industry tariff to match with these individuals. Among individuals that were available to work, but did not, we create two definitions of unemployment. The first definition, narrow unemployment, is based on being available to work and trying to find work in the past 30 days. Our second definition, broad unemployment, includes individuals that were available to work, but did not report trying to find work during the past 30 days. Among individuals that were available to work, but did not seek work, the most commonly reported reason was that they thought there was no work available. We focus on unemployed individuals that had previously worked and report the industry of their most recent job.

Table A1 in Appendix A provides summary statistics for employed individuals. We have 977 and 631 workers in manufacturing, 1,614 and 935 workers in mining and manufacturing, and excluding workers in agriculture, we have 8,895 and 6,587 observations in 1995/96 and 2005/06 respectively. Table A2 provides summary statistics for unemployed individuals based on the industry of their most recent job. Within manufacturing, unemployed individuals are younger, on average, than employed individuals. They are also more likely to be female.

We report industry summary statistics in Table A3. We have 5 industries within mining and quarrying and 27 industries in manufacturing for a total of 32 traded industries. The table reports the share of economy-wide employment within each traded industry and for non-traded industries aggregated together. Within traded industries, the largest are clothing, diamond mining, and copper or nickel mining. The share of workers in traded industries fell between 1995/96 and 2005/06.

The timing of the initial labor force survey is after SACU trade liberalization had already started in 1994 (Cassim *et al.* (2004), Edwards (2005)). As such, any adjustment that had already taken place by the time of the 1995/96 LFS will be missed in our estimates. We thus view our estimates as a lower bound of the effect by the time of the 2005/06 LFS as we match the 1995 and 2005 tariffs to the 1995/96 and 2005/06 LFSs by industry.

It would be ideal to have an additional labour force survey or population census prior to SACU liberalization as a way to check whether pre-existing trends within Botswana's labor markets are correlated with subsequent industry tariff reductions. Unfortunately, such data

is not available. There is no labour force survey prior to the 1995/96 LFS. Additionally, the 1991 population census used more aggregated industry codes, leaving only 11 manufacturing industries, and the 1981 population census grouped all manufacturing industries together. Hence, data availability is a constraint, as is common in most sub-Saharan countries (Center for Global Development, 2014).

### **3.2 Changes in employment, unemployment, and informality**

We begin by examining the reported activity of working age individuals. Table 1 shows the number and share of individuals according to whether they were working; seeking work; not available to work; or available to work, but did not look for a job during the past 30 days. The estimates are based on the individual's activity during the past 7 days, according to the 1995/96 and 2005/06 labor force surveys, respectively. We focus on individuals between the ages of 15 and 60 inclusive. Over the sample period, the labor force participation rate increased by 8.5 percentage points as the number of working age individuals increased by 24 percent and the number of individuals not in the labor force remained roughly constant. Among labor force participants, the share of those actively seeking work fell from 22 percent to 19 percent. However, the share of the working age population who reported that they were available to work but did not work during the past 30 days (discouraged workers) increased from 10.9 to 13.9 percent. If we count both those actively seeking work and discouraged workers, the share of the working age population that is unemployed is very high in both periods at 23.3 and 26.0 percent, respectively.

HIV prevalence is extremely high in Botswana. Using Botswana's AIDS survey and correcting for selection bias, Levinsohn and McCrary (2010) estimate prevalence rates to be around 17 percent. According to UNAIDS, the prevalence among working age individuals is much higher, at close to 40 percent. Contrary to our expectations, illness does not seem to be a major determinant of labor force participation. The share of the population reporting that they were not in the labor force due to illness increased only marginally from 3 percent in 1995/96 to 3.4 percent in 2005/06. This may be a testament to the government's aggressive campaign to treat individuals who are HIV positive. With our data, it is impossible to tell. However, given the importance of HIV in Botswana, in our econometric work we control for

the individual characteristics that Levinsohn and McCrary found to be important correlates of HIV status: age, location (urban or rural), and education.

Next, in Table 2 we examine the distribution of workers across sectors. The estimates are based primarily on the current job of the individual, but for agriculture we also report estimates based on the usual job over the past 12 months because of the seasonality of agricultural employment (recall that the surveys were conducted across 12 months). Additionally, for the workers usually working in agriculture, we report the number of seasonal and non-seasonal workers. An agricultural worker is defined as seasonal if the worker reported working less than 52 weeks and reported working on their own/family lands/cattlepost (hereafter referred to as own lands) for their usual job. In contrast, a non-seasonal agricultural worker reported working all 52 weeks in the sector. The distinction between the individual's usual and current job is crucially important in agriculture. It is immediately obvious that the two definitions yield very different trends in estimates of the number of workers in agriculture. The number of current workers in agriculture grew by 182 percent, while the number of usual agricultural workers grew by only 19 percent. The most likely explanation for these differences has to do with the timing of interviews. More households were surveyed during the lean season in 1995/96 than in 2005/06. As a result, in section 4 we focus our empirical analysis on non-agricultural workers.

Outside of agriculture, as reported in Panel A, there were some important changes in the distribution of workers across sectors. The share of workers in public administration and construction fell appreciably, while the number of workers in wholesale and retail trade, hotels, restaurants, etc.; and finance, insurance, real estate, and business services increased. The remaining sectors experienced only marginal changes in their shares of the non-agricultural workforce. In the context of the SACU tariff cuts, it is interesting to note that the share of workers in manufacturing fell, but only by 0.6 percentage points, and the share of workers in mining fell by 1.4 percentage points or 27 percent.

In Table 3, we return to the issue of unemployment and labor force participation by various segments of the working age population. We report these rates for males and females, urban and rural workers, by age (30 or younger and older than 30), and by education levels. We find significant differences across groups. For example, males are less likely to be

unemployed and more likely to be in the labor force than females in either year, although both genders significantly increased their labor force participation rates between 1995/96 and 2005/06. Urban individuals have a higher rate of narrow unemployment than rural individuals and the gap has grown to 5.4 percentage points by 2005/06. Urban individuals are also more likely to be participating in the labor force, although the gap has shrunk considerably over time. There is not much difference in either unemployment or labor force participation rates across individuals with primary or secondary education. However, having some education, as compared to no formal education, is an important determinant of employment status. Lastly, older workers have a higher rate of labor force participation and lower rates of both narrow and broad unemployment than younger workers.

An additional concern about the SACU tariff cuts, aside from displacement and unemployment, is the movement of workers into informal firms. The labor force surveys define informality according to a series of questions related to the ownership sector (e.g., government, parastatal, NGO, or private), the number of workers in the business, the location of the business, whether the business is registered, and whether the business keeps a complete set of accounts. The enumerator evaluated whether the worker's place of work was formal or informal based on these questions.<sup>13</sup> Note that the questions about location, business registration, and accounts were only asked for workers in businesses with 10 or fewer workers in the private sector. Consequently, for all workers that were not asked the detailed questions related to formality, we classify them as formally employed as they either worked in large private firms or in sectors more likely to be formal (e.g., government, parastatal, or NGOs). This definition of informality is thus based on the status of the business, not on whether the business conforms to existing labor legislation. Furthermore, the definition of an informal business, based on a combination of ownership type, employment size, registration status, and account keeping, is consistent with those from other countries. For example, La Porta and Shleifer (2008, 2014) define a business as informal based on its registration status. In Vietnam, an informal firm is one that is not registered with the central government as an enterprise under Vietnam's Enterprise Law. Vietnamese domestic private businesses are not required to register with the government if they have less than 10 workers and do not operate

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<sup>13</sup>See questions 24 through 30 in the 1995/96 LFS and questions 34 through 39 in the 2005/06 LFS.

in more than one location (McCaig and Pavcnik (2018)). And in India, manufacturing firms are legally required to register with the government if they have 10 or more workers and use electricity or if they have 20 or more workers, but don't use electricity (Nataraj (2011)).<sup>14</sup>

We use this employer-based definition of informality to report on the incidence of informal work by major sector in Table 4. Overall, the percentage of work in informal firms has increased by 4.8 percentage points or 36 percent, a very significant increase. Importantly, the incidence of informality in the manufacturing sector increased by 4.3 percentage points, which is slightly below the overall increase, but may be partially related to the SACU tariff cuts. We explore this possibility in Section 4.3. Many sectors experienced an increase in the share of workers in informal firms. In fact, the only sector to experience a decrease was community, social, household, and personal services.

In summary, the share of individuals working increased between 1995/96 and 2005/06, however the share of discouraged workers also increased. At an aggregate level, employment in manufacturing fell slightly, by 0.6 percentage points, but the share of informal workers in manufacturing increased significantly, by 4.3 percentage points from 27 percent in 1995/96. In section 4, we explore whether these changes are related to SACU tariffs reductions.

## 4 SACU trade liberalization and labor market adjustment in Botswana

### 4.1 Endogeneity of SACU tariff cuts

Before estimating the impacts of SACU trade liberalization on labor markets in Botswana, we address possible concerns about the endogeneity of the tariff reductions. As shown in Figure 1, the size of the tariff reductions were closely related to the initial tariff level. Furthermore, as previously discussed, Botswana had no ability to influence the size of the tariff reductions due to South Africa dominating trade policy within SACU. Nonetheless, it is still possible that the size of the tariff reductions may vary with conditions across industries in Botswana.

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<sup>14</sup>Note that this definition of informality differs from many papers in the trade and informality literature that focus on workers in formal firms and define informal employment as failure to comply with labor legislation (see Goldberg and Pavcnik (2003), Paz (2014), and Dix-Carneiro and Kovak (2019) among others).

To explore this possibility, we estimate the following equation:

$$\Delta \ln(1 + \text{tariff}_j) = \alpha + \beta X_j + u_j \quad (1)$$

where  $\Delta \ln(1 + \text{tariff}_j)$  is the change in  $\ln$  tariff in industry  $j$  and  $X_j$  is a vector of initial conditions in industry  $j$ . We calculate the following initial conditions from the 1995/96 labor force survey: the share of workers within the industry that work in informal firms, the share of young workers (30 years and less), the share of urban workers, the share of highly educated workers (completed at least junior secondary), and the industry's share of total employment.

We report the results in Table 5 for manufacturing and traded (mining and manufacturing together), and for both sets of industries, but omitting clothing. We find that some of the initial conditions have a statistically significant relationship with the tariff reductions. Specifically, industries with a higher share of workers in informal firms and industries with a greater share of individuals attached to it (either currently working or most recently employed in the industry) experienced greater tariff reductions. Although the coefficient is not statistically different from 0, industries with a greater share of attached individuals that were unemployed also experienced larger tariff decreases. The employment share is a particularly strong predictor of the size of the tariff cut within manufacturing. The finding that initial conditions are correlated with subsequent tariff cuts is common in the literature. For example, Goldberg and Pavcnik (2005) find that the initial share of skilled workers is correlated with subsequent tariff reductions in Columbia. Topalova and Khandelwal (2011) find that the initial share of nonproduction workers is correlated with the size of industry tariff reductions in India.<sup>15</sup>

In our context, the results are significantly weaker when clothing is excluded from the analysis, as shown in columns 3 and 4. Clothing is a very important industry in this analysis for two reasons. First, it is a very large industry in terms of employment, representing 25 percent of manufacturing employment and 15 percent of mining and manufacturing employ-

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<sup>15</sup>Although many papers do not report results for testing whether change in trade policy or trade flows are correlated with initial conditions, it is very common in the literature to include initial conditions as controls in subsequent regression analysis due to concerns about correlations with initial conditions. Examples of papers that include initial conditions as controls include Topalova (2010), McCaig (2011), Autor *et al.* (2013), and Costa *et al.* (2016).



ment in 1995/96. Second, it is the industry that experienced the largest tariff reduction (Figure 1). These two features make it a very influential observation.

Furthermore, clothing is an important industry for a second reason. The 2000 U.S. African Growth and Opportunities Act (AGOA) led to duty free U.S. imports from numerous Sub-Saharan African countries, including Botswana.<sup>16</sup> Botswana’s clothing exports to the U.S. rose by almost 700 percent between 2000 and 2005, from 8.9 to 61.7 million USD.<sup>17</sup> Hence, in our labor market analysis we will check the robustness of our results controlling for the influence of AGOA on the clothing industry.

## 4.2 SACU trade liberalization and industry employment

Traditional trade theory predicts that workers should reallocate across industries in response to changes in tariffs. In particular, the industries that received the largest tariff cuts should contract. We begin our formal analysis of the labor market consequences of SACUs trade liberalization by looking for evidence of worker reallocation across industries in response to tariff changes. We estimate the following regression model:

$$s_{jt} = \beta \ln(1 + \text{tariff}_{jt}) + \theta D_{2005} X_{j1995} + \lambda_j + \eta_t + u_{jt} \quad (2)$$

where  $j$  indexes industries,  $t$  indexes time (i.e., 1995/96 and 2005/06),  $s_{jt}$  is the share of the workforce working in industry  $j$  at time  $t$ ,  $\text{tariff}_{jt}$  is the SACU tariff in industry  $j$  at time  $t$ ,  $D_{2005} X_{j1995}$  is a dummy for 2005 interacted with a vector of initial industry conditions,  $\eta_t$  is a time fixed effect, and  $\lambda_j$  is an industry fixed effect. The vector of initial industry conditions is the same as in Table 5 and includes the share of workers within the industry in informal firms, the share of individuals affiliated with the industry that are male, 30 and younger, urban, have finished junior secondary, are (broad) unemployed, and the share of individuals affiliated with the industry. We are interested in the coefficient on tariff. Our identifying variation is changes in tariffs over time within an industry. Thus, we are identifying whether industries that experienced larger tariff cuts either grew or shrunk in comparison to industries that

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<sup>16</sup>See Frazer and Van Biesebroeck (2010) and Rotunno *et al.* (2013) for analysis of the causal effects of AGOA on trade flows.

<sup>17</sup>Authors’ calculation based on data from UNComtrade.

received smaller tariff cuts, conditional on initial industry conditions. Conventional trade theory predicts that the industries that experienced the largest tariff cuts should experience a reduction in the share of workers and thus that the coefficient on tariff,  $\beta$ , should be positive.

We estimate equation (2) for manufacturing, traded, and for all industries (excluding agriculture). For non-traded industries, we assign a tariff of 0 in both 1995/96 and 2005/06. With the inclusion of industry fixed effects, this implies that identification for non-traded industries is based on no change in the tariff.

Table 6, Panel A presents the results from estimating equation (2). For manufacturing, the coefficient is negative, suggesting an increase in employment shares in response to SACU liberalization, but the implied magnitude is very small and the coefficient is not statistically different from 0. In column 2, the coefficient is also negative, suggesting an increase in employment share in response to the SACU tariff reductions, but again the implied magnitude is very small and the coefficient is not statistically different from 0. Lastly, in column 3 for all industries (excluding agriculture), the coefficient is positive and statistically different from 0, suggesting that employment in traded industries shrunk relative to non-traded industries in response to SACU liberalization.

In Panels B and C of Table 6 we explore how sensitive our results are to the clothing industry. In Panel B we add an AGOA indicator variable as an additional control variable. This variable is 1 for the clothing industry in 2005/06 and 0 for all other observations. In Panel C we remove the clothing industry from the analysis. Recall that the clothing industry is the largest manufacturing industry in terms of employment, accounting for 25 percent of manufacturing workers in 1995/96. Additionally, as previously discussed, the clothing industry was subject to other large trade policy changes during this time period, specifically the African Growth and Opportunities Act. Given the size of the clothing industry and the clothing-specific effect of AGOA, it makes sense to explore how sensitive our results are to the inclusion of clothing. In both Panels B and C, the coefficients are smaller in magnitude than in Panel A for manufacturing and mining. For all industries, the estimates in Panels B and C are very similar to that in Panel A, again suggesting a relative expansion of the non-tradable sector in response to SACU tariff cuts. Lastly, note that the AGOA indicator

is positive in columns 1 and 2, suggesting an expansion in the relative size of the clothing industry, as one would expect from AGOA.

In summary, there is little evidence of a systematic reallocation of workers across traded industries in response to the SACU tariff cuts, but some evidence of relocation to non-traded industries.<sup>18</sup> These results are consistent with a lack of reallocation across industries in response to domestic trade liberalization in developing countries surveyed by Goldberg and Pavcnik (2007) and more recently found by Topalova (2010) in the case of India’s trade liberalization in the early 1990s, Dix-Carneiro (2014) for Brazil’s trade liberalization in the late 1980s and early 1990s, and McCaig and Pavcnik (2018) in Vietnam in the early 2000s in response to reductions in a trading partner’s tariffs (i.e., export market liberalization).

### 4.3 SACU trade liberalization and workers

Although the tariff changes do not appear to have substantially affected the distribution of workers across industries, it may be the case that there have been important within-industry changes. For example, workers could have become unemployed, moved to informal firms, changed hours worked, or experienced changes in pay. We explore whether there is evidence of changes in worker outcomes in response to the SACU tariff cuts using the following regression model:

$$Y_{ijt} = \beta \ln(1 + \text{tariff}_{jt}) + \delta Z_{ijt} + \theta D_{2005} X_{j1995} + \lambda_j + \eta_t + u_{ijt} \quad (3)$$

where  $j$  indexes industries,  $t$  indexes time (i.e., 1995/96 and 2005/06),  $Y_{ijt}$  is an outcome variable for worker or individual  $i$ ,  $\text{tariff}_{jt}$  is the SACU tariff in industry  $j$  at time  $t$ ,  $Z_{ijt}$  is a vector of individual characteristics (age, male indicator, urban indicator, finished primary, finished junior secondary, finished senior secondary),  $D_{2005} X_{j1995}$  is a dummy for 2005 interacted with a vector of initial industry conditions (the same as used previously in Tables 5 and 6),  $\lambda_j$  is an industry fixed effect, and  $\eta_t$  is a time fixed effect.

We are interested in the coefficient on tariffs. Our identifying variation is changes in

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<sup>18</sup>We get very similar results if we use the share of individuals affiliated with an industry, which includes both workers and unemployed individuals, as the dependent variable. These are available from the authors on request.

tariffs over time within an industry, conditional on controlling for observable individual characteristics and initial industry conditions. Controlling for initial industry conditions is important in this context due to their correlation with SACU tariff reductions. Failing to directly control for them would then imply that the SACU tariff cuts are partially picking up any effects related to initial differences in industry size and composition.

**Unemployment** We begin by examining two definitions of unemployment. The first is based on workers that were available to work and sought work. The second is broader and includes individuals that were available for work but did not seek employment. In both cases, our sample includes individuals that are actively working and individuals that are defined as unemployed according to the respective definition. For individuals that are currently working, their industry is that in which they are currently working, but for unemployed individuals, their industry is that in which they most recently worked.

In Table 7, we report regression results from estimating (3) for manufacturing, traded (mining and manufacturing), and all industries (excluding agriculture). As before, we explore the sensitivity of our results to the clothing industry. Within manufacturing, column 1, we consistently find a small, statistically insignificant effect on unemployment. Adding mining to the sample (column 2) causes the estimate to become negative and to increase in magnitude, but it remains statistically insignificant in all three panels. Using the estimate from Panel A, the magnitude of the coefficient for the manufacturing and mining sample is relatively large and suggests that the average reduction in manufacturing tariffs,  $-0.107$ , is associated with a 1.6 percentage point increase in the likelihood of narrow unemployment, but the coefficient is estimated imprecisely, limiting our ability to draw firm conclusions. For all industries (column 3), the coefficient is also negative, but is smaller in magnitude.

In Table 8, we report results for estimating equation (3) with an expanded definition of unemployment. We include unemployed individuals that sought work as well as unemployed individuals that did not seek work (i.e., discouraged). Across all specifications, the effects are noticeably larger than in Table 7, but are typically not statistically different from 0, especially once we control for the effects of AGOA (Panel B) or remove clothing (Panel C). As in Table 7, the results within manufacturing suggest a reduction in unemployment in association with SACU tariff reductions. Using the estimate from Panel B, the magnitude of the coefficient for

manufacturing suggests a 2.4 percentage point decrease in unemployment, broadly defined, due to the mean tariff cut (-0.107), although the estimate is imprecisely estimated and not statistically different from 0. The results in columns 2 and 3 are qualitatively similar to those for narrow unemployment.<sup>19</sup>

In summary, our results examining the effects of SACU liberalization on unemployment are suggestive of a decrease in unemployment within manufacturing and an increase in unemployment in traded industries. However, in both cases the results are imprecisely estimated and not generally statistically different from 0. Our results of a possible increase in unemployment are consistent with those reported for Brazil. Menezes-Filho and Muendler (2011), Gaddis and Pieters (2017), and Dix-Carneiro and Kovak (2019) report that Brazil’s domestic trade liberalization was associated with a rise in non-formal employment (i.e., a rise in informal employment, unemployment, or non-participation). In South Africa, Erten *et al.* (2019) find evidence of an increase in unemployment in local labor markets in response to SACU trade liberalization. However, our results differ from Hasan *et al.* (2012) who report no increase in unemployment in India in response to domestic trade liberalization in the 1990s. The difference between contexts likely has to do with overall labor market policies and institutions. Botswana, South Africa, and Brazil have much higher rates of unemployment than India. For example, Dix-Carneiro and Kovak (2019) report mean non-employment (unemployed plus not participating in the labor force) rates of 36 to 40 percent across Brazilian regions and Erten *et al.* (2019) report broad unemployment rates of 23 percent for South Africa, while Hasan *et al.* (2012) report unemployment rates between 4.1 and 5.6 percent across Indian states. Botswana’s unemployment and non-employment rates are more similar in magnitude to those in Brazil and South Africa, suggesting that unemployment is, more generally, a common outcome and thus more likely to be an adjustment margin in response to domestic trade liberalization.

**Work in informal firms and self-employment** We next explore margins of adjustment among workers. Recent work has highlighted the role of trade in the reallocation of

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<sup>19</sup>In Tables A4 and A5, we provide disaggregated results for our two definitions of unemployment based on individual characteristics. We estimate the same model as in Panel C of Tables 7 and 8 respectively. In most of these comparisons, cautious interpretation should be given to the differences among workers due to the large standard errors.

workers between informal and formal firms (McCaig and Pavcnik (2018) and Dix-Carneiro and Kovak (2019)). In Table 9, Panel A, we report the estimation of equation (3) using an indicator for working in an informal firm as the dependent variable. We find evidence of an increase in the prevalence of work in informal firms within manufacturing in response to the tariff reductions. The implied magnitude is large, a 7.8 percentage point increase in the prevalence of working in an informal firm in response to the average tariff reduction within manufacturing. However, the result is imprecisely estimated and not statistically different from 0. In columns 2 and 3 of Panel A, the estimate is very close to 0.

In Panel B, we add an indicator for AGOA. We find that AGOA is associated with a reduction in informality within clothing. Controlling for this influence leads to an increase in the magnitude of the coefficient on SACU tariffs relative to Panel A. The coefficient for manufacturing suggests a 8.0 percentage point increase in the prevalence of working for an informal firm in response to the mean tariff reduction within manufacturing (-0.107). The inclusion of mining in column 2 leads to a smaller effect but it is still statistically different from 0. Lastly, in column 3, the effect is again smaller than within manufacturing, but is statistically different from 0. The smaller effects in mining and non-traded industries is likely due to the lack of informal businesses in mining and the lower overall prevalence of such work in some large non-traded industries, such as public administration (Table 4).

We check the sensitivity of our results to removing clothing from the specification and report the results in Panel C of Table 9. The estimated coefficients are very similar to those in Panel B, both in magnitude and statistical significance.<sup>20</sup>

The estimates of an increase in informality due to SACU tariff reductions are consistent with evidence from Colombia and Brazil where domestic trade liberalization was associated with an increase in informality (Goldberg and Pavcnik (2003), Bosch *et al.* (2012), Paz (2014), and Dix-Carneiro and Kovak (2019)).<sup>21</sup> However, those studies primarily focus on a

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<sup>20</sup>In Table A6, we estimate equation (3) for various subsamples of workers. We report specifications that include initial industry characteristics interacted with time fixed effects and we exclude clothing.

<sup>21</sup>Goldberg and Pavcnik (2003) find an increase in informality within industries in Colombia due to trade liberalization, but only prior to a major labor market reform. However, in Brazil, they find no effect on informality within industries. This is in contrast to Bosch *et al.* (2012) that do find an increase in informality within industries in Brazil. Dix-Carneiro and Kovak (2019) construct regional measures of informality and exposure to trade liberalization in Brazil. Paz (2014) also studies Brazil's trade liberalization, but defines informality based on the payment of payroll taxes as compared to having a signed work card as in the other

definition of informality that is based on employment conditions for workers within formal firms and focus only on workers in formal firms. Our definition of informality is based on the registration and size of the business and more closely aligns with the definition used by McCaig and Pavcnik (2018). They find a reduction in informal employment in response to new export opportunities. The difference in effects of changes in trade policy are likely due to the positive nature of the export demand shock studied by McCaig and Pavcnik (2018) as compared to domestic trade liberalization in Botswana. This is consistent with a recent survey by Goldberg and Pavcnik (2016) that highlights how the nature of trade policy changes matters.

Since the definition of an informal firm varies across countries, we provide a robustness check based on self-employment. In particular, we focus on the distinction between paid employment and self-employment. Information on whether a worker is self-employed or working in wage employment is more widely available in household and labor force surveys in developing countries and McCaig and Pavcnik (2018) show that employment in an informal business is highly correlated with self-employment in Vietnam. We find that working in an informal business is highly positively correlated with self-employment in Botswana as well. The correlations are 0.82, 0.84, and 0.73 in manufacturing, traded, and all industries, respectively. Thus, using an indicator for self-employment is both a useful check on the sensitivity of our results to the particular definition of an informal firm in Botswana and facilitates comparisons with other low- and middle-income countries.

In Table 10, we report results from estimating equation 3 using an indicator for self-employment as the dependent variable. The specifications mimic those in Table 9. Within manufacturing, we consistently find that the SACU tariff cuts are associated with an increase in the prevalence of self-employment within an industry. The estimates are larger than those reported in Table 9 in terms of magnitude. The results in Panel C suggest an increase in self-employment of 11.7 percentage points within an industry that experienced the mean tariff reduction in manufacturing as compared to no reduction. The effects are largest within manufacturing. Self-employment within mining is unobserved in our data, which is likely why the magnitude is lower once mining industries are added to the regression.

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Brazil studies.

We can further disaggregate self-employment into self-employment with employees, without employees, and as an unpaid family helper. These results are reported in Tables A7 through A9 in Appendix A. We find that more than half of the increase in self-employment due to SACU trade liberalization occurred within unpaid family help. The combination of self-employment with employees and unpaid family help accounts for over three quarters of the SACU induced increase in self-employment. These results are remarkably consistent with the informality results, suggesting that the particular definition of an informal business in Botswana is not driving the results.

**Hours worked** The analysis thus far has focused on extensive margins of adjustment: changes in unemployment and changes in the type of job (working for an informal business and self-employment). In this subsection we explore whether hours worked were affected by SACU trade liberalization.

In Table 11 we report estimates of equation (3) with  $\ln$  of actual hours worked during the past week as the dependent variable. The results for manufacturing consistently suggest a decrease in weekly hours worked. The estimate in Panel A suggests a decrease in weekly hours of 8.7 percent in response to the mean tariff reduction within manufacturing. The same pattern emerges once mining is included, particularly once clothing is controlled for. Once non-traded industries are added to the analysis (column 3), the estimate is much smaller.

The reduction in weekly hours worked is partially driven by the shift of workers into informal firms as workers in informal firms work fewer hours on average. For example, within manufacturing in 1995/96, the mean number of weekly hours was 35.9 and 43.6 hours in informal and formal businesses, respectively. This is confirmed in Table 12 which repeats the previous specifications, adding an indicator for working in an informal firm as a control variable. The coefficient on informal is consistently negative, suggesting a decrease in hours of between 17 and 21 percent across the various specifications. Moreover, the coefficient on tariffs falls by about 0.2  $\ln$  points when the informal control is added relative to Table 11. This suggests the shift of workers into informal firms is partly responsible for the decrease in weekly hours in response to the SACU tariff cuts.

**Monthly income** Lastly, we report results using  $\ln$  monthly gross income from paid employment as the dependent variable. This includes both cash and the value of in kind



payments. We present the results in Table 13. The specifications follow the same pattern as in previous tables. The results for manufacturing suggest a decrease in monthly income, although the coefficient is not very precisely estimated and is not statistically different from 0. Nonetheless, the suggested magnitude of the effect remains large. For example, the coefficient on tariffs in panel A for manufacturing suggests a reduction in monthly income of 9 percent in response to the mean tariff reduction. However, when we add workers in mining to the sample, the coefficient switches sign. Recall that mining industries, on average, experienced very small tariff reductions (Table A3, Figure 1). Hence, the change in the coefficient from column 1 to 2 implies that workers in mining experienced slower wage growth than workers in manufacturing industries that experienced small tariff reductions.

## 5 Conclusion

We study the impact of trade liberalization on workers in Botswana. A unique feature of Botswana's trade liberalization is that it was driven by South Africa's control of the external trade policy of the Southern Africa Customs Union. This provides an excellent context for exploring causal effects since it decreases the likelihood that tariff reductions were influenced by factors within Botswana.

The evidence presented in this paper indicates that SACU's trade liberalization had little impact on the allocation of employment across industries in Botswana. This is consistent with existing trade and labor market adjustment studies that generally find little or no changes in industry size in developing countries in response to domestic trade liberalization.

We find mixed evidence that the SACU tariff reductions impacted the prevalence of unemployment within industries. The results suggest a decrease in unemployment within manufacturing, but an increase once mining industries are added to the analysis. However, although the implied increase in unemployment is large, the results are imprecisely estimated and not statistically significant. The prevalence of working in an informal business increased within manufacturing due to SACU liberalization, as did the prevalence of self-employment. We further find that weekly hours decreased and that this is driven in part by the increase in work in informal businesses, as these workers report working fewer hours on average.

Lastly, we find evidence of a decrease in monthly income in manufacturing due to SACU liberalization, but despite large coefficients, the results are imprecise and not statistically different from 0.

The lack of statistically significant results is commonly the outcome of large standard errors, not of estimates that are quantitatively close to 0. This highlights the need for either larger labor force surveys in terms of sample sizes or more frequent labor force surveys to help derive more definitive results. This echoes concerns about the lack of data for a large number of Sub-Saharan African countries.

The reallocation of workers out of formal firms and into informal firms and unemployment may have important consequences for labor productivity, particularly within manufacturing, the most impacted sector. A growing literature documents that informal firms are typically much less productive than formal firms. Thus, the movement of workers away from formal firms to informal firms is likely associated with a decrease in aggregate labor productivity.

The results on unemployment, working in an informal business, and self-employment add to the more recent literature on labor market adjustment to trade in developing countries. In particular, there is scant evidence on the effects of trade liberalization on unemployment within industries in developing countries due to the lack of data in household or labor force surveys on the previous industry of employment (Goldberg and Pavcnik (2007), Hasan *et al.* (2012)). Additionally, this is one of the first papers to study the impact of trade liberalization on labor markets in Sub-Saharan Africa, with Erten *et al.* (2019) being the notable exception.

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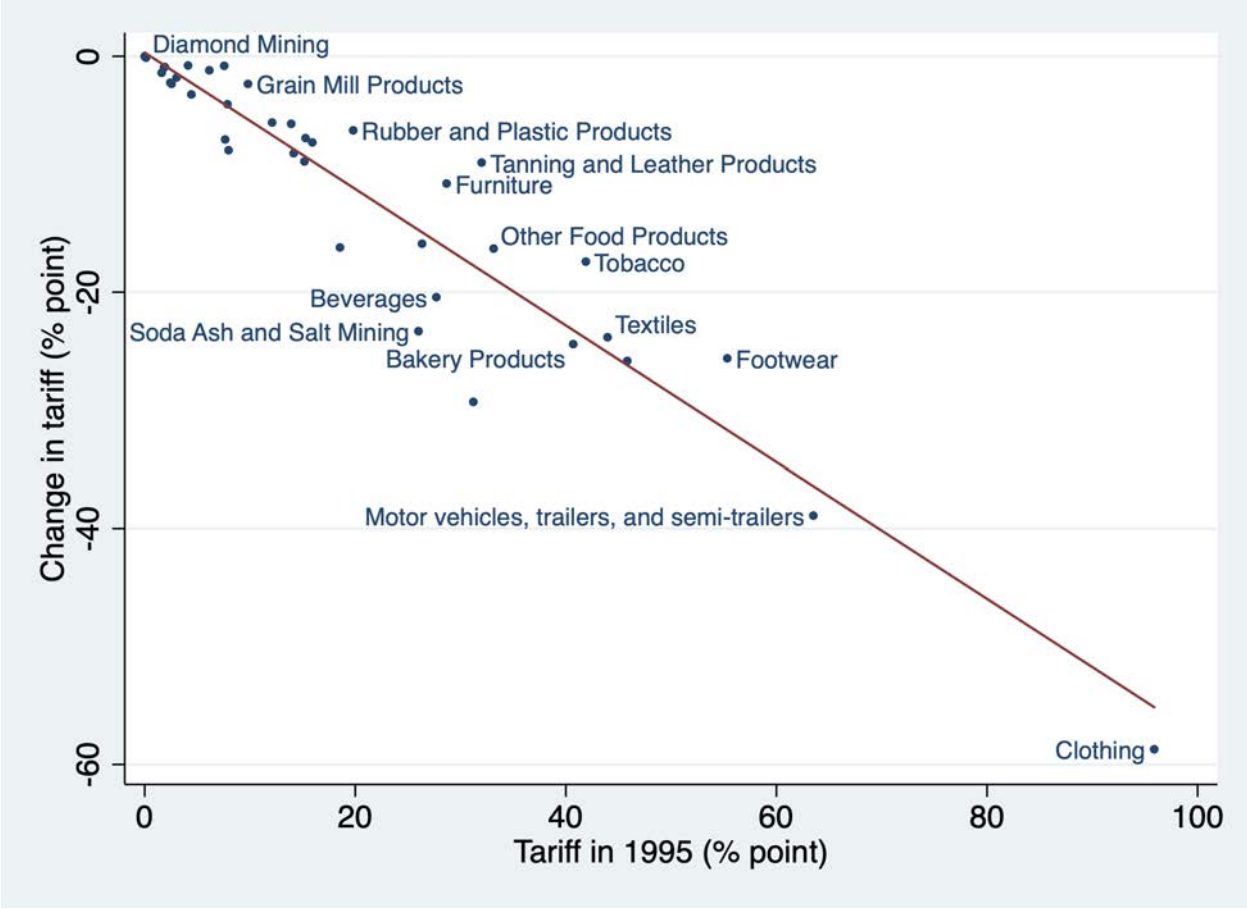


Figure 1: Change in industry tariff versus initial tariff

Table 1: Economic activity of the working age population

	Number of individuals		Percentage of individuals	
	1995/96	2005/06	1995/96	2005/06
Total	743,403	920,646	100	100
In labour force:	415,251	592,993	55.9	64.4
Working	323,034	481,409	43.5	52.3
Actively seeking work	92,217	111,584	12.4	12.1
Not in labour force:	328,152	327,653	44.1	35.6
Not available to work	247,073	199,610	33.2	21.7
Attending school	109,821	109,904	14.8	11.9
Engaged in household duties	101,658	38,915	13.7	4.2
Too old	876	1,798	0.1	0.2
Sick	22,570	31,523	3.0	3.4
Disabled	5,826	4,101	0.8	0.4
Other	6,322	13,368	0.9	1.5
Available but did not look for work	81,079	128,043	10.9	13.9
Thought no work available	41,409	61,101	5.6	6.6
Awaiting reply for earlier inquiries	6,089	9,037	0.8	1.0
Waiting to start arranged job	2,598	3,142	0.3	0.3
Occupied with household duties	25,989	37,331	3.5	4.1
Other	4,994	17,432	0.7	1.9

*Note:* The sample is restricted to individuals aged 15 to 60. The numbers reported are population estimates based on using sampling weights. The estimates are based on the individual's activity during the past 7 days.



Table 2: Distribution of workers across major sectors

	Number of workers		Percentage of workers	
	1995/96	2005/06	1995/96	2005/06
<i>Panel A: Non-agriculture</i>				
Public Administration	99,526	114,850	35.6	31.8
Foreign missions and international organizations	224	895	0.1	0.2
Mining and quarrying	15,028	14,289	5.4	4.0
Manufacturing	27,899	34,076	10.0	9.4
Electricity, gas, and water supply	2,794	4,132	1.0	1.1
Construction	38,759	26,473	13.9	7.3
Wholesale and retail trade, hotels, restaurants, etc.	51,973	85,416	18.6	23.7
Transport, storage, and communication	7,644	15,904	2.7	4.4
Finance, insurance, real estate, and business services	11,379	30,333	4.1	8.4
Community, social, household, and personal services	24,572	34,349	8.8	9.5
Total	279,798	360,718	100.0	100.0
<i>Panel B: Agriculture</i>				
Current	42,760	120,691		
Usual	120,926	143,746		
Non seasonal	28,862	44,086		
Seasonal	92,064	99,660		

*Source:* Authors' calculations using 1995/96 and 2005/06 LFS data.

*Notes:* The sample is restricted to individuals aged 15 to 60. The estimates reported are population estimates based on using sampling weights. The estimates are based on the individual's activity during the past 7 days. The number of agricultural workers is based on the individual's usual job and only includes individuals who reported doing some work on their own land/farm/cattlepost as usual job. The total number of workers in 1995/96 differs from Table 4 (on labor force) since there were 476 individuals with undefined industry. Non-seasonal agricultural workers are those who reported working all 52-weeks of the year and reported the sector as their usual sector of employment. Seasonal agricultural workers are those who reported not working all 52-weeks of the year and reported the sector as their usual sector of employment.

Table 3: Unemployment and labor force participation rates

	Narrow Unemployment		Broad Unemployment		Labor Force	
	Rate (%)		Rate (%)		Participation Rate (%)	
	1995/96	2005/06	1995/96	2005/06	1995/96	2005/06
All	22.2	18.8	29.4	28.8	55.9	64.4
Males	20.1	16.6	25.9	23.1	62.9	71.9
Females	24.5	21.0	33.0	33.7	49.7	58.3
Urban	22.8	21.0	24.9	28.0	64.5	65.5
Rural	21.4	15.6	34.8	30.0	47.3	62.9
Less than primary	20.4	15.2	31.4	29.4	53.8	63.2
Finished primary	29.0	19.0	34.0	29.4	50.7	58.5
Finished junior secondary	11.6	22.3	15.7	32.6	62.8	61.3
Finished senior secondary	17.8	19.4	20.0	24.3	77.6	77.3
Older than 30	15.0	11.3	23.5	21.7	68.0	75.6
30 years old or younger	29.9	27.5	34.8	35.5	47.0	55.1

*Source:* Authors' calculations using 1995/96 and 2005/06 LFS data.

*Notes:* The sample is restricted to individuals aged 15 to 60. The numbers reported are population estimates based on using sampling weights. The estimates are based on the individual's activity during the past 7 days. The narrow unemployment rate is defined as the ratio of the number of individuals seeking work relative to the sum of the number of workers and individuals seeking work. The broad unemployment rate is defined as the ratio of the number of individuals available to work relative to the sum of the number of workers and individuals available to work.

Table 4: Percentage of workers in informal firms by major sector

	Percentage of informal workers		
	1995/96	2005/06	Change
Public Administration	0.1	0.7	0.5
Foreign missions and international organizations	0.0	0.0	0.0
Mining and quarrying	0.0	0.0	0.0
Manufacturing	27.0	31.3	4.3
Electricity, gas, and water supply	0.0	0.0	0.0
Construction	17.5	26.5	9.1
Wholesale and retail trade, hotels, restaurants, etc.	32.4	41.6	9.3
Transport, storage, and communication	27.0	36.0	9.0
Finance, insurance, real estate, and business services	3.7	6.4	2.7
Community, social, household, and personal services	12.7	9.2	-3.5
Total	13.2	18.0	4.8

*Source:* Authors' calculations using 1995/96 and 2005/06 LFS data.

*Notes:* Sample is persons aged 15 to 60. Informal workers are all those workers in the private sector, employed at firms with less than ten employees and defined as informal in the survey by question 30 in the 1995/96 LFS and question 39 in the 2005/06 LFS. Sample excludes agricultural workers. The numbers reported are population estimates based on using sampling weights. The estimates are based on the individual's activity during the past 7 days.

Table 5: SACU tariff cuts and initial industry conditions

	Manuf. (1)	Traded (2)	Manuf., no clothing (3)	Traded, no clothing (4)
Share informal	-0.103* (0.058)	-0.176** (0.072)	-0.146* (0.074)	-0.211*** (0.071)
Share male	0.068 (0.067)	0.045 (0.074)	0.039 (0.080)	-0.015 (0.080)
Share 30 or younger	-0.057 (0.074)	-0.072 (0.063)	-0.029 (0.081)	-0.034 (0.064)
Share urban	-0.049 (0.092)	-0.112 (0.095)	-0.071 (0.096)	-0.136 (0.097)
Share highly educated	-0.110 (0.195)	-0.080 (0.189)	-0.078 (0.196)	-0.046 (0.192)
Share attached to industry	-0.735*** (0.214)	-0.537 (0.477)	-0.222 (0.279)	0.097 (0.288)
Share (broad) unemployed	-0.136 (0.112)	-0.126 (0.088)	-0.143 (0.106)	-0.121 (0.082)
Observations	27	32	26	31
R <sup>2</sup>	0.515	0.375	0.299	0.273
F	9.652	4.084	6.242	3.927
Prob F	0.000	0.004	0.001	0.006

The dependent variable is the change in  $\ln(1+\text{tariff})$ . Heteroskedasticity robust standard errors are reported in parentheses.  
 \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 6: SACU tariffs and industry employment

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry Tariff	-0.015 (0.059)	-0.024 (0.026)	0.021** (0.009)
Observations	54	64	192
R <sup>2</sup>	0.964	0.976	0.969
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry Tariff	-0.001 (0.058)	-0.002 (0.031)	0.021** (0.009)
AGOA indicator	0.086* (0.049)	0.034* (0.017)	0.000 (0.003)
Observations	54	64	192
R <sup>2</sup>	0.970	0.978	0.969
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry Tariff	-0.001 (0.057)	-0.002 (0.031)	0.021** (0.009)
Observations	52	62	190
R <sup>2</sup>	0.925	0.968	0.968

The dependent variable is the share of workers within an industry in a given year. Standard errors are reported in parentheses and clustered by industry. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The sample is restricted to workers aged 15 to 60. The employment shares are calculated relative to total employment within each year in the indicated industries in each column. All regressions have industry and year fixed effects and initial industry conditions (see Table 5) interacted with a 2005 indicator. The industry tariff is  $\ln(1 + \text{tariff} + \text{surcharges})$ .

Table 7: SACU tariffs and narrow unemployment

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	0.069 (0.385)	-0.148 (0.173)	-0.099** (0.047)
Observations	1917	2934	18167
R <sup>2</sup>	0.046	0.086	0.088
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	0.050 (0.353)	-0.267 (0.243)	-0.094 (0.150)
AGOA indicator	-0.144 (0.169)	-0.077 (0.111)	0.003 (0.055)
Observations	1917	2934	18167
R <sup>2</sup>	0.047	0.086	0.088
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	0.072 (0.358)	-0.267 (0.244)	-0.094 (0.150)
Observations	1417	2434	17667
R <sup>2</sup>	0.050	0.096	0.090

The dependent variable is an indicator for being available to work and seeking as work as opposed to working. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to individuals aged 15 to 60 that were either working or available to work and sought work. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table 8: SACU tariffs and broad unemployment

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	0.241 (0.463)	-0.171 (0.227)	-0.211*** (0.076)
Observations	2105	3185	20336
R <sup>2</sup>	0.058	0.112	0.123
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	0.228 (0.431)	-0.296 (0.306)	-0.147 (0.244)
AGOA indicator	-0.162 (0.169)	-0.082 (0.134)	0.030 (0.089)
Observations	2105	3185	20336
R <sup>2</sup>	0.059	0.112	0.123
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	0.221 (0.419)	-0.304 (0.303)	-0.148 (0.244)
Observations	1546	2626	19777
R <sup>2</sup>	0.061	0.123	0.125

The dependent variable is an indicator for being available to work as opposed to working. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to individuals aged 15 to 60 that were either working or available to work. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table 9: SACU tariffs and work in informal firms

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	-0.726 (0.444)	0.020 (0.182)	0.053 (0.177)
Observations	1608	2549	15417
R <sup>2</sup>	0.330	0.389	0.476
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	-0.743* (0.394)	-0.530** (0.244)	-0.506** (0.223)
AGOA indicator	-0.257* (0.140)	-0.357*** (0.096)	-0.269*** (0.080)
Observations	1608	2549	15417
R <sup>2</sup>	0.331	0.391	0.477
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	-0.686* (0.397)	-0.540** (0.250)	-0.511** (0.222)
Observations	1210	2151	15019
R <sup>2</sup>	0.388	0.455	0.493

The dependent variable is an indicator variable for working in an informal firm. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .



Table 10: SACU tariffs and self employment

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	-1.176* (0.617)	-0.089 (0.240)	0.013 (0.163)
Observations	1608	2549	15417
R <sup>2</sup>	0.355	0.410	0.474
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	-1.186* (0.583)	-0.664** (0.259)	-0.485** (0.222)
AGOA indicator	-0.153 (0.128)	-0.372*** (0.081)	-0.240*** (0.076)
Observations	1608	2549	15417
R <sup>2</sup>	0.356	0.412	0.475
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	-1.092* (0.580)	-0.665** (0.273)	-0.491** (0.221)
Observations	1210	2151	15019
R <sup>2</sup>	0.403	0.471	0.489

The dependent variable is an indicator variable for being self-employed. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table 11: SACU tariffs and weekly hours

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	0.812* (0.427)	0.156 (0.188)	-0.045 (0.063)
Observations	1507	2413	14680
R <sup>2</sup>	0.039	0.061	0.107
<i>Panel B: Baseline specification, AGOA indicator</i>			
Industry tariff	0.833** (0.383)	0.463** (0.222)	0.063 (0.121)
AGOA Indicator	0.208** (0.080)	0.199** (0.078)	0.053 (0.038)
Observations	1507	2413	14680
R <sup>2</sup>	0.039	0.062	0.107
<i>Panel C: Baseline specification, omitting clothing</i>			
Industry tariff	0.822** (0.389)	0.457** (0.221)	0.065 (0.121)
Observations	1142	2048	14315
R <sup>2</sup>	0.045	0.068	0.109

The dependent variable is ln of actual hours worked during the past 7 days. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is ln(1+tariff+surcharges).

Table 12: SACU tariffs and weekly hours controlling for informal work

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	0.638* (0.370)	0.155 (0.160)	-0.046 (0.060)
Informal	-0.214*** (0.067)	-0.219*** (0.064)	-0.211*** (0.047)
Observations	1507	2413	14680
R <sup>2</sup>	0.068	0.089	0.120
<i>Panel B: Baseline specification, AGOA indicator</i>			
Industry tariff	0.653* (0.343)	0.340* (0.194)	-0.052 (0.134)
AGOA Indicator	0.150** (0.066)	0.120 (0.072)	-0.003 (0.044)
Informal	-0.214*** (0.067)	-0.218*** (0.065)	-0.211*** (0.047)
Observations	1507	2413	14680
R <sup>2</sup>	0.069	0.089	0.120
<i>Panel C: Baseline specification, omitting clothing</i>			
Industry tariff	0.689* (0.361)	0.359* (0.199)	-0.046 (0.133)
Informal	-0.169** (0.076)	-0.173** (0.073)	-0.203*** (0.050)
Observations	1142	2048	14315
R <sup>2</sup>	0.062	0.084	0.121

The dependent variable is ln of actual hours worked during the past 7 days. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is ln(1+tariff+surcharges).

Table 13: SACU tariffs and ln monthly income

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	0.861 (1.239)	-0.232 (0.586)	-0.031 (0.246)
Observations	1128	2056	12889
R <sup>2</sup>	0.581	0.693	0.685
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	0.828 (1.305)	-0.655 (0.800)	-0.720 (0.599)
AGOA indicator	-0.418 (0.335)	-0.260 (0.298)	-0.320 (0.208)
Observations	1128	2056	12889
R <sup>2</sup>	0.581	0.693	0.685
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	0.833 (1.317)	-0.659 (0.809)	-0.722 (0.601)
Observations	842	1770	12603
R <sup>2</sup>	0.585	0.679	0.685

The dependent variable is the ln of monthly income from paid employment, including both cash and in kind payments. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60 in paid employment. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is ln(1+tariff+surcharges). Income is the sum of paid employment in their primary or secondary job.

## 6 Appendix

Table A1: Summary statistics for workers

	Manufacturing		Traded		All	
	1995/95	2005/06	1995/96	2005/06	1995/96	2005/06
Age	33.9	33.4	35.1	35.3	34.1	34.6
Male	0.419	0.460	0.591	0.597	0.498	0.487
Did not complete primary	0.340	0.197	0.325	0.210	0.333	0.176
Completed primary	0.472	0.358	0.405	0.335	0.361	0.292
Completed junior secondary	0.107	0.231	0.129	0.202	0.146	0.203
Completed senior secondary	0.081	0.214	0.141	0.253	0.161	0.328
Urban	0.643	0.734	0.762	0.793	0.541	0.755
Weekly hours worked	41.6	42.9	42.9	44.0	41.9	46.0
Informal	0.261	0.292	0.158	0.197	0.119	0.174
Paid employment	0.744	0.680	0.845	0.784	0.889	0.811
Self-employment with employees	0.040	0.063	0.024	0.043	0.025	0.047
Self-employment without employees	0.201	0.200	0.121	0.135	0.077	0.108
Unpaid family helper	0.015	0.057	0.009	0.039	0.008	0.033
Number of observations	977	631	1614	935	8895	6542

The sample is workers aged 15 to 60 outside of agriculture. The reported information is for the individual's primary job with the exception of income, which is the sum of paid employment in their primary or secondary job.

Table A2: Summary statistics for unemployed individuals

	Manufacturing		Traded		All	
	1995/96	2005/06	1995/96	2005/06	1995/96	2005/06
Age	30.0	31.5	33.1	33.8	29.3	29.7
Male	0.317	0.378	0.465	0.469	0.385	0.361
Did not complete primary	0.270	0.172	0.392	0.241	0.369	0.239
Completed primary	0.579	0.475	0.482	0.425	0.479	0.301
Completed junior secondary	0.112	0.176	0.094	0.160	0.060	0.238
Completed senior secondary	0.039	0.176	0.032	0.173	0.092	0.222
Urban	0.595	0.718	0.541	0.697	0.456	0.618
Did not seek work	0.328	0.433	0.351	0.446	0.434	0.514
Number of observations	259	238	342	294	3748	3708

The sample is unemployed individuals aged 15 to 60 outside of agriculture. Includes individuals who did not work despite being available to work, regardless of whether they sought work.

Table A3: Industry summary statistics

	Tariff		Employment		Share (narrow)		Share (broad)		Share		Share	
	percentage point		share		unemployment		unemployment		informal		self-employed	
	1995	2005	1995	2005	1995	2005	1995	2005	1995	2005	1995	2005
Coal Mining	0.0	0.0	0.1	0.1	0.0	19.1	0.0	27.9	0.0	0.0	0.0	0.0
Copper or Nickel Mining	8.0	0.0	2.1	1.6	4.2	7.6	5.5	12.9	0.0	0.0	0.0	0.0
Diamond Mining	0.0	0.0	2.5	1.6	5.3	3.6	10.0	9.9	0.0	0.0	0.0	0.0
Soda Ash and Salt Mining	26.0	2.7	0.2	0.1	14.0	6.3	14.0	6.3	0.0	0.0	0.0	0.0
Gold Mining	1.8	0.9	0.5	0.5	44.5	30.1	56.0	45.0	0.0	0.0	0.0	0.0
Meat and Meat Products	15.3	8.3	1.3	0.5	7.6	15.2	14.0	19.2	2.1	0.0	9.1	0.0
Dairy Products	45.8	20.0	0.2	0.1	6.8	6.5	15.0	6.5	0.0	0.0	6.1	8.5
Grain Mill Products	9.8	7.5	0.6	0.5	3.7	15.1	14.1	20.9	0.0	0.0	0.0	0.0
Bakery Products	40.7	16.3	0.6	0.4	19.8	30.1	27.2	45.9	19.8	23.1	12.6	32.3
Food Products Not Elsewhere Classified	33.1	16.8	0.3	0.0	8.8	34.1	18.8	43.1	37.8	48.0	37.2	48.0
Beverages	27.7	7.3	1.3	1.5	10.4	5.6	16.5	10.3	69.9	76.4	69.8	81.3
Textiles	44.0	20.1	0.5	0.6	18.4	9.1	24.8	26.5	22.3	47.4	20.5	50.5
Clothing	95.9	37.2	2.5	2.2	20.4	22.2	26.2	36.1	33.3	20.4	32.0	23.7
Tanning and Leather Products	32.0	23.0	0.2	0.1	18.8	0.0	20.3	19.7	16.7	45.1	16.7	45.1
Footwear	55.3	29.7	0.0	0.0	43.0	82.9	43.0	85.7	36.6	100.0	36.6	100.0
Wood and Wood Products	13.9	8.2	0.1	0.3	13.4	11.6	20.4	16.9	39.3	36.9	36.6	58.2
Paper and Paper Products	15.9	8.6	0.1	0.1	0.0	38.0	31.9	48.8	0.0	0.0	0.0	0.0
Printing and Publishing	4.1	3.3	0.1	0.2	24.6	21.4	24.6	21.4	18.2	5.8	23.4	6.0
Chemicals and Chemical Products	14.2	5.9	0.1	0.1	17.5	14.0	19.6	36.3	24.1	10.3	24.1	0.0
Rubber and Plastic Products	19.8	13.5	0.1	0.2	22.9	23.0	22.9	28.2	0.0	0.0	0.0	0.0
Non-Metallic Mineral Products	7.9	3.8	0.3	0.7	22.9	18.1	28.5	33.7	21.3	27.1	11.1	27.8
Basic Metals	4.4	1.2	0.2	0.1	11.8	11.0	19.9	11.0	5.0	0.0	27.6	0.0
Fabricated Metal Products	15.2	6.2	0.2	0.7	32.0	16.3	51.2	25.1	17.1	40.9	13.5	40.6
Machinery and Equipment	3.0	1.2	0.1	0.2	7.5	5.0	10.7	5.0	5.6	13.6	5.6	0.0
Office, Accounting, and Computing Machinery	0.0	0.0	0.0	0.1	6.6	0.0	6.6	0.0	0.0	23.4	45.5	0.0
Electrical Machinery and Apparatus	12.1	6.5	0.1	0.2	3.6	18.2	15.3	22.3	0.0	25.9	0.0	42.9
Radio, Television, and Communication Equipment	18.5	2.3	0.1	0.1	0.0	18.2	0.0	35.3	61.6	35.2	61.6	34.2
Medical, Precision, and Optical Instruments	2.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles, Trailers, and Semi Trailers	63.5	24.6	0.0	0.3	0.0	20.3	26.7	20.3	0.0	47.0	0.0	45.4
Other Transport Equipment	1.6	0.2	0.1	0.0	15.6	45.2	15.6	45.2	0.0	0.0	0.0	0.0
Furniture	28.7	17.9	0.4	0.3	22.9	18.7	23.3	30.1	26.1	30.4	22.0	33.0
Manufacturing of Products Not Elsewhere Classified	26.3	10.4	0.5	0.1	18.2	14.6	22.5	14.6	32.7	0.0	30.3	0.0
Non-traded	0.0	0.0	84.7	86.6	21.2	22.2	31.4	37.4	12.4	17.3	11.1	18.7

This table reports summary statistics for each of the subsectors of employment, excluding agriculture. The sample is individuals aged 15 to 60.

Table A4: SACU tariffs and narrow unemployment by worker characteristics

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Males</i>			
Industry Tariff	0.049 (0.360)	-0.264 (0.317)	-0.239 (0.199)
Observations	753	1634	8790
R <sup>2</sup>	0.061	0.137	0.108
<i>Females</i>			
Industry Tariff	0.105 (0.668)	-0.704 (0.447)	0.007 (0.173)
Observations	663	799	8873
R <sup>2</sup>	0.117	0.119	0.091
<i>Rural</i>			
Industry Tariff	2.145*** (0.698)	2.127*** (0.504)	0.377 (0.230)
Observations	493	591	6607
R <sup>2</sup>	0.157	0.184	0.120
<i>Urban</i>			
Industry Tariff	-0.430 (0.378)	-0.442* (0.241)	-0.185 (0.161)
Observations	923	1841	11050
R <sup>2</sup>	0.083	0.129	0.096
<i>Less than complete junior secondary</i>			
Industry Tariff	0.700 (0.733)	-0.215 (0.412)	-0.030 (0.221)
Observations	1003	1611	10787
R <sup>2</sup>	0.073	0.116	0.092
<i>Completed junior secondary</i>			
Industry Tariff	-0.870 (1.181)	0.010 (0.533)	0.411 (0.257)
Observations	204	355	2912
R <sup>2</sup>	0.201	0.209	0.137
<i>30 years or younger</i>			
Industry Tariff	-0.273 (0.500)	-0.760* (0.380)	-0.225 (0.229)
Observations	649	921	7842
R <sup>2</sup>	0.057	0.082	0.071
<i>Older than 30</i>			
Industry Tariff	1.031 (0.634)	0.439 (0.395)	0.122 (0.169)
Observations	767	1512	9821
R <sup>2</sup>	0.083	0.160	0.113

The dependent variable is an indicator for being available to work and seeking work as opposed to working. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\*p<0.05, \* p<0.1. The sample is restricted to individuals aged 15 to 60 that were either working or available to work and sought work. Unemployed is defined as available to work and sought work. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .



Table A5: SACU tariffs and broad unemployment by worker characteristics

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Males</i>			
Industry Tariff	-0.034 (0.438)	-0.307 (0.445)	-0.342 (0.256)
Observations	804	1742	9491
R <sup>2</sup>	0.084	0.186	0.137
<i>Females</i>			
Industry Tariff	0.510 (0.768)	-0.517 (0.598)	-0.007 (0.360)
Observations	741	883	10282
R <sup>2</sup>	0.109	0.118	0.126
<i>Rural</i>			
Industry Tariff	2.115** (0.895)	1.448** (0.569)	0.279 (0.365)
Observations	563	697	7911
R <sup>2</sup>	0.113	0.158	0.163
<i>Urban</i>			
Industry Tariff	-0.101 (0.517)	-0.285 (0.288)	-0.253 (0.189)
Observations	983	1928	11857
R <sup>2</sup>	0.093	0.149	0.110
<i>Less than complete junior secondary</i>			
Industry Tariff	-0.126 (0.675)	-0.575 (0.434)	-0.181 (0.355)
Observations	1108	1773	12466
R <sup>2</sup>	0.082	0.138	0.125
<i>Completed junior secondary</i>			
Industry Tariff	0.521 (1.420)	0.526 (0.509)	0.403 (0.424)
Observations	221	375	3160
R <sup>2</sup>	0.187	0.211	0.167
<i>30 years or younger</i>			
Industry Tariff	-0.039 (0.540)	-0.670 (0.401)	-0.183 (0.247)
Observations	714	991	8851
R <sup>2</sup>	0.049	0.090	0.094
<i>Older than 30</i>			
Industry Tariff	0.833 (0.577)	0.146 (0.500)	-0.050 (0.341)
Observations	831	1634	10922
R <sup>2</sup>	0.115	0.201	0.168

The dependent variable is an indicator for being available to work as opposed to working. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\*p<0.05, \* p<0.1. The sample is restricted to individuals aged 15 to 60 that were either working or available to work. Unemployed is defined as available to work regardless of whether they sought work. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table A6: SACU tariffs and work in informal firms by worker characteristics

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Males</i>			
Industry Tariff	-0.792 (0.527)	-0.467 (0.288)	-0.492* (0.284)
Observations	649	1462	7548
R <sup>2</sup>	0.187	0.256	0.365
<i>Females</i>			
Industry Tariff	-0.546 (0.395)	-0.041 (0.215)	-0.454** (0.228)
Observations	559	687	7466
R <sup>2</sup>	0.574	0.615	0.625
<i>Rural</i>			
Industry Tariff	1.470 (1.677)	0.338 (0.851)	-0.636 (0.575)
Observations	431	492	5597
R <sup>2</sup>	0.517	0.560	0.594
<i>Urban</i>			
Industry Tariff	-0.574 (0.389)	-0.087 (0.265)	-0.367 (0.329)
Observations	776	1656	9412
R <sup>2</sup>	0.231	0.286	0.452
<i>Less than complete junior secondary</i>			
Industry Tariff	-0.018 (0.635)	-0.513* (0.266)	-0.801*** (0.304)
Observations	864	1408	8944
R <sup>2</sup>	0.448	0.520	0.508
<i>Completed junior secondary</i>			
Industry Tariff	2.307*** (0.643)	1.298** (0.533)	-0.216 (0.562)
Observations	173	319	2537
R <sup>2</sup>	0.334	0.388	0.551
<i>30 years or younger</i>			
Industry Tariff	-1.101** (0.511)	-0.946** (0.357)	-0.685** (0.321)
Observations	524	780	6274
R <sup>2</sup>	0.327	0.369	0.456
<i>Older than 30</i>			
Industry Tariff	-0.288 (0.623)	-0.201 (0.309)	-0.380* (0.225)
Observations	684	1369	8742
R <sup>2</sup>	0.474	0.549	0.546

The dependent variable is an indicator for working in an informal firm. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\*p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. Clothing workers are omitted. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table A7: SACU tariffs and self-employment with employees

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	-0.351 (0.422)	0.029 (0.135)	-0.001 (0.045)
Observations	1608	2549	15417
R <sup>2</sup>	0.096	0.095	0.091
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	-0.339 (0.420)	0.042 (0.213)	-0.003 (0.136)
AGOA indicator	0.168* (0.097)	0.008 (0.085)	-0.001 (0.048)
Observations	1608	2549	15417
R <sup>2</sup>	0.097	0.095	0.091
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	-0.325 (0.418)	0.030 (0.216)	-0.004 (0.136)
Observations	1210	2151	15019
R <sup>2</sup>	0.098	0.096	0.092

The dependent variable is an indicator variable for being self-employed with employees. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table A8: SACU tariffs and self-employment without employees

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	-0.116 (0.228)	0.049 (0.103)	-0.027 (0.074)
Observations	1608	2549	15417
R <sup>2</sup>	0.364	0.391	0.418
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	-0.127 (0.211)	-0.269* (0.156)	-0.174 (0.154)
AGOA indicator	-0.163* (0.083)	-0.206*** (0.058)	-0.071 (0.052)
Observations	1608	2549	15417
R <sup>2</sup>	0.364	0.392	0.418
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	-0.069 (0.212)	-0.257 (0.171)	-0.178 (0.154)
Observations	1210	2151	15019
R <sup>2</sup>	0.431	0.463	0.433

The dependent variable is an indicator variable for being self-employed without employees. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .

Table A9: SACU tariffs and unpaid family help

	Manufacturing (1)	Mining and Manufacturing (2)	All (3)
<i>Panel A: Baseline specification</i>			
Industry tariff	-0.709** (0.276)	-0.167 (0.128)	0.041 (0.103)
Observations	1608	2549	15417
R <sup>2</sup>	0.111	0.105	0.120
<i>Panel B: Baseline specification, plus AGOA indicator</i>			
Industry tariff	-0.720*** (0.223)	-0.437** (0.165)	-0.308*** (0.115)
AGOA indicator	-0.158** (0.062)	-0.175*** (0.062)	-0.168*** (0.041)
Observations	1608	2549	15417
R <sup>2</sup>	0.113	0.109	0.122
<i>Panel C: Baseline specification, omitting clothing industry</i>			
Industry tariff	-0.698*** (0.221)	-0.438** (0.166)	-0.309*** (0.115)
Observations	1210	2151	15019
R <sup>2</sup>	0.120	0.116	0.123

The dependent variable is an indicator variable for being self-employed as an unpaid family helper. Standard errors are reported in parentheses and clustered by industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The sample is restricted to workers aged 15 to 60. All regressions include individual characteristics (age, gender, urban indicator, and indicators for finishing primary, junior secondary, and senior secondary), initial industry characteristics (see Table 5) interacted with a 2005 indicator, and industry and year fixed effects. The industry tariff is  $\ln(1+\text{tariff}+\text{surcharges})$ .