Gendered effects of trade restrictions on labour market outcomes in Malawi

Henry Kankwamba*

* The author would like to acknowledge assistance and comments from Marva Corley-Coulibaly, Ken Chamuva Shawa, Monica Hernandez, Sajid Ghani, Ira Postolachi, Pelin Sekerler Richiardi, Karl Pauw and Karen Vokhiwa. This work benefited greatly from the SUPPORT project, which is funded jointly by the Government of Flanders and the ILO.

7

▶ Introduction

Literature on trade theory largely agrees that trade restrictions harm economic growth (Davidson and Matusz 2004). However, the disaggregated impacts of trade restrictions on various segments of the labour market and over a cross-section of economic sectors are little understood. Using Malawi as a case study, we explored the gendered effects of trade restrictions on labour market outcomes, focusing in particular on the agriculture sector. Malawi presents a curious case because it is committed to achieving UN SDG 8 – "decent work and economic growth" – through enhancing agricultural productivity and commercialization, industrialization and urbanization (Government of Malawi 2020). In its overarching developing strategy, the Malawi Vision 2063, the country aims to shift its model from largely smallholder subsistence farming to commercial farming through the promotion of high-value crops for export, farm insurance, agricultural finance, improved farming technology, improved agricultural legislation, well-functioning market and pricing mechanisms, and active participation in international trade (Government of Malawi 2020). Since the Malawi Vision 2063 seeks to improve agricultural productivity but places no emphasis on labour market aspects within the sector, this chapter could contribute to the debate by underlining the effects that some trade policy choices could have on the labour market, with an emphasis on the agricultural sector.

Malawi's agricultural sector is an interesting case: not only is it highly representative of the situation in most African countries – that is, reporting the lowest income per capita, being labour abundant and having scarce natural resources – but it also presents practical problems that directly resonate with trade restrictions and labour markets. First, the country follows rather liberal policies, associating itself with trade blocs such as the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), and recently the African Continental Free Trade Area (AfCFTA) (MCCCI 2021).[1] Also, Malawi has suffered considerably from the COVID-19 pandemic, of which the consequences for trade and labour markets are yet to be analysed (WHO 2021).

In addition, Malawi's labour markets are not entirely competitive (Cuddington and Hancock 1995; Simtowe 2015). The rigidity or flexibility regarding the ease of entry and exit into jobs and markets, the hiring and firing of workers,

1 For a more detailed analysis of the implications of the AfCFTA for the labour market see MacLeod in Volume 2.

the influence of skills and education in finding job opportunities, and the sectoral gender implications have not been studied extensively. For instance, recent living standards measurement surveys indicate that, despite labour mobility and active migration within Malawi's districts, productivity has not increased in agriculture (Kilic, Palacios-López and Goldstein 2015a). The major export sectors are either dominated by monopolies or oligopolies (for example, the sugar, tea and tobacco industries (Chambers, Reed and Snell 2000; Chinoko 2013; Moyer-Lee and Prowse 2015). The country also has a history of imposing ad hoc trade bans, which have considerable distortionary effects on general factor employment (Aragie, Pauw and Pernechele 2018). Implementing lasting solutions to these issues could be highly beneficial to ensure more sustainable economic growth.

The aim of this study is to assess the impact of trade restrictions on labour market outcomes in Malawi. Specifically, the study seeks to assess the gendered impact of trade restrictions on occupational choice – wage earners, non-agriculture self-employed workers and farmers – among skilled and unskilled individuals in Malawi's labour market. The study also aims to assess the gendered impact of trade restrictions on farming, micro-enterprise and self-employment revenues among skilled and unskilled individuals employed in the agricultural sector. Conducting a skill-differentiated analysis is of particular importance because, as UNCTAD (2017) observed, many of the inequalities, wage disparities and further occupational choices could be explained by skills. A standard CGE model is used as well as a top-down behavioural micro-simulation attached to real microeconomic data for Malawi, such as the Living Standards Measurement Survey (LSMS), also called the fifth integrated household survey or IHS5. The key innovation of this approach is to combine an ex ante impact evaluation technique and link it to a representative household survey using ex post econometric techniques (Tiberti, Cicowiez and Cockburn 2017). This approach, using such a mix of methods, augments existing analytical tools to better understand the impacts of trade policies.

The rest of the chapter is structured as follows. Section 7.1 presents the literature review and section 7.2 explains the methodology. Section 7.3 provides the data and analysis, followed by the results of the estimation in section 7.4. Finally, section 7.5 draws the conclusions.

▶ 7.1 Literature review and contextual issues

Trade could stimulate economic growth and development (Krugman, Obstfeld and Melitz 2017). There is consensus in the literature on the fact that, when a country faces labour market rigidities and has distortionary market policies, trade impediments might lead to increased unemployment (Helpman and Itskhoki 2010). Though the country may have a comparative advantage, gains from trade are lower than when it removes trade restrictions and implements more flexible labour market policies (Helpman and Itskhoki 2010). Helpman and Itskhoki (2010) further argue that flexible labour market policies lead to increased total factor productivity and generally lower price levels. For a country dependent on agriculture, higher total factor productivity is often linked with increased economic growth (Benfica, Cunguara and Thurlow 2019).

Thus, under assumptions of intra-industry firm and worker heterogeneity, and wage distortions, removing trade restrictions in the form of tariff reductions could change the structure of the labour market when it is open to foreign competition (Helpman and Itskhoki 2010; Balassa 1964; Samuelson 1994). Using data from Colombia, Attanasio, Goldberg and Pavcnik (2004) found that tariff removals between the 1980s and the 1990s led to increased human capital, which negatively affected sectors that relied significantly on unskilled workers. While an increase in human capital is associated with increased total factor productivity (TFP), it is difficult to establish the ease with which individuals can find and switch between available jobs and the ease of hiring and firing individuals once they have been employed based on the predictions from TFP-based theory and literature alone. As such, it is important to examine the empirical context for specific impacts, and a theoretically consistent ex ante analysis, coupled with an approach driven by micro-econometric data, can uncover these mechanisms. To illustrate how this could be achieved, Colombo (2009) modelled, in a didactic micro-simulation-linked CGE, the behavioural probability of employment and expected wage equations using a two-stage Heckman sample selection model.[2]

2 The Heckman model expresses the logarithm of the wage as a linear combination of explanatory variables and an inverse Mills ratio – an individual specific constant to account for sample selection bias because one only observes the wages of individuals who are employed and not the unemployed (Heckman 1974 and 1976).

Additionally, the evidence indicates that, within the sub-Saharan context, women face significant constraints consistent with theoretical predictions from some selected trade models. For example, the lower productivity among women in Malawi is abundantly explained by child dependency (Kilic, Palacios-López and Goldstein 2015b) and the number of hours they dedicate to unpaid domestic work, in line with Akerlof and Yellen's (1990) fair wage-effort hypothesis. Specifically, in Malawi, women commit about 9 per cent of their working hours to unpaid domestic work (UN Women 2014). Consequently, it is important to consider theoretical underpinnings in trade when gender is considered.

Removing trade barriers creates a large market for domestic export commodities by creating more demand for commodities produced in a country (Davidson and Matusz 2004). In so doing, this creates opportunities for more economic activities in other economic sectors. In turn, this increases demand for factors of production, such as labour, which could significantly reduce unemployment (Krugman, Obstfeld and Melitz 2017). More demand for a country's exports means that the country faces competitive prices for its commodities and can therefore have a positive trade balance (Löfgren, Robinson and Harris 2002). Higher prices for exports – often leading to favourable terms of trade where export prices are higher than import prices – tend to further reduce unemployment (Porto 2008). Implementing and adhering to decent work principles could attract more trade, i.e. an increase in the demand of a country's exports, thus increasing labour productivity through increased employment of factors in the export sectors (Carrère, Olarreaga and Raess 2022; Distelhorst and Locke 2018). This, in turn, has the potential to create more value-added through increased productivity and generate higher income for households and the whole economy through increased profitability (Carrère, Olarreaga and Raess 2022).

However, there is some evidence that trade liberalization in the form of sudden removal of tariffs destroys jobs. Attanasio, Goldberg and Pavcnik (2004) found that the probability of unemployment grew after removing tariffs. Furthermore, according to Porto (2008), lower production costs and fewer regulations in foreign countries could make imports outcompete commodities produced domestically, thereby making foreign firms crowd out domestic firms. Writing from a perspective centred on the United States, and then from a global one, Davidson and Matusz (2004) pointed out that such competition could result in lower production, massive lay-offs and closures of domestic firms, which all contribute to higher unemployment. Further, Devarajan and Rodrik (1991) show that positive impacts of trade liberalization are not evident due to increased imports and reduced employment in high wage sectors. While much of the discussion on Devarajan and Rodrik's work shows the rate at which individuals lose jobs (Davidson and Matusz 2004; Menezes-Filho and Muendler 2011), it ignores the rate at which displaced workers find new jobs in a more liberalized economy. Therefore, it is important to examine whether the same applies from the perspective of a developing country with a comprehensive accounting of all economic activities.

Hasan et al. (2012), using trade protection data and industry-level unemployment data from India, did not find evidence that removing trade restrictions increases unemployment. They noted that, when states liberalize trade, urban employment increases where labour markets are more flexible and predominantly produce export commodities. This is consistent with the Heckscher–Ohlin model, according to which trade restrictions would lead to more employment in the most abundant factor that is producing the export (see Krugman, Obstfeld and Melitz 2017).

It is interesting to note that, according to the Ricardo–Viner model of trade, the removal of trade restrictions benefits the factors specific to the sector producing export commodities but harms the factors in the competing import industry. Nevertheless, Davidson and Matusz (2004) pointed out that the impact on mobility is unclear.

Furthermore, it is widely accepted that most African countries have an abundance of unskilled and medium-skilled labour, such that opening up trade could trigger changes in occupation choices between sectors (Crush and Williams 2010). For instance, employed individuals who run the risk of being laid off may become entrepreneurs, self-employed or move to the agricultural sector. However, the extent to which a trade-related impact could prompt changes in labour supply with respect to the rigidities of the African labour market has not yet been analysed.

Additionally, according to UNCTAD (2017), most countries in the COMESA trading bloc face significant gender constraints. First, the study, which highlighted trade and gender linkages within the COMESA, indicated that there was a difference of US$200 between the incomes of male and female workers using 2011 purchasing power parity. This gap could potentially stem from the fact that most women work on their own account, especially in agricultural sectors where 86 per cent of women are not formally employed. The study further highlighted that women in agriculture face discrimination and are often relegated to vulnerable, informal, low-wage farm work. Consequently, women working in the agricultural sector had the lowest incomes, and ranked among the poorest in the study. The study also pointed out that most rural women who work in the agricultural sector have low literacy rates, and that a huge inequality exists between men and women in terms of access to and ownership of land. Specifically, Malawi has a gender inequality index of 140, which is the second highest in the COMESA trade bloc, 9 points behind the Democratic Republic of the Congo. However, the study showed that the impacts of trade restrictions on labour market outcomes are not straightforward as they are different depending on skill, sector and markets structure (UNCTAD 2017).

Wamboye and Seguino (2015) attempted to explore the effects of trade liberalization (that is, the removal of tariff and non-tariff barriers to trade) on women's occupational choices in the mining and minerals sector of 38 countries south of the Sahara Desert. Their analysis found that only 20 per cent of women worked in the mining industry, compared with 40 per cent who were employed in agriculture. Their results, based on two-stage least squares estimation, revealed that being a mainly exporting country was negatively correlated with women having more employment chances. Though not particularly robust across different specifications, trade expansion generally had negative effects on female employment rates. Yet a critical review paper by Winters and Martuscelli (2014) observed that trade restrictions could improve women's incomes. Country-specific studies in a counterfactual scenario could help to explain the mechanisms at play, specifically across other labour categories such as agriculture, self-employment and wage employment.

The approach used by Creedy and Kalb (2005) seems appropriate to mitigate the fact that micro data in developing countries may face serious measurement errors – for example, individuals may not divulge their actual wages but the amount of hours they have worked. The study used maximum likelihood methods to estimate discrete hours labour supply functions. Using a multinomial logit model, Creedy and Kalb (2005) were able to model individual workers' responses to tax incentives by calibrating the discrete hours labour supply model to the individual base data. Further, Tiberti, Cicowiez and Cockburn (2017), using a top-down behavioural microsimulation for distributional analysis, took a multinomial logit approach to model occupational choice, following the Creedy and Kalb (2005) approach to model changes in occupational choice when a shock occurs.

Experimental approaches can be used to assess the effects of trade restrictions on labour market outcomes. As Malawi cannot proffer itself to a natural experiment of assessing the outcomes before and after trade restrictions, different numerical counterfactual experimental options can be used to mitigate data deficiencies, such as input–output, SAM multiplier and CGE modelling approaches (Boccanfuso and Savard 2012; Colombo 2009; Tiberti, Cicowiez and Cockburn 2017). These methods have the advantage of presenting a baseline overview of the economy and can proceed to create ex ante counterfactual scenarios based on changes in trade policies. Then, the effects of these trade policies can be translated into micro data in a manner similar to Tiberti, Cicowiez and Cockburn (2017), using behavioural microsimulation models.

Trade restrictions may alter the employment of specific factors of production, such as labour and capital, by initiating changes in their mobility across sectors. Most of the trade agreements that Malawi is party to involve most of the aforementioned structural and behavioural shifts in economic activities (for example, tariff deregulation and productivity shifts), making a simple static CGE model centred on the agricultural sector particularly adequate.

It may also be argued that, since we are chiefly focusing on the agricultural sector, it would have been better to use a PE model, one of those models that focus on one sector of the economy but could account for more markets. However, while a PE model can take a single commodity, it is not well suited to handle complex issues, such as the use of intermediate products that may come from the non-agricultural sector and other forward linkage effects, as our analysis considered multiple markets and regions. Moreover, institutions like households, enterprises and government, which are the key focus of the distributional component of this study, may not be well represented in a PE model. Thus, this study benefits from maximizing the merits of a CGE model while making it simple and more tractable.

This review suggests that removing trade barriers creates more economic activities and has the potential to increase sector-specific productivity. It is also worth noting that removing trade barriers creates mixed employment outcomes for women, and that context plays a significant role. While data remain scarce, the combined use of forward-looking and theoretically consistent ex post analyses can help overcome these complex problems.

▶ 7.2 Methodology

This section presents the methods that were used to assess the gendered effects of trade restrictions on labour market outcomes in Malawi. In summary, the analysis started with a CGE model calibrated to a comprehensive SAM for Malawi with a 2014 baseline. The CGE model simulated a 50 per cent increase in tariffs, imposed where sectoral, and observed the effects on income. Then, the results of the CGE model were linked to theoretically consistent micro-econometric models of occupational choice, and wage and/or profit determination estimated using nationally representative data. Lastly, a counterfactual scenario was simulated, in which the impacts of the CGE model reflected on real households in terms of income distribution and changes in poverty using standard Foster–Greer–Thorbecke measures. Counterfactual results were then compared with the baseline to identify the impact.

7.2.1 A static computable general equilibrium model for Malawi

We used a standard CGE model for Malawi, which was adopted from the International Food Policy Research Institute by Löfgren, Robinson and Harris (2002). The standard CGE model used a calibrated share form for its structural parameters in order to replicate a base that was represented by SAM data. It was solved either through mixed complementarity programming or non-linear programming. The Malawi model broadly comprised five sectors, namely agriculture, manufacturing, utilities, private services and public services. It contained ten types of households, which were distinguished according to their place of origin (rural versus urban), level of education (primary, secondary school and tertiary education) and income quintiles. To illustrate how the model works, we used various assumptions from economic theory.

Our model started with producers in each of the sectors producing output using factors of production under constant returns to scale. The model took productivity as exogenous and used fixed shares of production technologies. We assumed that firms maximized profits in such a way that factor payments were equal to production revenues. We also assumed that labour supply was exogenous. Labour with no formal education or basic primary education was understood to be unemployed and mobile; labour with secondary education to be unemployed and fully mobile, and that with tertiary education to be employed but sector-specific.

To illustrate these assumptions, unskilled labour can easily move across the sectors. For example, an unskilled smallholder farmer can easily move to become a security guard or domestic worker in another sector. However, it would be difficult for an architect or medical doctor to switch between sectors during the study's time frame. Another critical assumption was that wages are not uniform across economic activities. Indeed, there are considerable distortions in wages. However, we fixed the wage differentials across the sectors and allowed for a market clearing wage. These labour market closures enabled us to study the impacts of trade restrictions on employment outcomes within the agricultural sector, as farmers can reallocate their labour resources to activities that are more lucrative on the international market. While Malawi, like many African countries, has a large informal sector – there are many unregistered firms and countertrading practices – which is a bit difficult to track for tax purposes, all economic activities were captured within the representative survey from which many of the institutional data in the SAM accounts were obtained.

As land and capital are fully employed and sector-specific, one-off production decisions are taken at the beginning of the season. For example, if farmers perceive that soya bean prices are likely to be high, they can shift production from cereals to soya beans in order to maximize profits from farming at the beginning of the farming season. However, once production has begun, farmers cannot change their production decisions in the short run. This is what Pauw et al. (2011) call the dumb farmer assumption; it summarizes the short-run factor market closure for CGE models where factors of production such as land and capital are sector-specific and fully employed.[3]

Households are utility-maximizing agents who earn their incomes from factors of production, remittances and transfer payments from the government. Assuming standard Cobb–Douglas preferences, households consume commodities in fixed shares that add up to one.

To model international trade, domestic prices and international prices were compared through an exchange rate mechanism. We assumed that the exchange rate was flexible and market-driven. The model did not account for financial assets but the exchange rate determined the real exchange rate; that is, the relative price of traded to non-traded commodities (Burfisher 2017). The model also assumed that Malawi is a small country and therefore did not influence international prices. Domestically and foreign-produced commodities substituted each other using the Armington assumption (Alston et al. 1990; Armington 1970). The model created an aggregate commodity of imported and domestically produced goods based on the real exchange rate and the preferences were determined by a constant elasticity of substitution (CES). Thus, the CES gave rise to an optimal ratio of demands for domestic and foreign goods as a function of relative prices and their shares, respectively. Similarly, exporters also decide whether to sell domestically or export. Using the Armington assumption, we used a constant elasticity of transformation function; that is, a CES with a positive response to price changes (Alston et al. 1990). We also obtained an optimal ratio of demands as a function of relative prices and shares of goods exported and sold on the domestic market (Pauw

3 Closure rules refer to how the model treats market equilibrium in the specification of behavioural equations.

et al. 2011). We assumed that world prices were fixed but that domestic prices adjusted through tariffs, taxes and subsidies (Pauw et al. 2011).

In order to assess the welfare of a given policy in a CGE framework, one often seeks to evaluate whether individuals become better off after a particular policy has been implemented. Then, a monetary value is given which represents the impact of the policy in terms of real consumption. Real consumption is therefore computed as the cost of the new consumption bundle compared with that of the old bundle using pre-policy consumer prices. The difference materializes the change in welfare. A detailed model description can be found in Löfgren, Robinson and Harris (2002).

7.2.2 A multinomial logistic regression of occupational choice

One effect of trade restrictions would be to make certain jobs less desirable than others, which could hinder the achievement of Malawi's productivity goals. For instance, the competing import sectors that a tariff may protect may experience higher wages to the detriment of other sectors in the economy (Di Ubaldo and Winters 2020). Further, in line with Akerlof and Yellen (1990), workers would also not be as productive in those sectors whose job openings are undesirable, to the point that productivity might be driven down. As a result, the vision for Malawi's strategic sectors could be affected.

The CGE model was able to capture changes in general factor employment and its associated changes in incomes. However, it required detailed microeconomic data to simulate the changes in actual factor employment. For example, if the CGE model showed that labour employment and income had decreased by 10 per cent, respectively, it would require data from a detailed representative survey to show the number of people who could lose their jobs. This is because CGE models often work with representative agents, such as a worker or a household.

To link the policy experiment in the CGE model to the survey data, we followed a theoretically consistent behavioural approach, like Colombo (2009). The approach started with how individuals could choose occupations to maximize their utility, given their income as a constraint. Based on their observable characteristics, we used a multinomial logistic regression to model occupational choice among individuals. The utility from each occupational choice was generated econometrically (see Tiberti, Cicowiez and Cockburn 2017). We obtained each individual's highest utility based on their characteristics. Thus, following this logic, lower utilities were associated with lower probabilities of being employed in a particular sector.

If results from the CGE model indicated that a certain proportion of jobs would be lost in a given sector, we replaced the proportionate individuals in the employment category with the unemployed in the sector if an individual's probability of being employed in the sector was less than the mean percentile probability of that particular job category (Tiberti, Cicowiez and Cockburn 2017).

7.2.3 Heckman sample selection model for wages, and distributive analysis

The main goal for individuals choosing wage employment is to maximize their utility by earning their desirable wage. To transfer the results of the CGE model on to a representative survey, we also followed a microeconomic behavioural approach as opposed to only using a top-down approach of transmitting the results to the agents. Based on the above, the Heckman model was used to model the wage equation. The Heckman model, considered as a reference in labour economics, is a model that was first used to assess the effect of hours worked by women on their wage rates. As women who work self-select into employment, some women worked and others did not. Thus, a missing data problem occured, causing a selection bias (Heckman 1974). Heckman (1974) provided a two-step econometric procedure to correct this bias by explicitly modelling determinants of the probability to work and determinants of the wage equation – leading to a simultaneous equation approach. From the CGE model, we examined the percentage change in the wages. Then, we replaced the predicted wage earnings with the changes from the CGE in the following manner:

$$logY_{km} = log[\hat{Y}_{km}.\,(1 + \Delta Y_{km}^{CGE})]$$

where $\hat{Y}_{km}$ is the predicted total household factor income for an individual k in sector m, and ΔY_{km}^{CGE} is the percentage change in the income obtained from the CGE model. This way, the CGE model linked with the microeconomic data in a theoretically consistent manner by econometrically adjusting for selection bias and closely following microeconomic theory.

Workers that self-select into farming as farmers do not face a wage function. They rather face profit functions which are non-decreasing in output prices and non-increasing in input prices, homogeneous of degree 1, convex and continuous in prices (Varian 1992). To model the impacts of trade restrictions on farmer profits, a similar Heckman procedure was adopted. It is worth noting that, upon diagnostic testing, results pointed towards the use of a single equation form.

Given the effects on wages and profits, a distributive analysis was conducted to assess the impact of counterfactual trade restriction policies on incidence, and the depth of poverty and inequality. Standard Foster–Greer–Thorbecke indexes were used (Foster, Greer and Thorbecke 2010). All micro-econometric work was conducted in Stata 14 using standard commands. However, for the distributive analysis, a DASP package was used.

7.2.4 Experimental design

In order to assess gendered effects of trade restrictions on labour market outcomes using Malawi's CGE model, the following experimental design was considered. First, we showed prevailing tariffs and formulated a baseline scenario. Then, we created a hypothetical counterfactual scenario and observed the results. Lastly, we transferred the results to an econometric simulation module.

It is important to note that Malawi is party to several trade agreements (table 7.1). These agreements formed our baseline scenario. In this scenario, all tariffs on exports to the SADC, the East African Community (EAC) and the EU under the Everything but Arms (EBA) programme are set at zero (see table 7.1, columns 2–5). However, Malawi imposes 20 per cent taxes on coffee and tea, and 5 per cent on tobacco and groundnuts to the countries in the Economic Community of West African States (ECOWAS). These current tariffs are effectively applied rates. In columns 6 and 7, we showed the MFN tariff rates. These are the tariffs that a country can impose on exports to certain countries that are not under any preferential trade agreement. In essence, they are the highest tariffs a nation can charge. Column 6 shows that the maximum tariff rate on trade is up to 125 per cent, beyond which it may lead to redress at the WTO. Column 7 represents the prevailing MFNs for various commodities. Column 8 presents bound tariff rates on selected agricultural commodities. These are the types of trade agreements that Malawi negotiated at the WTO and to which it is bound (MCCCI 2021).

▶ **Table 7.1 Malawi's tariff schedule showing maximum MFN, bound and prevailing rates based on trade agreements (percentage)**

Product (1)	SADC (2)	ECOWAS (3)	EAC (4)	EU (EBA) (5)	Max MFN (6)	MFN (7)	BND (8)
Sugar	0	n.a.	0	0	125	50	121
Macadamia	0	n.a.	0	0	125	5	121
Soya beans	0	n.a.	0	0	125	8.50	121
Coffee	0	20	0	0	125	8.50	121
Tea	0	20	0	0	125	34	121
Tobacco	0	5	0	0	125	18.40	121
Groundnuts	0	5	0	0	125	15	121
Rice	0	n.a.	0	0	125	75	121
Chillies	0	n.a.	0	0	125	0	121
Honey	0	n.a.	0	0	125	40	121

Note: MFN = most favoured nation; BND = bound tariff; n.a. = not applicable.

To formulate a rationale for the hypothetical trade-restrictive scenario, we focused on the MFN rate (50 per cent) in column 7 and effectively adjusted all the tradable commodities' tariffs in the SAM to that level. Having done that, we ran the CGE model and analysed the results across sectors, factors of production and households. Furthermore, we took results from the CGE model and transferred them to the micro-econometric simulation module to observe disaggregated impacts.

▶ 7.3 Data

7.3.1 The Malawi social accounting matrix

We used a 2014 SAM for Malawi (Thurlow 2017). The SAM used the Malawian kwacha as a currency, with 2014 as a base year. The SAM combined 42 activities and 43 commodities (table 7.2). Commodities in the SAM are primary outputs from productive activities. For example, maize farmers produce maize as an output so the SAM creates a maize account. Similarly, food processors produce processed foods as their primary output. The SAM contains eight factors disaggregated by education level and ten households disaggregated by rural/urban status and income quintiles. It also contains three types of taxes, namely direct taxes (corporate and personal), import duties and sales taxes (taxes on products minus product subsidies). In addition, the SAM contains additional accounts: domestic trade margins, export margins, import margins, enterprises, government, savings and investments, changes in stocks, and rest of the world.

We focused the attention of the study on the agricultural sector by aggregating the SAM accounts for the non-agricultural manufacturing sectors and analysed multipliers and agriculture's forward linkages with regard to the implementation of decent work indicators.

▶ Table 7.2 Aggregate SAM for Malawi with 2014 as the base year

	Activities	Commodities	Factors	Enterprises	Households	Government	Investment	Rest of the world	Total
	(a)	(c)	(f)	(e)	(h)	(g)	(i)	(w)	
Activities		3 121			262				3 383
Commodities	1 223	0			1 673	308	307	725	4 236
Factors	2 173							1	2 175
Enterprises			1 154			96		115	1 364
Households			889	1 175		20		11	2 095
Government	–13	263		113	102			98	563
Savings				75	53	139		40	307
Rest of the world		853	132	1	5	0			990
Total	3 383	4 236	2 175	1 364	2 095	563	307	990	

7.3.2 The Integrated Household Survey

We used the fifth LSMS for Malawi, also known as the IHS5. The objective of the IHS5 data is to provide a benchmark for poverty, and socio-economic indicators for evidence-based policy formulation and analysis (Government of Malawi 2020). The data are also used for national accounting purposes. The survey, with 12,288 random households obtained using stratified sampling, is a nationally representative dataset for Malawi, which has detailed data on occupational choice, approximate hours of work and wages. We used these data to estimate the impacts of trade restrictions on occupational choices and factor earnings. The IHS5 also has a detailed expenditure module, which we used for impacts on revenue and wages that result from labour market changes.

The survey data show that 87.4 per cent of households in Malawi are farm households comprising 4±2 individuals, with considerable heterogeneity. The typical male household head (70 per cent) is 35±16 years old and married (76 per cent), but mostly categorized as an unskilled worker having only attended seven years of primary school. The household head is reported to earn a maximum of 36,315 kwacha in monthly wages, while living in a rural area (81 per cent) with possibly 1 child under 6 (see table 7.3). Gender is the major source of income inequality: unskilled male farmers earn, in general, a staggering 6,583 kwacha more than their female counterparts. Nevertheless, the disparity disappears for skilled workers, with a difference of only 1,859 kwacha.

▶ Table 7.3 Socio-economic characteristics of individuals based on skill and occupational status

Occupational choice	Unskilled	Skilled	Full sample
	(1)	(2)	(3)
Wage earner			
Gender (male = 1)	0.87 (0.34)	0.91 (0.29)	0.88 (0.33)
Age (years)	37.98 (12.36)	39.42 (11.82)	38.42 (12.20)
Married (yes = 1)	0.85 (0.35)	0.81 (0.38)	0.84 (0.36)
Natural log wage	10.20 (0.68)	11.00 (1.37)	10.45 (1.02)
Rural (yes = 1)	0.78 (0.41)	0.51 (0.50)	0.70 (0.45)
Household size	4.20 (2.05)	4.13 (1.98)	4.17 (2.03)
Non-agricultural/self-employed			
Gender (male = 1)	0.85 (0.36)	0.89 (0.32)	0.86 (0.34)
Age (years)	36.71 (12.14)	36.32 (9.32)	36.56 (11.12)

Occupational choice	Unskilled	Skilled	Full sample
	(1)	(2)	(3)
Married (yes = 1)	0.87 (0.34)	0.85 (0.35)	0.86 (0.34)
Natural log wage	10.48 (0.73)	11.19 (1.01)	10.76 (0.91)
Rural (yes = 1)	0.48 (0.50)	0.28 (0.45)	0.40 (0.49)
Household size	4.16 (2.09)	4.07 (1.90)	4.12 (2.02)
Farmer			
Gender (male = 1)	0.71 (0.45)	0.66 (0.47)	0.70 (0.45)
Age (years)	42.62 (15.25)	46.55 (15.61)	43.70 (15.45)
Married (yes = 1)	0.80 (0.40)	0.69 (0.46)	0.77 (0.41)
Natural log farm earnings	10.44 (0.47)	11.77 (0.78)	10.81 (0.82)
Rural (yes = 1)	0.92 (0.27)	0.77 (0.42)	0.88 (0.32)
Household size	4.61 (2.04)	4.28 (2.13)	4.52 (2.07)
Not working/unemployed			
Gender (male = 1)	0.70 (0.46)	0.57 (0.49)	0.67 (0.47)
Age (years)	41.10 (15.81)	50.22 (18.91)	43.47 (17.11)
Married (yes = 1)	0.77 (0.42)	0.61 (0.48)	0.73 (0.44)
Rural (yes = 1)	0.82 (0.38)	0.74 (0.44)	0.80 (0.01)
Household size	4.44 (2.07)	4.08 (2.21)	4.34 (2.11)
General statistics			
Farmers (%)			87.4 (0.41)
Unemployed (%)			9.0 (0.04)
Wage earners (%)			3.6 (0.02)
Household size			4.1 (2.02)
Age of household head (years)			35.1 (16.2)
Married (%)			76.2 (0.32)
Years of schooling			7.3 (4.3)
Average wage/month			36 315 (15 132)
Male	27 859 (28 367)	38 543 (25 454)	33 201 (29 328)
Female	21 276 (20 438)	36 684 (17 682)	28 980 (22 435)
Rural residents			81.2 (0.38)

Note: The means are reported with standard deviations between parentheses. N = 11 433. US$1 = 816 kwacha. All results in the table have used survey weights accounting for complex design.

The remaining 3.6 per cent of the labour categories were wage earners. They were workers that could do other jobs requiring minimal skills, but highly likely to require brute force. Those in the non-agricultural/self-employed category were mostly male (86 per cent).[4] Respondents in this category were about 37 years old, married (86 per cent) and earned about 44,355 kwacha as their monthly wage. In total, 60 per cent of them lived in urban areas with a household size of four members.

The unemployed represented 9 per cent of the respondents in the sample. They were about 38 years old on average, living largely in rural areas (70 per cent), and 84 per cent of them were married while mostly earning about 34,544 kwacha with a household size of four members. There were considerable differences between unskilled and skilled wage workers in terms of wages, with skilled workers earning up to 68,872 kwacha while unskilled workers earned about 26,027 kwacha.

The other statistically robust source of heterogeneity among wage workers was the location. Most unskilled wage earners were based in rural areas. Furthermore, results showed no household-level economies of size as the differences between large and small households were not statistically significant. Nevertheless, there was strong evidence of gender bias among skilled wage earners, with a difference of 33,075 kwacha. The gender bias among unskilled workers was only significant at 10 per cent.

About 46 per cent of respondents were statistically categorized as unemployed when they did not report a wage. Their occupation was unclassified or classified as labourer, not employed, institutionalized and above the age of 16. Of these, 67 per cent were male and 73 per cent were married. They were, on average, 43 years old and lived in rural areas.

▶ 7.4 Results and discussion

7.4.1 Econometric results

Table 7.4 presents the results of two multinomial logistic regression models of occupational choice between skilled and unskilled workers. The multinomial logistic model enabled the study to estimate the parameters

4 The reported statistics are from column (3), "Full Sample".

of occupational choice in a theoretically consistent manner using nationally representative data. The dependent variable is occupational choice, with groups such as wage earners, non-agricultural self-employed, not working/unemployed and the base category of farming. The naming convention follows Tiberti, Cicowiez and Cockburn (2017). Generally, results indicate that the models fitted correctly with a Wald chi-square significant at 1 per cent ($p < 0.01$). Factors that were statistically significant in the unskilled labour category among wage earners and non-agricultural workers were the geographical location, the age of the household head, the marital status, the education level and the number of children under 16 years old. Unemployed respondents were barely different from farmers in terms of socio-economic characteristics. The results were also similar for the skilled categories.

▶ Table 7.4 Multinomial logistic regression results of occupational choice

	Unskilled labour (1)		Skilled labour (2)	
Occupational category	**Coefficient**	**Standard error**	**Coefficient**	**Standard error**
Wage earner				
Rural (yes = 1)	1.50***	0.15	1.13***	0.28
Head of household (yes = 1)	0.00	0.00	0.02**	0.01
Age (years)	0.81***	0.17	0.90***	0.29
Education (years)	–1.00***	0.31	–1.81***	0.19
No. of children under 16	0.19**	0.08	0.89***	0.13
Married (yes = 1)	–0.08**	0.04	–0.18**	0.06
Regression constant	–0.12	0.10	–0.04	0.19
Non-agricultural self-employed				
Rural (yes = 1)	1.32***	0.11	0.72***	0.14
Head of household (yes = 1)	0.01***	0.00	0.02***	0.01
Age (years)	0.61***	0.12	1.13***	0.16
Education (years)	–1.34***	0.30	–1.62***	0.17
No. of children under 16	0.60***	0.05	0.83***	0.10
Married (yes)	–0.15***	0.03	–0.15***	0.03
Regression constant	–0.02	0.07	–0.14*	0.10
Not working/unemployed				
Rural (yes = 1)	3.00***	0.93	0.61	0.86
Head of household (yes = 1)	0.01	0.02	0.00	0.02

	Unskilled labour (1)		Skilled labour (2)	
Occupational category	**Coefficient**	**Standard error**	**Coefficient**	**Standard error**
Age (years)	1.65***	1.14	0.70	0.77
Education (years)	–1.15***	0.40	–1.66***	0.33
No. of children under 16	0.74	0.71	0.69***	0.14
Married (yes)	–0.67	0.64	–0.06	0.18
Regression constant	0.72**	0.40	–1.45**	0.94

Note: *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.10$. Other coefficients are not statistically significant at the 0.10 level. Wald chi-square of 1,630 ($p < 0.01$) for the unskilled labour model and 1,641 ($p < 0.01$) for the skilled labour model. The table presents two multinomial logistic regression models for unskilled (panel 1) and skilled (panel 2) labour categories. The dependent variable in both models is the occupational choice, with categories shown in italics. The base labour category is farming. Robust standard errors were used.

Table 7.5 summarizes the results of the Heckman sample selection model for estimating the wage of unskilled and skilled workers. Except for the unskilled workers category, the results generally indicated that the Heckman model was suitable for the analysis as there was indeed considerable selection bias in the sample. This was evidenced by the log likelihood test of independence of equations, which was vehemently rejected at all conventional significant levels. As a robustness check and appropriate model choice for the unskilled workers, an ordinary least squares regression with a log-level functional form coupled with robust standard errors was used. The model fitted correctly with an F-statistic of 620 ($p < 0.001$).

The key determinants in the wage equation among unskilled workers are the age, the gender, the education level, and whether the worker is located in an urban area. All other things being equal, these are the conditions that highlight the influence of trade restrictions. Results show that women receive 23 per cent lower wages than men. Also, for individuals who have attained secondary school education (skilled panel 3), an additional year of progressive schooling resulted in 43 per cent higher wages. Among unskilled workers, education played a significant role in determining wages, such that an additional year in school was associated with a 20 per cent increase in wages, other things being equal.

▶ Table 7.5 Results of the Heckman sample selection wage determination model

	Heckman unskilled (1)		OLS unskilled (2)		Heckman skilled (3)	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Variables	(1)	(2)	(5)	(6)	(9)	(10)
Age	0.091***	0.010	0.002***	0.001	0.034*	0.019
Age 2	–0.001***	0.000	0.000***	0.000	0.002	0.000
Gender (male = 1)	0.233***	0.084	0.244***	0.004	–0.772***	0.128
Education (years)	0.203***	0.028	0.019***	0.004	0.426***	0.023
Household size	0.001	0.011	0.004***	0.001	–0.014	0.017
Central region	0.091	0.071	–0.008**	0.005	0.251**	0.102
Southern region	0.001	0.069	0.008*	0.006	0.058	0.090
Urban dweller	–0.163***	0.049	–0.002	0.006	–0.116**	0.047
Constant	7.777***	0.392	10.1***	0.012	10.62***	0.475
Wage worker (yes = 1)						
Married	0.339***	0.037			0.386***	0.054
Age	0.002*	0.001			–0.017***	0.001
Gender	0.485***	0.030			0.598***	0.042
No. of children	–0.093***	0.020			–0.089***	0.024
Access to credit	–0.039	0.031			–0.041	0.029
Central region	–0.117***	0.039			–0.242***	0.056
Southern region	–0.017	0.037			–0.100*	0.054
Constant	–1.987***	0.052			–0.771***	0.071
/athrho	0.029	0.146			–1.864***	0.174
/insigma	–0.170*	0.092			0.463***	0.102
rho	0.029	0.146			–0.953***	0.016
sigma	0.844	0.078				
lambda	0.025	0.124				

Note: *** = p < 0.01; ** = p < 0.05; * = p < 0.10. OLS = ordinary least squares. Other coefficients are not statistically significant at the 0.10 level. Wald test of independent equations (rho = 0) panel 1: chi2(1) = 0.04 Prob > chi2 = 0.8414. F(8, 20185) = 619.51, R-squared = 0.16, Prob > F = 0.0000. Wald test of independent equations (rho = 0): chi2(1) = 115.26 Prob > chi2 = 0.0000. The outcome variable is the wage for both skilled and unskilled labour categories. A standard Heckman procedure was employed. Robust standard errors were used.

To link the micro-econometric labour market analysis with the CGE results, we considered the applied MFN tariff of 50 per cent (see table 7.1) that could be levied on import commodities. In the simulation, we adjusted the import prices upwards by the tariff rate. This is the opposite of what Attanasio, Goldberg and Pavcnik (2004) empirically observed in Colombia, where tariffs were entirely removed over a period of time; they empirically observed a period of tariff removals while in our case we do the opposite – we impose tariffs in a forward-looking manner. As a result (table 7.6), demand for both skilled and unskilled labour declined at the sectoral level. In the unskilled labour category, where people mostly work in agriculture as casual labourers and farmers, maize and tobacco labour demand decreased by 4.6 per cent and 6.5 per cent respectively. Since the agricultural sector relies heavily on import commodities, such as chemicals and fertilizers (not shown in the table but present in the disaggregated SAM under industry (Thurlow 2017)), it could bear the brunt of the effects of trade restrictions.

▶ Table 7.6 Changes in sectoral labour demand when a 50 per cent MFN tariff is imposed (CGE results)

	Unskilled labour				Skilled labour					
	flab-n		flab-p		flab-m		flab-s		flab-t	
	Base	%Δ	Base	%Δ	Base	%Δ	Base	%Δ	Base	%Δ
Agriculture										
Maize	1.5	–4.6	3.0	–4.6	2.4	–4.6	0.1	–2.1	0.3	–2.3
Rice	0.4	–3.6	0.6	–3.6	0.3	–3.6	0.0	–1.2	0.0	–1.3
Other										
Cereals	0.6	–2.5	1.2	–2.5	0.5	–2.5	0.0	0.0	0.0	–0.1
Cassava	0.5	–4.3	1.0	–4.3	0.8	–4.3	0.0	–1.8	0.0	–1.9
Potato	0.4	–4.1	1.0	–4.1	0.6	–4.1	0.0	–1.6	0.0	–1.8
Pulses	1.4	–3.7	3.6	–3.7	3.4	–3.7	0.0	–1.2	0.0	–1.3
Horticulture	5.0	–3.3	11.3	–3.3	4.5	–3.3	0.1	–0.8	0.2	–1.0
Tobacco	1.1	–6.5	2.6	–6.5	2.3	–6.5	0.2	–4.1	0.1	–4.2
Cotton	0.7	–3.1	1.3	–3.1	0.8	–3.1	0.1	–0.6	0.0	–0.8
Sugar	0.3	–8.4	0.3	–8.4	0.2	–8.4	0.0	–6.0	0.1	–6.1
Seeds	0.1	–3.8	0.1	–3.8	0.1	–3.8	0.0	–1.3	0.0	–1.5
Livestock	4.6	–0.9	10.5	–0.9	6.6	–0.9	0.2	1.7	0.2	1.5
Poultry	1.3	–1.3	2.5	–1.3	1.6	–1.3	0.0	1.3	0.0	1.1
Forestry	0.8	–2.0	1.9	–2.0	2.1	–2.0	0.7	0.5	0.9	0.4

	Unskilled labour				Skilled labour					
	flab-n		flab-p		flab-m		flab-s		flab-t	
	Base	%Δ	Base	%Δ	Base	%Δ	Base	%Δ	Base	%Δ
Fishing	1.5	–1.8	3.1	–1.8	2.2	–1.8	0.1	0.8	0.7	0.6
Industry	0.2	–3.5	1.1	–3.5	1.9	–3.5	0.2	–1.0	0.5	–1.1
Utilities	0.0	–3.3	0.4	–3.3	1.5	–3.3	0.8	–0.8	1.3	–1.0
Services	0.7	–2.7	2.6	–2.7	14.1	–2.7	1.2	–0.2	4.8	–0.4

Note: %Δ = percentage change from base; flab-n = unskilled labour with no education; flab-p = unskilled labour with primary education only; flab-m = skilled labour with a Junior Secondary School Certificate; flab-s = skilled labour with a Malawi School Certificate of Education; flab-t = labour with tertiary education. The base values were billions of kwacha when 419.03 kwacha equalled US$1.

The effects for the skilled labour category were also negative, albeit twice as low in magnitude compared with the unskilled labour category. For skilled workers, agricultural labour demand declined the most: the demand for workers with a middle secondary school certificate (flab-m) declined by between 4.6 per cent and 6.5 per cent. The evolution of labour demand for this category was similar to that for other agricultural workers because people in this category may work as permanently employed farm workers, such as machine operators, farm workshop assistants and clerks. However, people who finished secondary school (flab-s) and those with tertiary education (flab-t) saw their labour demand decrease by about 1.8 per cent in the agricultural sector and only 1 per cent in industry sectors.

These changes in labour demands were linked to actual households through the micro-simulation model by taking the sectoral declines in labour demands – which suggested job losses – and linking them to the occupational choice model. The decline in labour demand from the CGE model expressed as a percentage was placed alongside the occupational category probability percentile in the form of job queuing – i.e. the probability of losing a job among individuals in a category was sorted from highest to lowest. If this value corresponded to a percentile along the occupational choice probability, then individuals with a probability of employment less than or equal to that percentile would end up losing their jobs and falling into the unemployment group. Table 7.7 summarizes the link between the CGE results of the impact of a 50 per cent MFN tariff on labour demand and the behavioural micro-simulation results based on multinomial logistic regression in table 7.4.

▶ Table 7.7 Micro-simulation results showing number of jobs lost due to trade restrictions

	Unskilled workers		
	Wage to unemployed	**Non-agriculture to unemployed**	**Agriculture to unemployed**
CGE %Δ	–3.5	–3.5	–3.5
Probability	0.0012	0.0134	0.0923
No. of jobs lost	2 805	65 623	671 481
	Skilled workers		
CGE %Δ	–3.25	–1.1	–1.5
Probability	0.0037	0.0169	0.1171
No. of jobs lost	14 368	44 415	302 511

Note: CGE results are based on averages from table 6.6. Survey results use inverse probability importance weights to find population figures. %Δ = percentage change from base.

Results showed that implementing trade restrictions would hurt unskilled workers more than skilled ones. The most affected would be the agricultural sector with a loss of close to 671,481 jobs, followed by the non-agricultural sector losing 65,623 jobs. Interestingly, people with wage jobs seemed to lose the least jobs.

Moreover, skilled workers would also be affected, with over 300,000 agricultural jobs and over 44,000 non-agriculture jobs lost. Wage workers in this category would be particularly vulnerable as, in comparison, only 14,000 unskilled workers' jobs would disappear.

Another finding of the study was that trade restrictions would hurt women more than men. Among unskilled wage earners, women would lose 2,118 jobs, compared with 687 jobs lost by men (tables 7.7 and 7.8). In the non-agricultural working category, the 50 per cent MFN tariff rate would drive about 40,000 female workers into unemployment. Finally, unskilled female farmers would be the most exposed to trade restrictions as close to 320,000 jobs would disappear. Almost 1 million jobs would be lost in agriculture when skilled and unskilled farmers are combined. Further, 18,000 jobs would be lost among skilled female non-agricultural workers and 2,543 wage earners would lose their jobs. Thus, these results indicate that women, particularly unskilled, in the labour market are adversely affected by trade restrictions.

▶ Table 7.8 Micro-simulation results showing the number of female jobs lost due to trade restrictions

	Wage to unemployed	Non-agriculture to unemployed	Agriculture to unemployed
Unskilled workers			
CGE %Δ	–3.5	–3.5	–3.5
Probability	0.0012	0.0134	0.0923
No. of jobs lost	2 118	39 819	320 715
Skilled workers			
CGE %Δ	–3.25	–1.1	–1.5
Probability	0.0037	0.0169	0.1171
No. of jobs lost	2 543	18 023	285 894

Note: CGE results are based on averages from table 7.6. Survey results use inverse probability importance weights to find population figures.

When disaggregated according to occupational incomes (that is, farm income, wages and salaries, and non-agricultural or self-employment income), results showed that factor incomes changed considerably under a restrictive trade regime. For example, CGE impacts showed that the incomes of self-employed and farm workers would fall by 2 per cent, while wage earners' incomes would fall by less than 1 per cent in the medium term. When these results were transferred to a distributive analysis module and welfare aggregates were calculated, it was found that the poverty head count index rose by four percentage points while the poverty gap index rose by three percentage points when an extreme poverty line of US$1.9 was considered (table 7.9). After the simulation, the structure of inequality remained generally unchanged, as evidenced by the Gini index.

▶ Table 7.9 Results of the poverty distributive analysis

Variable	Estimate	Standard error	Lower bound	Upper bound	Poverty line
Head count index					
Base	0.748	0.001	0.745	0.751	100
Sim	0.794	0.001	0.791	0.796	100
Poverty gap index					
Base	0.592	0.001	0.590	0.595	100
Sim	0.631	0.001	0.628	0.633	100
Gini index					
Base	0.731	0.002	0.728	0.734	
Sim	0.738	0.002	0.735	0.741	

▶ 7.5 Conclusion

This study assessed the impact of trade restrictions on labour market outcomes using a static CGE model for Malawi. The results of the CGE model were transferred to a behavioural micro-simulation model of the labour market to simulate changes in occupational choice when the economy adopts a more restrictive stance on trade.

We conducted a counterfactual scenario in which the government imposed the highest MFN of 50 per cent on imports. The results indicated that rising tariffs could have significant impacts on the labour market as we observed a decline of up to 7 per cent in sectoral labour demand. When these results were linked to the micro-simulation, the model showed a cumulative loss of 1 million jobs. Agriculture being the largest employer, it suffered the most as tariffs are associated with rising factor prices for imports. Furthermore, results also indicated that implementing trade restrictions would particularly affect women employed in the agricultural sector, and cause unskilled women to lose their livelihoods. Distributive analysis also showed that trade restrictions deepened the incidence and depth of poverty, but did little to change the structure of inequality.

It is worthwhile to point out some of the caveats in using the CGE model. First, the CGE model used is a static model. This means that it analysed the economy at one set point in time. Resources permitting, it could be more informative to consider a more dynamic version of the problem to ensure full adjustment and reallocation of resources over time. Second, CGE models can be complex to the unfamiliar, such that they may appear as a black box if the assumptions are not well articulated. In this chapter, we attempted to simplify the CGE model without adding too much detail and made explicit our short- to medium-term factor closures. As a guide for future research, a highly disaggregated CGE model which encompasses more sectors than only agriculture should be considered.

References

Akerlof, G.A., and J.L. Yellen. 2010. “The Fair Wage-Effort Hypothesis and Unemployment“. *Quarterly Journal of Economics* 105 (2): 255–83.

Alston, J.M., C.A. Carter, R. Green, and D. Pick. 1990. “Whither Armington trade models?“. *American Journal of Agricultural Economics* 72 (2): 455–467.

Aragie, E., K. Pauw, and V. Pernechele. 2018. “Achieving Food Security and Industrial Development in Malawi: Are Export Restrictions the Solution?“. *World Development* 108: 1–15.

Armington, P.S. 1970. “Adjustment of Trade Balances: Some Experiments with a Model of Trade among Many Countries“. *Staff Papers* 17 (3): 488–526.

Attanasio, O., P.K. Goldberg, and N. Pavcnik. 2004. “Trade Reforms and Wage Inequality in Colombia“. *Journal of Development Economics* 74 (2): 331–366.

Balassa, B. 1964. “The Purchasing-Power Parity Doctrine: A Reappraisal“. *Journal of Political Economy* 72 (6): 584–596.

Benfica, R., B. Cunguara, and J. Thurlow. 2019. “Linking Agricultural Investments to Growth and Poverty: An Economywide Approach Applied to Mozambique“. *Agricultural Systems* 172: 91–100.

Boccanfuso, D., and L. Savard. 2012. “A Segmented Labour Supply Model Estimation for the Construction of a CGE Microsimulation Model: An Application to the Philippines“. *Margin* 6 (2): 211–234.

Burfisher, M.E. 2017. *Introduction to Computable General Equilibrium Models*. 2nd edition. Cambridge University Press.

Carrère, Céline, Marcelo Olarreaga, and Damian Raess. 2022. “Labor Clauses in Trade Agreements: Hidden Protectionism?“. *Review of International Organizations* 17: 453–483.

Chambers, O.D., M.R. Reed, and W.M. Snell. 2000. “Strategic Behavior in the International Burley Tobacco Market“. *Journal of Policy Modeling* 22 (2): 139–148.

Chinoko, M. 2013. “Peeping at Malawi’s Tobacco Industry with an Anti-trust Lens: Are There Thieves at the Dinner Table?“. *Malawi Law Journal* 7: 35–56.

Colombo, G. 2009. “Linking CGE and Microsimulation Models: A Comparison of Different Approaches“. *International Journal of Microsimulation* 3 (1): 72–91.

Creedy, J., and G. Kalb. 2005. "Discrete Hours Labour Supply Modelling: Specification, Estimation and Simulation". *Journal of Economic Surveys* 19 (5): 697–734.

Crush, J., and V. Williams. 2010. "Labour Migration Trends and Policies in Southern Africa". *Policy* 23: 1–79.

Cuddington, J.T., and J.D. Hancock. 1995. "The Macroeconomic Impact of AIDS in Malawi: A Dualistic, Labour Surplus Economy". *Journal of African Economies* 4 (1): 1–28.

Davidson, C., and S.J. Matusz. 2004. *International Trade and Labor Markets: Theory, Evidence and Policy*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Devarajan, S., and D. Rodrik. 1991. "Pro-competitive Effects of Trade Reform". *European Economic Review* 35 (5): 1157–1184.

Distelhorst, Greg, and Richard M. Locke. 2018. "Does Compliance Pay? Social Standards and Firm-level Trade". *American Journal of Political Science* 62 (3): 695–711.

Di Ublado, M., and L.A. Winters. 2020. "International Trade Regulation and Job Creation". *IZA World of Labor* 75 (2).

Foster, J., J. Greer, and E. Thorbecke. 2010. "The Foster–Greer–Thorbecke (FGT) Poverty Measures: 25 Years Later". *Journal of Economic Inequality* 8 (4): 491–524.

Government of Malawi, National Planning Commission. 2020. *Malawi Vision 2063: An Inclusively Wealthy and Self-reliant Nation.*

Hasan, R., D. Mitra, P. Ranjan, and R.N. Ahsan. 2012. "Trade Restrictions and Unemployment: Theory and Evidence from India". *Journal of Development Economics* 97 (2): 269–280.

Heckman, J.J. 1974. "Effects of Child-Care Programs on Women's Work Effort". *Journal of Political Economy* 82 (2, Part 2): S136–S163.

———. 1976. "A Life-Cycle Model of Earnings, Learning, and Consumption". *Journal of Political Economy* 84 (4, Part 2) S9–S44.

Helpman, E., and O. Itskhoki. 2010. "Labour Market Rigidities, Trade and Unemployment". *Review of Economic Studies* 77 (3): 1100–1137.

Kilic, T., A. Palacios-López, and M. Goldstein. 2015a. "Caught in a Productivity Trap: A Distributional Perspective on Gender Differences in Malawian Agriculture". *World Development* 70: 416–463.

———. 2015b. "Gender and Agricultural Productivity in Malawi". *LSMS Integrated Surveys on Agriculture.* Washington, DC: World Bank Group.

Krugman, P.R., M. Obstfeld, and M. Melitz. 2017. *International Economics: Theory and Policy.* London: Pearson.

Löfgren, H., S. Robinson, and R.L. Harris. 2002. *A Standard Computable General Equilibrium (CGE) Model in GAMS*. International Food Policy Research Institute.

MCCCI (Malawi Confederation of Chambers of Commerce and Industry). 2021. "Trade agreements". https://www.mccci.org/economy/trade-agreements.html.

Menezes-Filho, N.A., and M. Muendler. 2011. "Labour Reallocation in Response to Trade Reform", NBER Working Paper No. 17372.

Moyer-Lee, J., and M. Prowse. 2015. "How Traceability is Restructuring Malawi's Tobacco Industry". *Development Policy Review* 33 (2): 159–174.

Pauw, K., J. Thurlow, M. Bachu, and D.E. Van Seventer. 2011. "The Economic Costs of Extreme Weather Events: A Hydrometeorological CGE Analysis for Malawi". *Environment and Development Economics* 16 (2): 177–198.

Porto, G.G. 2008. "Agro-Manufactured Export Prices, Wages and Unemployment". *American Journal of Agricultural Economics* 90 (3): 748–764.

Samuelson, P.A. 1994. "Facets of Balassa-Samuelson Thirty Years Later". *Review of International Economics* 2 (3): 201–226.

Simtowe, F. 2015. "Land Redistribution Impacts on Livelihood Diversification: The Case of a Market-assisted Land Redistribution Programme in Malawi". *Development* 58 (2–3): 366–384.

Thurlow, J., 2017. *2014 Social Accounting Matrix for Malawi: A Nexus Project SAM*. International Food Policy Research Institute.

Tiberti, L., M. Cicowiez, and J. Cockburn. 2017. "A Top-Down Behaviour (TDB) Microsimulation Toolkit for Distributive Analysis", Partnership for Economic Policy Working Paper No. 2017-24. Social Science Research Network (SSRN).

UN Women (United Nations Entity for Gender Equality and the Empowerment of Women). 2014. *Gender Assessment of the Extractive Industries in Malawi.*

UNCTAD (United Nations Conference on Trade and Development). 2017. *Module 4: Trade and Gender Linkages: An Analysis of COMESA.*

Varian, H. 1992. *Microeconomic Analysis*. 2nd edition. Norton.

Wamboye, E.F., and S. Seguino. 2015. "Gender Effects of Trade Openness in Sub-Saharan Africa". *Feminist Economics* 21 (3): 82–113.

Winters, L.A., and A. Martuscelli. 2014. "Trade Restrictions and Poverty: What Have We Learned in a Decade?". *Annual Review of Resource Economics* 6 (1): 493–512.

WHO (World Health Organization). 2021. "Malawi COVID-19 Situation: WHO Health Emergency Dashboard".