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Achieving food security and industrial development in Malawi: Are export restrictions the solution?

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Abstract—Restrictions on exports of staples or cash crops are frequently imposed in developing countries to promote food security or industrial development goals. By diverting production to the local market, these policies reduce prices and increase supply of food or intermediate inputs to the benefit of consumers or downstream industrial users. Although export restrictions reduce aggregate welfare they are attractive to policymakers: governments gain support when they are seen to keep consumer prices low; likewise, politicians are swayed by industrial lobbyists who promise increased value addition in exchange for access to cheaper inputs. This study weighs in on the debate around the desirability of export restrictions by simulating the economy-wide effects of Malawi’s longstanding maize export ban as well as a proposed oilseeds export levy intended to raise value addition in processing sectors. Our results show that while export restrictions may have the desired outcome in the short run, producers respond to weakening market prospects in the longer run by restricting supply, often to the extent that the policies become self-defeating. More specifically, maize export bans only benefit the urban non-poor, with poor farm households experiencing income losses and reduced maize consumption in the long run. The oilseeds export levy is equally ineffective: even when export tax revenues are used to subsidize processors, gains in industrial value addition are outweighed by declining agricultural value addition as the fledgling oilseeds sector is effectively decimated. The policy is further associated with welfare losses among rural households, while urban non-poor households benefit marginally.

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1 Introduction

1.1 Why export restrictions?

Whereas policies that promote exports or restrict imports are considered acceptable for developing economies, the frequent use of policies that restrict exports—most notably export quantity restrictions (bans or quotas) or export levies (taxes)—have left economists puzzled (Bouet and Laborde 2010; Porteus 2012). Not only are their impacts not always fully understood by policymakers, but they are by nature welfare-reducing. By restricting exports, domestic production is diverted to the domestic market, which raises supply and suppresses prices. This benefits consumers or downstream industrial users of those goods, but it comes at the expense of primary producers. Both theoretical and applied real-world models have shown that the losses in producer welfare associated with export restrictions outweigh the gains in consumer welfare, leading to a net decline in overall welfare (Mitra and Josling 2009; Minot 2013; Diao and Kennedy 2016; Dorosh et al. 2009).

Despite negative overall welfare effects, the distributional properties of export bans make them attractive to policymakers. Food security is most commonly offered as the reason for export restrictions on staple food products (Mitra and Josling 2009). By diverting supply from external to domestic markets the policy has the potential to raise domestic food availability and lower prices. Another objective is to shield domestic markets from price spikes in world markets, which is why many countries closed their borders during the 2007/08 global food price crisis. However, export bans are not always effective. At international level, many now agree that the world food price crisis was actually exacerbated when countries collectively banned their exports and global supply dwindled (Minot 2013). Domestically, export bans are likely to be ineffective if a large share of international trade takes place informally across porous borders and cannot be regulated (Babu 2013; Chapoto and Jayne 2009), or where bullish market agents hoard maize in anticipation of the domestic prices recovering, either due to their own attempts at restricting supply or because policymakers may eventually lift the ban (Porteus 2012).

Export restrictions can also form part of an industrial strategy. Fledgling agro-processing sectors receive an implicit subsidy when export restrictions are imposed on raw, unprocessed commodities used by those sectors as intermediate inputs (Piermartini 2004). This allows processors to better compete with imported goods, which means the policy is essentially a variant of infant industry protectionist policies, which traditionally restrict competing imports through tariffs or quotas. A related objective of export restrictions applied in this manner is to raise domestic value addition by restricting exports of raw products and diverting it instead to domestic manufacturing sectors. In doing so processing margins are retained locally (Mitra and Josling 2009). At least one possible drawback of infant industry protectionist policies is that they perpetuate the existence of inefficient sectors (Piermartini 2004).

There are several other justifications for export restrictions. Export levies may be an important source of government revenue, especially if the taxed commodity enjoys a monopoly position in world markets. Governments may also impose export restrictions in retaliation to trade restrictions imposed by trading partners. Export restrictions may also be implemented as a means to protect scarce natural resource or contain trade in illicit or

dangerous goods (Anania 2013). While these are all legitimate justifications, the focus in this study is specifically on the effectiveness of export restrictions imposed with the aim of promoting food security and achieving industrial development objectives.

1.2 *Political economy aspects*

Since export restrictions transfer benefits from producers to consumers or downstream industrial users, the political economy aspects of these policies are extremely pertinent (Anania 2013). Consumers (including net-consuming farm households) typically represent a larger share of the electorate than producers; hence policies that reduce consumer prices may garner more votes for politicians than those that protect net-producing farm households. Industrialists are also typically better organized and have stronger lobbying power than smallholder farmers, which may explain why governments are swayed towards adopting protectionist policies for industry at the expense of farmers. The notion that such policies will raise domestic value addition is also a compelling one, especially for politicians whose career prospects often depend on the performance of the economy.

Unfortunately a reality often overlooked by policymakers is that policies that persistently discriminate against farmers may become self-defeating in the longer run. For example, when export restrictions remain in place for too long, or when the policy decision-making process around imposing or lifting export restrictions is highly discretionary or *ad hoc*, they suppress prices or create market uncertainty for producers. Risk-averse farmers' rational response to uncertainty or the absence of markets is to shift productive resources towards other more profitable crops (Mitra and Josling 2009), discontinue producing a surplus for the market and instead revert to self-sufficiency (Fafchamps 1992; de Janvry et al. 1991), or constrain their productivity-enhancing investments, with long-term consequences for production and growth (World Bank 2015; Chapoto and Jayne 2009). All of these responses will undermine the food security and industrial development objectives of export restrictions.

1.3 *Malawi case study*

Malawi is a small agrarian economy facing persistent food security challenges. It also has an underdeveloped industrial sector which has proved to be a major stumbling block in its economic transformation. For these reasons Malawi represents an interesting case study of a country that has frequently used or called for export restrictions to promote its food security and industrial development goals. With respect to maize, Malawi's key staple crop, government has often in the past imposed export bans to "maintain a semblance of food availability" (Chirwa and Chinsinga 2013:24). More recently government cited protection of their investment in the Farm Input Subsidy Program (FISP)—a large fertilizer subsidy program in place since 2005/06 designed to boost smallholder maize production—as a reason for their reluctance to allow maize exports (see Pauw and Edelman 2015). Following intermittent bans on maize exports between 2005/06 and 2010/11, an export ban has now effectively been in place, uninterrupted, since the 2011/12 cropping season.

The Malawi government regulates international trade of so-called "strategic crops" through Malawi's *Control of Goods Act* (2015). Commodities listed in the act, such as maize, require an export license; therefore, in practice, export bans are instituted by discontinuing the

issuing of licenses. While this restricts formal maize trade, small-scale informal trade often continues unabated, provided market conditions are favorable. In that regard, it is interesting to note that export parity prices have been below domestic prices for extended periods over the past decade, suggesting that Malawi's maize export bans have been mostly redundant (see Pauw and Edelman 2015). Unfortunately the licensing system is also a possible tool for furthering patrimonialism in Malawi, with some traders closely affiliated to government obtaining export licenses even when bans are in place (Chirwa and Chinsinga 2013).

Whereas maize is a politically important crop in Malawi, making policymakers reluctant to engage in debate around maize policies such as export bans, restrictions on oilseeds exports are highly controversial and have been fiercely debated. To understand the context of these debates it is useful to understand the provisions of Malawi's recently launched National Export Strategy (NES) 2013–2018. The NES prioritizes development of three product clusters—oilseeds, sugar, and manufacturers—selected on the basis of the clusters' perceived global competitiveness, linkages to other domestic sectors, and potential for further value addition (GoM 2012b). Among the prioritized clusters the oilseeds cluster has perhaps attracted the most attention. The oilseeds product strategy entails promotion of raw oilseeds production and exports in the short term (e.g., sunflower, groundnuts, soya and cotton), and diversification and increased domestic value addition within the cluster in the medium to longer term (e.g., cooking oil, soaps, lubricants, paints, varnishes, flour, biofuels, and so on).

In line with the NES short term ideals, oilseeds producers have for the past two years enjoyed a policy environment conducive to free trade. However, in recent months, and despite the fact that the NES is still in its infancy, government has mooted the idea of imposing export levies on primary oilseeds products in order to fast-track domestic value addition in the oilseeds processing sector (i.e., mostly cooking oil). Many argued at the time that such a move could be perceived as premature and in contravention of the NES's gradual approach to value addition. For the moment the oilseeds export levy appears to be off the agenda again, but government has nevertheless proceeded to add oilseeds products back onto the list of products in the *Control of Goods Act* (2015), effectively paving the way to regulate trade flows in future.

1.4 Study objectives

The aim of this study is to explore the economy-wide implications of maize export bans and the proposed oilseeds export levy in Malawi against their respective objectives of improved food security and increased domestic value addition in the short and long run. Economy-wide effects are measured using the Standard General Equilibrium (STAGE) model (McDonald and Thierfelder 2012) calibrated to a 2010 Social Accounting Matrix (SAM) for Malawi (Pauw et al. 2015). We simulate the impact of export restrictions under various scenarios with different assumptions about policy implementation modality, policy timeframe, and the fundamental macroeconomic relationships that exist in the Malawian economy. In the case of the export levy, we also explore different options for utilizing revenue generated to potentially enhance the policy effect. The remainder of the paper is structured as follows: section 2 elaborates on the model and simulation setup; section 3 presents the simulation results; and section 4 concludes.

2 Model and simulations

2.1 Model overview

For our analysis we use a comparative static version of the Standard General Equilibrium (STAGE) model (McDonald and Thierfelder 2012). Production is defined by a multi-level nested structure specified for each sector with fixed input-output relationships and variable factor use governed by a constant elasticity of substitution (CES) function. Consumption behavior of representative households is defined by a linear expenditure demand system (LES) that distinguishes consumption of home-produced goods from discretionary consumption (market purchases). The model further adopts an Armington approach to modelling trade flows. Specifically, a CES function determines the substitutability between and optimal mix of imported and domestically produced goods consumed locally, subject to relative prices of imports and locally produced goods. Likewise, a constant elasticity of transformation function (CET) determines the optimal allocation of domestically produced goods across domestic and export markets, again subject to relative prices in those markets.

We calibrate the model with a modified version of the 2010 IFPRI Social Accounting Matrix (SAM) for Malawi developed by Pauw et al. (2015). The SAM includes 70 commodity accounts, 52 activities representing producers operating in the main sectors of the economy, 15 types of factors of production by subgroups labor, land and capital, and 30 representative household groups distinguished by main economic activity, location and expenditure quintile. Whereas the SAM captures financial resource flows associated with transactions between different economic sectors and agents in the economy for a particular accounting period, the STAGE model defines, in mathematical terms, economic agents' behavioral responses to economic or policy shocks. The calibrated model therefore represents an initial state ("baseline") of the economy while at the same time serving as a tool for quantitatively examining policy impact channels, economic interactions, and spillovers associated with exogenous policy shocks through simulation.

2.2 Simulation design

Maize export bans

Maize is a dominant crop in Malawi, accounting for around 28.8 percent of agricultural GDP (see Table 1). However, over 60 percent of maize is consumed by producers themselves, which means the traded maize market is relatively thin. By some estimates only around 10 percent of maize produced is formally traded (see Pauw and Edelman 2015), of which only a fraction is traded internationally when the opportunity exists, i.e., when parity prices in export markets are higher than domestic prices. In 2010, for example, the model base year, less than 0.1 percent of maize production was exported. This is explained by low export parity prices, as no export restrictions were in place during 2009–2011. By 2011, however, export parity prices were more favorable and significant quantities of maize were exported before an export ban was reintroduced late in 2011. During the "2009–2011 free trade period", approximately five percent of all maize produced was exported.

In the absence of maize exports in our base model, an export ban simulation would yield insignificant results. For this reason we first create—through a simple simulation exercise—a

new or “alternative” baseline where surplus maize is produced and around five percent of production is exported, thus adjusting our baseline to be more representative of the period 2009–2011, and just prior to the introduction of an export ban late in 2011. This particular maize export ban remains in place to this day, and therefore our model results are useful for informing us on the impacts of the current policy, both in the short and long run.

When in force, Malawi’s maize export ban applies to both maize grain and processed maize (flour). In our model maize flour is produced by the “grain milling” sector, which technically but to a limited extent includes processing of other grains as well (maize makes up approximately two-thirds of output). Imported grain milling products include mostly non-maize products, while exports, although limited (less than one percent of domestic production) includes mainly maize. The implication is that an export ban on milled grain products may not have a significant direct impact on the economy; however, failure to extend the ban to grain milling products will produce results that are inconsistent with the way the policy is implemented, especially if the millers are able to cease the opportunity to access cheaper grain inputs (due to the export ban) and becoming more competitive in world markets. From a consumption perspective the grain milling sector is also relatively unimportant. Households spend almost five times as much on maize grain as they do on grain milling products—most grain processing is done at home or informally and therefore not captured in the grain milling sector. Nevertheless, the export ban could still have implications for consumers given relative price changes between maize grain and flour.

As explained earlier, in the STAGE model the allocation of domestic production between domestic and export markets is governed by a CET function whereby the optimal outcome depends on relative prices in those markets. However, an export ban removes the possibility of a market-determined outcome; hence for the maize export ban scenarios we alter the model following an approach proposed by Philippidis (2010) and applied by Boulanger et al. (2015)—albeit with an application to import bans—that permits us to eliminate exports and divert it to the domestic market as an exogenous policy shock. In the short run scenario (labelled *sim1a* in the results tables) there is no supply response from producers, i.e., domestic supply is restricted to exactly equal the sum of the base-level exports and domestic supply, while in the longer run (*sim1b*) maize producers have the option to reallocate resources away from maize production.

Oilseeds export levy

The National Export Strategy (NES) oilseeds cluster identifies cotton, groundnuts, soya, and sunflower as priority subsectors for development in Malawi (GoM 2012b). Among these, cotton is the most important export earner and fourth most important export sector in Malawi behind tobacco, sugar, and tea. Unprocessed cotton and cottonseed trade is strictly regulated under Malawi’s *Cotton Act* (2013), and hence did not feature in discussions around an oilseeds export levy. The remaining priority oilseeds crops are all listed in the *Control of Goods Act* (2015) as commodities requiring export licenses, and are the focus of the analysis in this study.

Groundnuts are a relatively significant smallholder food and cash crop. In the baseline model around 50 percent of groundnut production is consumed by producers themselves. Of the

marketed surplus approximately two-thirds is accounted for by household demand. Domestic demand from agro-processors is minimal and most of the balance of domestic supply—around 15 percent of total production—is exported. The sector remains small in value added terms, contributing around 1.6 percent to agricultural GDP (Table 1). Malawi’s sunflower sector is also relatively small and considered underexploited. Soya has also long been considered a high-potential crop in Malawi (GoM 2012b), but soya production has been hampered by a lack of transparency and predictability in soya trade policy. Soya and sunflower are jointly included in the model as the “oilseeds” sector (i.e., separate from groundnuts). Oilseeds is mostly a cash crop, and both household own consumption and marketed consumption are negligible. It is also a highly traded crop: imports make up around one-third of total domestic supply, while exports volumes virtually match domestic production levels. The balance of demand consists almost entirely of intermediate input demand from the “oilseeds and other food processing” sector, where it accounts for around 13 percent of that sectors total intermediate input expenditure. Oilseeds account for around 1.9 percent of agricultural GDP (Table 1).

The rationale for the introduction of an oilseeds export levy in Malawi is that it would encourage domestic value addition in the domestic oilseeds processing sector. Cooking oils are produced primarily from soya and sunflower, and, to a limited extent, groundnuts, and hence these three sectors are the target of our export levy simulations. Apart from direct implications for groundnut and oilseeds producers, we expect economic shocks to filter through to oilseeds processors via inter-industry linkages, while consumers will be impacted mostly via the groundnut consumption channel.

For the export levy simulations we impose a fifteen percent ad valorem tax on oilseeds and groundnuts exports. This causes producers to reallocate output to the domestic market. Increased supply of oilseeds and groundnuts at lower prices will lower production costs in the oilseeds and other food processing sector, which in turn, depending on changes in other prices and household disposable levels, may lead to a demand-induced increase in production. Importantly, since intermediate inputs are fixed relative to output levels under the Leontief specification, the only way in which industrial demand for oilseeds can increase is when demand for its processed variant increases. In the case of groundnuts, however, which is an important household consumption crop, changes in price or disposable income levels can lead to a direct change in demand by households in terms of the LES consumption function.

Two sets of simulations are conducted. In the first all export tax revenue collected is added to government savings where it is available to finance current investments. As in the case of the maize export ban simulations, we consider both a short run scenario (*sim2a*) where factor allocations in the agricultural sector are fixed, as well as a long run scenario (*sim2b*) where agricultural producers can respond to the changes in market condition. Under a second set of scenarios we rerun the same simulation but instead use the additional export tax revenue to finance a subsidy to oilseeds processors, which is expected to enhance the effect of the policy on domestic value addition. These simulations are revenue-neutral, i.e., the subsidy rate is determined endogenously so that all export tax revenue is allocated towards the subsidy.

Since the policy-induced decline in exports is smaller in the short run scenario (*sim2c*) than in the long run scenario (*sim2d*), the amount of funding available for the subsidy is expected to be less in the long run.

3 Results and discussion

3.1 Maize export bans

Table 1 shows the baseline GDP estimates by sector, calculated at factor cost (value added) and reported in millions of Malawi Kwacha (2010 prices). Maize contributes 28.8 percent to agricultural GDP and 9.4 percent to national GDP, and as such is Malawi's most important agricultural subsector. The much smaller grain milling sector, for which we also impose an export ban, contributes 0.8 percent to national GDP. Given the combined size of these sectors, policies that target maize or maize products potentially have significant economy-wide effects, both in terms of production and consumption. As discussed earlier, for the maize export ban simulation, results are compared against an "alternative" baseline (not reported in Table 1) in which maize production and exports are increased so that exports account for around five percent of production. This is more in line with the observed maize export trend during 2009-2011 as opposed to 2010 only when maize grain exports were 0.4 percent of production. Despite a fairly significant increase in maize production and exports, the overall value added structure of the alternative baseline remains remarkably similar to that reported in Table 1, with GDP shares moving up or down by around ± 0.1 percentage points on average.

In the short run (*sim1a*), the introduction of the maize export ban has a significant impact on GDP, with declines of -13.5 and -21.9 percent in the maize and grain milling sectors respectively (Table 1). Agricultural production is assumed unchanged in the short run (see *QXC* in Table 2), but since exports (*QE*) are diverted to the local market, domestic maize grain supply (*QQ*) rises by 6.8 percent, which in turn causes a -15.5 percent decline in maize grain prices (*PQD*). The supply shock in the domestic market is somewhat cushioned by the fact that maize imports (*QM*) decline quite sharply (-48.6 percent), albeit from a low base. Although its exports are banned, the grain milling sector does not face the same production constraints as agricultural producers in the short term, and therefore increases output (*QXC*) by 4.0 percent, replacing imports (*QM*) in the process. Overall supply (*QQ*) still increases by 5.2 percent and causes prices (*PQD*) to decline by -13.0 percent. Rapidly falling maize grain and flour prices cause wages and profits to decline, which explains the large decline in GDP (Table 1) in both the maize and grain milling sectors.

The long run (*sim1b*) price changes are similar to those in the short run in terms of their direction, although generally smaller due to behavioral responses from maize producers. Maize grain and flour prices (*PQD*) decline by -3.3 and -5.4 percent respectively. This is associated with a -6.6 percent decline in maize grain production (*QXC*), which together with the decline in imports (*QM*) almost exactly offsets the quantity of maize previously exported, such that there is no change in the domestic availability of maize (*QQ*). There is also virtually no increase in grain milling output. Under the more flexible long run closure productive resources such as labor, land and capital are extracted from the maize and grain milling

sectors and reallocated to more profitable activities. The small depreciation of the exchange rate (the cost of foreign currency increases by 1.0 percent; Table 2) caused by the loss of maize export earnings makes the export crops and export agro-processing sectors important targets for diverted investments, leading to production (*QXC*) increases of 3.8 and 2.3 percent in these two sectors respectively.

The greater responsiveness of maize producers in the longer run helps the sector reduce welfare losses, as evidenced by the smaller decline in maize GDP, which now falls by -4.3 percent (see Table 1). However, the agricultural sector as a whole suffers a greater reduction in GDP, i.e., by -0.6 percent compared to -0.2 percent in the short run, partly as a result of more mobile productive resources such as labor being attracted to non-agricultural sectors.

Table 1. Changes in real GDP at factor cost (value added): maize export ban and oilseeds export levy simulations

	Changes relative to base (%)*								
	GDP (value added) 2010 (baseline)			Maize export ban		15% oilseeds export levy		15% oilseeds export levy with processing subsidy	
	GDP (MWK millions)	National GDP share (%)	Agric. GDP share (%)	Short run closure (sim1a)	Long run closure (sim1b)	Short run closure (sim2a)	Long run closure (sim2b)	Short run closure (sim2c)	Long run closure (sim2d)
NATIONAL GDP	953,383	100.0		0.0	0.0	0.0	0.0	0.0	0.0
Agriculture	310,331	32.6	100.0	-0.2	-0.6	0.0	-0.1	0.0	-0.1
<u>Field crops, staples, and pulses</u>	<u>144,152</u>	<u>15.1</u>	<u>46.5</u>	<u>-5.0</u>	<u>-1.8</u>	<u>-0.3</u>	<u>-2.9</u>	<u>-0.2</u>	<u>-2.8</u>
Maize	89,305	9.4	28.8	-13.5	-4.3	0.6	1.2	0.9	1.2
Other cereals	11,689	1.2	3.8	6.4	3.2	0.3	0.7	0.4	0.7
Roots	17,150	1.8	5.5	10.4	3.2	0.8	1.3	0.9	1.3
Pulses	15,155	1.6	4.9	7.6	0.9	0.5	0.5	0.3	0.5
Groundnuts	5,060	0.5	1.6	10.5	3.0	-9.1	-4.3	-9.3	-4.3
Oilseeds	5,793	0.6	1.9	12.0	0.9	-14.1	-93.0	-14.3	-92.9
<u>Fruits & vegetables</u>	<u>21,976</u>	<u>2.3</u>	<u>7.1</u>	<u>8.0</u>	<u>3.1</u>	<u>0.4</u>	<u>0.9</u>	<u>0.1</u>	<u>0.9</u>
<u>Export & other crops</u>	<u>23,192</u>	<u>2.4</u>	<u>7.5</u>	<u>13.2</u>	<u>4.4</u>	<u>0.7</u>	<u>16.5</u>	<u>0.3</u>	<u>16.2</u>
<u>Livestock, forestry & fishing</u>	<u>121,010</u>	<u>12.7</u>	<u>39.0</u>	<u>1.6</u>	<u>-0.7</u>	<u>0.1</u>	<u>-0.2</u>	<u>0.0</u>	<u>-0.1</u>
Industry	158,532	16.6		1.0	1.2	0.0	0.1	0.1	0.1
<u>Food & agro-processing</u>	<u>57,756</u>	<u>6.1</u>		<u>-2.7</u>	<u>2.0</u>	<u>0.0</u>	<u>2.6</u>	<u>1.1</u>	<u>2.9</u>
Meat processing	1,278	0.1		7.5	-0.6	0.2	-0.4	1.4	0.0
Grain milling	7,210	0.8		-21.9	-11.5	0.0	-1.1	2.5	-0.5
Export agro-processing	25,604	2.7		0.5	2.1	0.0	6.4	0.0	6.2
Oilseeds & other food-processing	6,367	0.7		-3.9	-1.7	-0.1	0.0	7.2	2.1
Beverages	17,297	1.8		-0.5	-0.3	0.0	-0.2	0.0	-0.2
<u>Mining & other manufacturing</u>	<u>100,775</u>	<u>10.6</u>		<u>3.1</u>	<u>2.3</u>	<u>0.0</u>	<u>-1.3</u>	<u>-0.6</u>	<u>-1.4</u>
Services	484,520	50.8		-0.2	0.0	0.0	0.0	0.0	0.0
<u>Trade & business services</u>	<u>371,462</u>	<u>39.0</u>		<u>-0.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>	<u>0.0</u>	<u>0.1</u>
<u>Government & other services</u>	<u>113,058</u>	<u>11.9</u>		<u>-0.7</u>	<u>0.0</u>	<u>0.1</u>	<u>-0.2</u>	<u>-0.1</u>	<u>-0.2</u>

Source: Malawi Social Accounting Matrix (SAM) 2010 (Pauw et al. 2015) and STAGE model results

Note: (*) Simulation results reflect changes relative to the model base (2010). In the case of the export ban results, changes are relative to the “alternative” baseline generated for this scenario, as discussed in section 2.2.

Table 2. Price and quantity effects of maize export bans (selected activities/commodities)

	Changes relative to base (%)									
	Short run closure (<i>sim1a</i>)					Long run closure (<i>sim1b</i>)				
	Domestic prices (PQD)	Domestic production (QXC)	Exports (QE)	Imports (QM)	Total domestic supply (QQ)	Domestic prices (PQD)	Domestic production (QXC)	Exports (QE)	Imports (QM)	Total domestic supply (QQ)
<u>Field crops, staples & pulses</u>	<u>-11.0</u>	-	<u>-52.5</u>	<u>0.9</u>	<u>4.2</u>	<u>-3.1</u>	<u>-3.9</u>	<u>-51.7</u>	<u>-0.2</u>	<u>0.1</u>
Maize	-15.5	-	-	-48.6	6.8	-3.3	-6.6	-	-25.1	0.0
Other cereals	-13.7	-	3.2	4.6	1.0	-2.3	0.1	4.5	1.3	0.4
Roots	-2.4	-	9.3	-8.5	0.0	-3.0	0.1	8.5	-7.6	0.1
Pulses	-2.8	-	0.0	-7.6	0.0	-4.0	0.1	0.0	-9.6	0.1
Groundnuts	-1.6	-	2.9	-4.3	-0.5	-4.2	1.8	8.8	-8.1	0.5
Oilseeds	-0.1	-	-0.1	2.7	2.6	1.0	1.0	1.0	1.7	1.7
<u>Fruits & vegetables</u>	<u>-1.4</u>	-	<u>1.2</u>	<u>-3.2</u>	<u>-0.2</u>	<u>-1.3</u>	<u>0.3</u>	<u>3.0</u>	<u>-3.0</u>	<u>-0.1</u>
<u>Export & other crops</u>	<u>1.0</u>	-	<u>0.1</u>	<u>-1.3</u>	<u>-0.1</u>	<u>0.4</u>	<u>3.8</u>	<u>6.6</u>	<u>-3.3</u>	<u>2.7</u>
<u>Food & agro-processing</u>	<u>-0.9</u>	<u>1.0</u>	<u>-0.5</u>	<u>-4.0</u>	<u>1.0</u>	<u>-0.5</u>	<u>1.3</u>	<u>2.0</u>	<u>-2.3</u>	<u>0.4</u>
Meat processing	0.3	0.0	-1.1	1.4	0.5	-0.6	1.9	4.4	-1.3	0.8
Grain milling	-13.0	4.0	-	-20.7	5.2	-5.4	0.1	-	-10.1	2.0
Export agro-processing	0.9	0.2	0.3	-0.4	-0.3	0.7	2.3	2.9	-1.1	-0.1
Oilseeds & other food-processing	-5.1	2.4	8.4	-4.0	0.4	-0.9	1.1	3.9	-2.0	0.1
<u>Mining & other manufacturing</u>	<u>1.6</u>	<u>2.4</u>	<u>11.7</u>	<u>-1.5</u>	<u>-0.3</u>	<u>0.7</u>	<u>1.6</u>	<u>9.5</u>	<u>-0.8</u>	<u>-0.2</u>
Exchange rate			1.8					1.0		

Source: STAGE model results

Structural shifts in the economy combined with relative price changes have welfare implications for households, which we consider next. Table 3 reports changes in disposable income (i.e., the portion of household income that is available for consumption after deductions for taxes, savings, and other transfers) and maize consumption quantities for different household sub-groups. The most striking result in the short run scenario (*sim1a*) is a –1.4 percent decline in rural disposable income (*HEXP*), which stands in contrast to the 1.8 percent increase in urban areas. Among farm households, the biggest losses occur among medium and large scale farmers (–2.4 and –1.7 percent respectively), who are more likely to produce a marketable surplus and are therefore vulnerable to price shocks. Smallholder farmers, on the other hand, are more often subsistence-oriented, and hence are virtually unaffected. Among rural households, only non-farm households benefit from export bans (2.1 percent gain) as their incomes are not directly linked to the profitability of maize. Another striking result, probably contrary to the intension of policymakers, is that maize export bans either hurt the poor more than the non-poor (in rural areas) or benefit the non-poor more than the poor (in urban areas).

Table 3. Disposable income and consumption effects of maize export bans for different household groups

	Changes relative to base (%)					
	Short run closure (<i>sim1a</i>)			Long run closure (<i>sim1b</i>)		
	Dis- posable income (<i>HEXP</i>)	Maize grain cons. (<i>QCD_g</i>)	Grain flour cons. (<i>QCD_f</i>)	Dis- posable income (<i>HEXP</i>)	Maize grain consum (<i>QCD_g</i>)	Grain flour cons. (<i>QCD_f</i>)
<u>Rural households</u>	<u>-1.4</u>	<u>4.6</u>	<u>4.6</u>	<u>-0.8</u>	<u>-1.7</u>	<u>0.9</u>
<i>Rural households (by farm type)</i>						
Smallholder farmers	-0.1	6.0	5.6	-0.5	-1.3	1.2
Medium-scale farmers	-2.4	4.0	2.9	-1.2	-2.1	-0.1
Large farmers	-1.7	3.3	2.4	-0.9	-1.8	0.4
Non-farm households	2.1	11.7	7.1	0.9	5.0	3.7
<i>Rural households (by poverty status)</i>						
Rural poor	-2.2	5.0	4.5	-1.3	-2.2	0.1
Rural non-poor	-1.1	4.5	4.6	-0.7	-1.6	1.5
<u>Urban households</u>	<u>1.8</u>	<u>11.2</u>	<u>8.7</u>	<u>0.9</u>	<u>2.6</u>	<u>4.1</u>
<i>Urban households (by poverty status)</i>						
Urban poor	0.3	8.7	7.7	-0.1	-0.6	3.1
Urban non-poor	1.8	11.3	8.7	0.9	2.7	4.2
All households	0.0	5.5	6.1	-0.1	-1.2	2.1

Source: STAGE model results

Note: (*) “Poor” households are here crudely defined as those in the bottom two per capita expenditure quintiles, which translates to a poverty rate of 40 percent. Those in the third to fifth quintiles are classified as “non-poor”. The official poverty rate in Malawi is 50.7 percent (NSO 2012), which means our measure includes the poorest four-fifths of those officially classified as poor.

While we see mixed results as far as disposable income levels are concerned, maize grain (*QCD_g*) and flour (*QCD_f*) consumption quantities increase across the board, thanks to the

sharp decline in prices and increased availability. Consumption levels increase more for households that are net-consumers of maize, e.g., urban non-poor or rural non-farm households in particular. In summary, therefore, the short run scenario is associated with an improvement in household access to and affordability of maize, but this comes at the expense of farm households' ability to access other goods and services due to declines in disposable income levels.

In the long run (*sim1b*) we still note an increase in disposable incomes (*HEXP*) for urban households (0.9 percent) and a decline for rural households (−0.8 percent), although changes are somewhat smaller than in the short run owing to behavioral responses. Medium and large-scale farmers are able to mitigate some of the short-run losses by refocusing on more profitable crops, in particular export crops. Smallholder farmers, on the other hand, are less likely to benefit from new opportunities and see their disposable income levels decline even more in the longer (−0.5 percent). In addition to farming households, all poor households—rural ones in particular—experience a decline in disposable income levels, with the policy now only benefiting urban non-poor and non-farm rural households. These households benefit from cheaper food and increased income-earning opportunities in the non-agricultural sector related to the structural shifts in the economy.

Consumption of maize grain (QCD_g) declines across the board, with the exception of non-farm and urban non-poor households. At the countrywide level, consumption declines by −1.2 percent. Note that this result is not inconsistent with unchanged total supply (QQ) in the long run (see Table 2) since QCD_g represents maize availability to households after industrial demands have been met. Consumption of maize flour (QCD_f), on the other hand, increases for virtually all household types, and by 2.1 percent for the country as a whole, in part because of a shift in household demand towards maize flour, which is now relatively cheaper than maize grain (see PQD in Table 2). However, since in value terms households spend almost five times as much on maize grain than on maize flour, and with the latter priced almost three times more (NSO 2015), the decline in maize grain quantity far outweighs the increase in flour consumption, such that the combined grain and flour consumption quantity declines by around one percent.

From a food security perspective the above is perhaps not an alarming result, especially when considering increases in supply and access to other staple foods, pulses and oilseeds (see Table 2). However, it is evident that a long term maize export ban does not contribute to the availability of and access to maize, and as such is not an effective food security strategy; instead, it more likely limits maize production. The long term maize ban in Malawi, combined with the inputs subsidy program for subsistence farmers, has likely suppressed commercial cultivation of maize to such an extent that surpluses are at an absolute minimum, thus providing a very limited buffer during periods of crisis or even minor production swings. A more favorable trade policy regime will encourage commercial producers to re-enter the maize market, thus improving food security outcomes. Equally concerning is that export bans are regressive in that they generally favor urban non-poor at the expense of farm households, many of whom are poor.

3.2 Oilseeds export levy

The relatively small size and limited export penetration of the groundnuts and oilseeds sectors in Malawi means that even a fairly significant export levy of 15 percent is unlikely to have major macroeconomic effects or government revenue implications. However, it is expected to have important sector-level effects. In interpreting results it is important to understand that intermediate input use is fixed relative to the output of a sector (Leontief function), as discussed earlier. If demand for processed oilseeds is constrained, intermediate input demand for raw oilseeds will also be constrained, and this crucially determines the effectiveness of the policy.

Table 4a shows the results from the short (*sim2a*) and long run (*sim2b*) scenarios where export tax revenue contributes to government savings. Since the domestic consumer market for groundnuts is relatively large, producers are able to divert a relatively large share of exports (*QE*) to the domestic market (−11.6 percent), but with the consequence that prices (*PQD*) decline quite sharply (−7.4 percent). By contrast, oilseeds is mostly used domestically as an intermediate input for which demand is less robust for reasons explained above, and hence a smaller share of exports is diverted (−0.8 percent) and domestic prices decline less sharply (−0.8 percent). However, with a large share of production remaining in the export market, the profitability of oilseeds sector is severely affected, leading to a larger reduction in value added (−14.1 percent) than that of the groundnuts sector (−9.1 percent) (Table 1).

The small decline in oilseeds prices implies limited benefits to the oilseeds processing sector in terms of reduced costs of production, especially bearing in mind that oilseeds only account for around 13 percent of total intermediate input demand. Output (*QXC*) in the oilseeds and other food processing sector increases only marginally by 0.1 percent (Table 4a), suggesting some increased economic activity as the sector is able to replace some imports (*QM*) and raise exports (*QE*). However, with no significant change in processed food prices (*PQD*) consumers switch towards cheaper agricultural produce. Value added declines, albeit very marginally (−0.1 percent; Table 1), and so ultimately the policy fails to achieve its objective in the short run.

In the long run we observe a very significant supply (*QXC*) shock from oilseeds producers (−93.2 percent). With production almost decimated a relatively larger share of the domestic supply mix is made up of imports. Overall we see a 19.8 percent decline in total domestic supply (*QQ*) of oilseeds. These effects, together with the small depreciation of the exchange rate, which raises the cost of imported oilseeds, explain the unexpected price (*PQD*) increase of 5.0 percent. The impact is much less severe for groundnuts, of which a significant share of production is consumed by producers themselves. Agricultural production is diverted mostly to the export crop sector, which leads to relatively large increases in value added in this sector (16.5 percent) as well as the export agro-processing sector (6.4 percent; Table 1). By sharp contrast, output (*QXC*) declines by −0.3 percent and prices (*PQD*) rise by 0.4 percent in the oilseeds and other food processing sector, the intended beneficiary. Consequently the sector experiences no value addition relative to the base, while the small gain in value addition in the industrial sector as a whole (0.1 percent) is more than offset by the −0.1 percent decline in agricultural value added.

Table 4a. Price and quantity effects of oilseeds export levies (selected activities/commodities)

	Changes relative to base (%)									
	Short run closure (<i>sim2a</i>)					Long run closure (<i>sim2b</i>)				
	Domestic prices (PQD)	Domestic production (QXC)	Exports (QE)	Imports (QM)	Total domestic supply (QQ)	Domestic prices (PQD)	Domestic production (QXC)	Exports (QE)	Imports (QM)	Total domestic supply (QQ)
15% oilseeds export levy										
<u>Field crops, staples & pulses</u>	<u>-0.3</u>	-	<u>-1.9</u>	<u>-1.4</u>	<u>0.0</u>	<u>-0.7</u>	<u>-3.2</u>	<u>-79.0</u>	<u>-3.9</u>	<u>-0.3</u>
Maize	-0.1	-	0.3	-0.2	0.0	-0.8	0.1	2.1	-1.8	0.1
Other cereals	-0.2	-	0.0	-0.1	0.0	-0.4	-0.3	1.7	-0.4	-0.4
Roots	0.0	-	0.2	-0.1	0.0	-1.0	0.1	2.9	-2.6	0.1
Pulses	-0.1	-	0.0	-0.3	0.0	-1.3	0.1	0.0	-3.0	0.1
Groundnuts	-7.4	-	-11.6	-15.0	1.9	0.5	-4.8	-27.6	-2.2	-1.0
Oilseeds	-0.8	-	-0.8	-4.5	-2.8	5.0	-93.2	-94.8	-12.3	-19.8
<u>Fruits & vegetables</u>	<u>0.0</u>	-	<u>0.0</u>	<u>-0.1</u>	<u>0.0</u>	<u>-0.3</u>	<u>0.1</u>	<u>1.0</u>	<u>-0.7</u>	<u>0.0</u>
<u>Export & other crops</u>	<u>0.1</u>	-	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>-0.2</u>	<u>12.3</u>	<u>12.2</u>	<u>-3.7</u>	<u>12.2</u>
<u>Food & agro-processing</u>	<u>0.0</u>	<u>0.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>	<u>0.1</u>	<u>4.5</u>	<u>11.1</u>	<u>-0.2</u>	<u>-0.1</u>
Meat processing	0.2	0.0	-0.3	0.3	0.1	0.1	-0.1	-0.2	0.0	-0.1
Grain milling	0.0	0.1	0.2	0.0	0.1	-0.2	0.0	0.8	-0.7	0.0
Export agro-processing	0.0	0.0	0.0	0.0	0.0	-0.1	9.2	11.5	-2.9	-0.1
Oilseeds & other food-processing	0.0	0.1	0.3	-0.1	0.1	0.4	-0.3	-1.1	0.5	-0.1
<u>Mining & other manufacturing</u>	<u>0.1</u>	<u>0.0</u>	<u>-0.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.2</u>	<u>-0.8</u>	<u>-5.4</u>	<u>0.3</u>	<u>0.2</u>
Exchange rate			0.1					0.1		

Source: STAGE model results

Table 4b. Price and quantity effects of maize export bans (selected activities/commodities)

	Changes relative to base (%)									
	Short run closure (<i>sim2c</i>)					Long run closure (<i>sim2d</i>)				
	Domestic prices (<i>PQD</i>)	Domestic production (<i>QXC</i>)	Exports (<i>QE</i>)	Imports (<i>QM</i>)	Total domestic supply (<i>QQ</i>)	Domestic prices (<i>PQD</i>)	Domestic production (<i>QXC</i>)	Exports (<i>QE</i>)	Imports (<i>QM</i>)	Total domestic supply (<i>QQ</i>)
15% oilseeds export levy with processing subsidy										
<u>Field crops, staples & pulses</u>	<u>0.5</u>	-	<u>-2.1</u>	<u>2.8</u>	<u>0.2</u>	<u>-0.6</u>	<u>-3.2</u>	<u>-79.0</u>	<u>-2.7</u>	<u>-0.2</u>
Maize	0.8	-	-1.2	1.4	0.0	-0.7	0.2	2.1	-1.7	0.2
Other cereals	0.3	-	-1.3	3.9	1.1	-0.3	-0.2	1.7	0.7	0.0
Roots	0.7	-	-0.3	0.3	0.0	-0.9	0.1	2.9	-2.6	0.1
Pulses	0.3	-	0.0	0.2	0.0	-1.2	0.2	0.0	-2.9	0.2
Groundnuts	-7.1	-	-11.9	-14.6	2.0	0.6	-4.8	-27.6	-2.2	-1.0
Oilseeds	-0.5	-	-0.9	0.7	2.3	5.1	-93.2	-94.7	-10.6	-18.3
<u>Fruits & vegetables</u>	<u>0.3</u>	-	<u>-0.1</u>	<u>0.2</u>	<u>0.0</u>	<u>-0.2</u>	<u>0.1</u>	<u>1.0</u>	<u>-0.7</u>	<u>0.0</u>
<u>Export & other crops</u>	<u>0.2</u>	-	<u>0.0</u>	<u>-0.3</u>	<u>0.0</u>	<u>-0.1</u>	<u>12.1</u>	<u>11.9</u>	<u>-3.7</u>	<u>12.0</u>
<u>Food & agro-processing</u>	<u>-1.3</u>	<u>1.5</u>	<u>0.4</u>	<u>-5.7</u>	<u>1.1</u>	<u>-0.3</u>	<u>4.8</u>	<u>11.0</u>	<u>-2.1</u>	<u>0.3</u>
Meat processing	1.4	0.0	-2.9	3.9	1.3	0.2	0.3	0.2	0.5	0.3
Grain milling	0.5	1.9	1.2	2.6	1.9	-0.1	0.6	1.3	-0.1	0.6
Export agro-processing	0.3	0.1	-0.1	0.3	0.5	0.0	9.0	11.2	-2.8	0.0
Oilseeds & other food-processing	-5.0	7.2	24.8	-9.2	1.8	-1.2	1.8	5.8	-2.4	0.4
<u>Mining & other manufacturing</u>	<u>0.2</u>	<u>-0.4</u>	<u>-1.8</u>	<u>0.0</u>	<u>-0.1</u>	<u>0.2</u>	<u>-0.8</u>	<u>-5.6</u>	<u>0.3</u>	<u>0.1</u>
Exchange rate			0.2					0.2		

Source: STAGE model results

Constrained demand for oilseeds used as intermediate inputs explains the poor outcome of this scenario. Since the policy does raise some revenue for government, one possibility is to subsidize oilseeds processing in an attempt to increase demand for its output and hence intermediate input demand for oilseeds; another possibly more effective strategy would be to provide government grants directly to consumers, but this falls beyond the scope of the analysis. Table 4b reports the price and quantity results of these scenarios, once again under a short run (*sim2c*) and long run (*sim2d*) closure. A detailed discussion of these results is omitted; suffice to say, this policy now indeed raises value addition in the oilseeds and food processing sector in the short run (i.e., by 7.2 percent; Table 1), but still fails to mitigate the negative effects for primary producers. In the long run the results look less positive. Since primary producers get no reprieve, they respond sharply by reducing supply by a similar extent as in the first set of simulations. This lowers government revenue from the export levy—by a staggering 86.4 percent—which lowers the subsidy rate to oilseeds and other food processors from 8.2 percent to 2.4 percent of the value of output. Even with the subsidy in place, the reorientation of the agricultural sector towards the export crop sector still makes the export agro-processing sector a more viable option for investors than the oilseeds and other food processing sector.

Finally, we turn to an assessment of household welfare outcomes as measured by changes in disposable income levels reported in Table 5. In the absence of the oilseeds processing subsidy (*sim2a* and *sim2b*) the oilseeds export levy harms farmers, particularly medium- and larger-scale farmers who are more actively engaged in cash crop cultivation. Urban households benefit slightly, and these effects are amplified in the long run.

Table 5. Disposable income effects of oilseeds export levies for different household groups

	Changes relative to base (%)			
	15% oilseeds export levy		15% oilseeds export levy with processing subsidy	
	Short run closure (<i>sim2a</i>)	Long run closure (<i>sim2b</i>)	Short run closure (<i>sim2c</i>)	Long run closure (<i>sim2d</i>)
Rural households	-0.1	-0.2	0.1	-0.2
<i>Rural households (by farm type)</i>				
Smallholder farmers	0.1	0.0	0.3	0.1
Medium-scale farmers	-0.1	-0.4	0.1	-0.3
Large farmers	-0.2	-0.6	-0.1	-0.5
Non-farm households	0.2	0.3	0.1	0.3
<i>Rural households (by poverty status)</i>				
Rural poor	-0.1	-0.3	0.2	-0.3
Rural non-poor	0.0	-0.2	0.1	-0.2
Urban households	0.2	0.3	0.1	0.3
<i>Urban households (by poverty status)</i>				
Urban poor	0.1	0.1	0.2	0.1
Urban non-poor	0.2	0.3	0.1	0.3
All households	0.1	0.0	0.1	0.0

Source: STAGE model results

The oilseeds processing subsidy (*sim2c* and *sim2d*) helps alleviate the negative for rural households, particularly the poor, in the short run, mostly as a result of lower processed food prices (see *PQD* in Table 4b), but in the long run the significant reduction in funding available for the subsidy leads to a distributional outcome that is very similar to the scenario without subsidies. In summary, therefore, the oilseeds export levy fails not only in achieving its goal of raising value addition in the economy—unless the oilseeds processing sector is heavily subsidized—but causes a deterioration in the already skewed distribution of income between rural and urban areas.

4 Conclusions

Restrictions on exports of staple foods or cash crops are frequently imposed in developing countries as a means to promote food security or industrial development goals. By diverting domestic production to the local market, these policies reduce prices and increase supply of food or intermediate inputs to the benefit of consumers or downstream industrial users. However, a reality often overlooked by policymakers is that short term outcomes—which may be consistent with the intended objectives—are very different from those in the long run owing to behavioral responses of producers. The aim of this study is to explore the economy-wide implications of maize export bans and a proposed oilseeds export levy in Malawi against their respective objectives of improved food security and increased domestic value addition, highlighting the differences between the short and long run. Using the Standard General Equilibrium (STAGE) model calibrated to a 2010 Social Accounting Matrix (SAM) for Malawi, we simulate the impact of export restrictions under various scenarios and policy timeframes.

In line with findings of Diao and Kennedy (2016), Dorosh et al. (2009), and others, our results show that in the short run Malawi's maize export ban achieves its stated goal of increased food security, measured in terms of access and availability of maize. Maize grain and flour consumption increases by around six percent. However, these gains come at a cost to the rural farm sector in particular, as evidenced by a 0.2 percent decline in agricultural value added, which translates into lower disposable income levels for farm households. In general, the policy benefits urban households and harms rural households, the majority of whom are poor. In the long run the policy causes maize producers to shift to other crops, to the extent that maize grain and flour consumption actually declines marginally, i.e., by around one percent, while agricultural value addition declines by 0.6 percent. The policy now only benefits urban non-poor and rural non-farm households, with all other households, including the urban poor, experiencing declines in their disposable income levels.

In contrast to the maize export ban results, a 15 percent oilseeds export levy is less likely to achieve its goal of increased value addition in processing sectors, unless the revenue generated by the new tax is used to finance a production subsidy for oilseeds processors. In the long run, whether processors are subsidized or not, we note a very significant response from oilseeds producers (soya and sunflower) who lower production by over 90 percent. Given robust demand for groundnuts from domestic consumers, the supply response is smaller for groundnuts producers. As in the case of the maize export ban, an oilseeds export levy tends to benefit urban consumers at the expense of rural producers, in the short run, and

more so in the long run. In the short run the subsidy to processors mitigates some of the negative welfare effects for rural households by lowering food prices. However, the sharp decline in export tax revenue in the long run (i.e., by 86.4 percent) prevents government from continuing to offer a generous food processing subsidy. Thus, irrespective of how export tax revenues are utilized in the scenarios explored here, the distributional effects of the policy remain biased against rural poor households and favors the urban non-poor in the long run.

Our results confirm that policy-induced distortions in the form of export bans or export levies create disincentives to produce, rendering these policies self-defeating and unsustainable. Beyond the modeling analysis itself, many have argued that even when policies are not actually implemented or actively enforced, the mere threat of their imposition or the possibility of penalties for non-compliance raises transaction costs and creates market uncertainty, which ultimately encourages a subsistence-oriented approach to farming as farmers and consumers lose trust in markets. Not only are export restrictions welfare-reducing and biased against rural poor households, but they are ultimately inconsistent with the government's ambition—articulated in the second Malawi Growth and Development Strategy (MGDS II)—of transforming the economy from being a “predominantly importing and consuming economy to a predominantly producing and exporting economy” (GoM 2012a).

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