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The Impact of Aid for Trade in Ethiopia: A CGE-based Simulation Analysis

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Abstract

Depending on the nature of the aid and the characteristics of the economy, aid and trade can either reinforce or counteract each other in fostering economic development. This paper contributes to the ongoing debate on the interaction between aid and trade by analysing the impact of aid for trade (A4T), which involves different interventions in support of the supply side of the economy.

Using computable general equilibrium (CGE) simulations developed around a recently completed social accounting matrix (SAM) for Ethiopia, the impact of different types of A4T interventions have been analysed. The simulations reveal how Dutch disease effects of aid can be ameliorated through A4T policies and taking account of their supply side effects. The results suggest that, if appropriately designed, aid need not be in conflict with trade objectives.

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1. Introduction

The interaction of aid and trade, two of the most important external forces that can generate development, is the subject of continuing debate. Depending on the nature of the aid and the characteristics of the economy, aid and trade can be partners or rivals (discussed in Page, 2006).

The most commonly-cited negative effect of aid is Dutch disease, whereby the inflow of foreign currency appreciates the exchange rate making exports less competitive abroad. On the other hand, aid can positively influence export capacity through its impact on the supply-side of the economy.

Donors are increasingly considering export promotion as part of their strategies, often referred to as aid for trade (A4T), and there are calls for this to become a higher priority (e.g. Stiglitz and Charlton, 2006). Using a model of the Ethiopian economy, this paper attempts to shed some light on the conditions under which aid can assist or damage this nation's exports, highlighting the policy implications.

This paper is organised as follows. Section two reviews the interaction of aid and trade, as well as the specific concept of A4T, and section three offers a brief outline of the barriers to trade in Ethiopian economy. The data and modelling framework is given in section four, with the simulations in section five and results in section six. Section seven concludes, suggesting policy implications and recommendations for future development of the research.

2. Aid, Trade and Aid for Trade (A4T)

The most commonly cited effect of aid on trade is the phenomenon of Dutch disease, which is well-established in theory and observed empirically (e.g. Rajan and Subramanian, 2005). A standard CGE framework will typically (and appropriately) deliver a Dutch disease result, unless counteracting factors are brought into consideration. The standard result arises from focusing on the effect of aid on the demand side of the economy. The key counteracting factors depend on the impact that aid has on the supply side of the economy, which under plausible conditions can outweigh the simple Dutch disease concerns;[2] [3] the literature has identified several channels, which are outlined below.

Aid may raise productivity in the economy as a whole, which may boost exports sufficiently to outweigh the reduction in exports from an appreciating exchange rate. Rising productivity could occur at the firm level, but could also occur by reducing impediments to production, such as through improved infrastructure or streamlining bureaucracy.

[2] Adam and Bevan (2006) investigate this in a stylised model, loosely based on Ugandan data.
[3] Killick and Foster (2007) discuss the challenges in realising positive supply side policies.

Aid could also have differential impacts on the tradable and nontradable sectors. If aid raises the productivity of nontradables, this could serve to offset the appreciation of the exchange rate. In other words, the increase in demand for nontradables, caused by the appreciation, is more than matched by the increase in supply (Bevan, 2005:11).

If, on the other hand, aid is focused primarily at raising the productivity of exportables, the real appreciation may be even greater than from the Dutch disease effects alone. Nevertheless, despite the lower price received for exports (in local currency), exports may yet increase because the enhanced productivity results in higher profitability (ibid.).

Bevan (ibid:11-12) also notes a third mechanism through which aid could operate: the reduction of under-utilised capacity. Policy is not simply a matter of "smoothing a fairly regular [business] cycle," rather that "market inefficiencies permit there to be sustained pockets of reduced activity, and also that there are large shocks which induce extended periods of disequilibrium." [4] Aid may help to reduce this underemployment of factors.

In light of these four considerations (raising productivity (1) overall, (2) of nontradables, (3) of exports and (4) reducing underemployment), it is clear that, in principle, aid has the potential to boost an economy's exports. Despite this, donors have, until recently, been focusing less on trade policy. A recent IMF/World Bank report (2007:16-7) gave this explanation:

> "The World Bank, for example, sharply reduced its activities in trade in the 1990s, in part because the wave of tariff reforms in the prior ten years was thought to be enough to help countries integrate better into the global market."

While tariff reforms have assisted many developing countries to boost their trade, many countries that have experienced poor export performance and this has been especially true across sub-Saharan Africa.

The positive role that donors can play with respect to export promotion is based around the impediments they face, some of which are outlined by Nielson (2006:23):

> "Some [poor countries] lack the necessary infrastructure… [o]thers have inefficient institutions… that drive up the costs of trading… [o]r producers may lack knowledge about market opportunities and how to access them… many are unable… to meet high standards in export markets."

Such impediments to trade are areas where a successful A4T intervention could improve the situation.

At this point, it is necessary to define more precisely what constitutes an A4T intervention. The commonly accepted definition of the Bank and the Fund encompasses five main activities:

[4] The point regarding under-utilised capacity was made with respect to Ethiopia by a World Bank economist in an interview with the author in March 2007.

- *Technical assistance*: the provision of technical assistance, advice, and expertise to assist countries confronted with the complexities of modern trade.
- *Capacity building*: building the capacity of developing countries to deal with trade issues, for example, through the training of government officials.
- *Institutional reform*: helping to create a framework of sound and well-functioning institutions for trade—in customs, quality assurance, and other areas.
- *Infrastructure*: improving roads and ports to link the poor and the goods they produce to markets through investment in infrastructure.
- *Assistance with adjustment costs*: fiscal support and policy advice to help countries cope with any transitional adjustment costs from liberalization.
  (IMF/World Bank, 2005:3)

It is apparent that many A4T elements are part of a common donor expenditure portfolio, and naturally, there are some inherent difficulties in drawing a line between A4T and non-A4T flows. Nevertheless, in order to get a picture of how much donors focus on A4T at the present time, an IMF/World Bank report (2007:10), using a broad definition estimated that A4T commitments amounted to $25 billion annually for the years 2002 to 2005, which was roughly 40 percent of all ODA excluding debt relief. Looking at the components of this figure, around $10 billion (40 percent) of this is spending on infrastructure and $5 billion (20 percent) is budget support. Focusing specifically on A4T in Ethiopia, a separate report (which uses a *narrower* definition of A4T) estimated that 42 percent of *sectoral* ODA to Ethiopia could be classified as A4T (OECD&WTO, 2007a:27-8).

It is clear that current aid patterns already incorporate a substantial A4T component, and there are calls for an even greater focus and additional funds to be directed towards an A4T agenda.[5] Therefore, it is important to investigate the impact that A4T might have. The paper introduces a model and simulations to approach this issue, but beforehand, some specifics about the nature of impediments to trade in Ethiopia must be elucidated.

3. Impediments to Trade in Ethiopia

Ethiopia is a largely agrarian economy, with agriculture accounting for around half of national income and 80 percent of employment (Ferede, 2008). The bulk of the population are smallholder farmers, and it is estimated that 87 percent of rural households rely on subsistence agriculture as their main source of income (World Bank, 2006:5). Food availability and food security are major concerns with estimates suggesting that 44 percent of the population is undernourished (Nega, 2003).

Utilising the SAM-based characterisation of the economy in 2001/02 (see section 4 below), one sees that exports account for 12.5 percent of GDP (at market prices), with imports accounting for 27.7 percent. The major exports are coffee, transport services, business services and public administration services. A majority of commodities are

[5] Such as Stiglitz & Charlton (2006), who propose that 7 percent of foreign aid be allocated to a Global Trade Facility.

not exported: of the 61 commodities in the SAM, 37 [6] export less than one percent of output.

Since the overthrow of the (ostensibly) socialist Mengistu regime in 1991, the EPDRF, led by Meles Zenawi has been in power. During this time, the government has moved towards greater marketisation of the economy, though not without reticence in some areas. More recently, the rhetoric has been much more that of becoming a 'developmental state,' closer to an East Asian model, including *the state being actively involved in export promotion* (e.g. Zenawi, 2006). The leather industry in Ethiopia is an example where training has been offered for manufacturers of exported goods were given state-funded training and assistance to move up the value chain (ibid.).[7]

Economic development has been hampered by the conflicts fought both within its borders and with both Somalia and Eritrea. Relationships with these two neighbours remain precarious, resulting in only available sea port being in Djibouti. This situation is reflected in Ethiopia's low ranking in the 'trading across borders' category of the World Bank's Doing Business Project (31st out of 46 in sub-Saharan Africa).[8]

Numerous other constraints on exports, and indeed the development of the economy as a whole, can be identified. Regarding infrastructure, road density is low by sub-Saharan African (SSA) standards, as is electricity generation, telephone penetration, improved water supplies, health infrastructure and education infrastructure (details given in Seyoum and Ferede, 2004:11-12). Skilled labour is another constraint, low literacy rates being indicative of a wider educational deficit.[9]

Many of these constraints could, potentially, be addressed by external support. Considering both the economic and political climate, A4T could play a significant role in Ethiopia.

4. Data and Modelling Methodology

This paper uses a social accounting matrix (SAM) for Ethiopia recently completed in a collaborative project between the Ethiopian Development Research Institute, the Institute of Development Studies, and the Universities of Sussex and Sheffield. The SAM was based upon data from a household survey, an agricultural census, labour survey and industry surveys from the Central Statistics Agency (CSA), with further data gathered from the Ministry of Trade and Industry (MOTI) and Ministry Finance

[6] These 37 commodities represent 63 percent of the total value of aggregate demand.
[7] The government has even *forced* manufacturer to move up the value chain by banning the export of raw hides and skins.
[8] It should be noted however that generally the Doing Business Project ranks Ethiopia fairly highly: 9th out of 46 in SSA in 'overall ease of doing business'. www.doingbusiness.org Accessed March 2008.
[9] Literacy rates are rising, but despite this, recent data records adult literacy at 36 percent, compared with an SSA average of 59 percent (World Bank, 2007:334).

and Economic Development (MOFED). The SAM used in this analysis has been slightly adapted.[10] A full list of SAM agents is given in Appendix One.

On the production side, 26 activities produce 61 commodities, of which 46 are exported. Some of this production (around 6 percent) goes straight to households (i.e. home production for home consumption). Since trade and transport services are used to market output, the cost of these services, together with consumption taxes, represents a wedge between producer and purchaser prices.

Three factors of production are specified: unskilled labour, skilled labour and capital (returns to land have been combined with returns to capital). These factors pass on all of their payments to households (with the exception of a small payment abroad from foreign-owned capital). In turn, households are split into two categories: urban and rural. Almost all (98 percent) of rural household income is derived from these factor payments, which, though still constituting the largest proportion of urban households' income (90 percent), the remaining 10 percent is derived from transfers from government and the rest of the world. On the expenditure side, home production is important for rural households, providing 27 percent of expenditures, though for urban households a mere 1 percent of expenditure is accounted for this way. Savings rate are similar at around 18 percent for both types of household.

Government is funded through four types of taxation (commodity taxes, import taxes, institutional taxes and a small export tax levied on coffee) and also receives transfers from the rest of the world, which account for 32 percent of the budget. Government expenditure is split into spending on public administration services (66 percent), education services (18 percent), health services (4 percent) and transfers to households (14 percent). There is also a small amount of dissaving (3 percent).

The model employed is derived from the IFPRI standard model as described in Lofgren et al (2002), which has been adapted to allow for factor-specific technical change. A balanced closure was chosen that ensures that the share of consumption, investment and government remain the same in nominal terms[11]. Capital is deemed to be activity specific and fully employed (rents are flexible). Skilled labour is also fully employed (skilled wages are flexible), but is mobile across activities. Unskilled labour is deemed to be in excess supply (wages are fixed) and is also mobile across activities.

5. Simulations

To analyse A4T in Ethiopia, eight simulations are run, all of which include an increase in aid of 3 percent of GDP. As transfers from the rest of the world to government in the SAM stand at 5.8 percent of GDP, this represents an increase of slightly more than 50 percent, which is a plausible magnitude. This section explains

[10] Specifically, the original 42 activities have been aggregated into 26 sectors, one of the 62 commodities has been aggregated leaving 61, the three types of skilled labour have been aggregated together, the 17 tax types have been placed into four groups, and trade & transport margins have been split into those applicable to exports, imports and domestically-produced commodities.

[11] Small changes in the real growth rates in the tables below are the result of relative price changes.

why each of these eight simulations were chosen to analyse A4T impacts, and the results of the simulations are then given in Section 6.

Recall from Section 2 that there are five elements in the definition of A4T: technical assistance, capacity building, institutional reform, infrastructure and assistance with adjustment costs. Table 5.1 lists these categories, proposes interventions that could be attempted, lists what a successful result would be and, lastly, how this is entered into the model. As this table outlines the justifications for the simulations carried out, it is worth going through in some detail.

Taking the first two categories, technical assistance and capacity building[12], the first intervention proposed is an A4T programme that improves knowledge of foreign markets. If successful, such a programme would locate markets for Ethiopian products that exporters had not yet tapped, the result being a shift in the demand curve for those exports. This can be simulated in the model through a rise in the world price of exports. Another A4T programme could be designed to improve the capacity to participate in trade negotiations, which if successful, could reduce the tariffs faced by Ethiopian exporters. This would also result in exporters receiving a higher price, which is how it is simulated in the model.

The next two A4T interventions proposed involve improving the productivity of factors, perhaps through supplying training and awareness of production processes (as in the leather industry example noted in Section 3). Training could be focused on one factor, most likely skilled labour, so this enters the model separately, or it could be a broader programme that would impact productivity more broadly, which is modelled as an increase in the productivity of all factors of production.

Capacity building could be focused on training for government officials to make them more efficient, such that they represent less of an impediment to exporters, and perhaps, other productive sectors. This would be a reduction in transaction costs to firms, which can be simulated by reducing trade margins.

There is potential for such capacity building in government to be combined with elements of the next category of A4T, institutional reform. A more streamlined bureaucratic structure would likewise reduce transaction costs, and can be simulated by a reduction in trade margins.

The introduction of better quality assurance is an institutional reform that may enable Ethiopian products to be sold to new markets. In effect, this is similar to improving knowledge of foreign markets (above) in that the demand for exports expands, and this is modelled in the same fashion: raising the world price of exports.

The next category of A4T, infrastructure improvements, could be widespread throughout the economy, or may be focused on trade, such as upgrading the airport facilities. Either way, this can be simulated through a reduction in the appropriate margins.

[12] Technical assistance and capacity building have been put together because there is a substantial overlap between them.

Finally, assistance with adjustment costs essentially involves transfers to government, for example, to compensate for the loss of revenue from a tariff reduction. In the model, this would enter as an increase in transfers from the rest of the world to government i.e. an increase in aid. This last simulation has not been addressed separately in the simulations, though as all simulations include an increase in aid, assistance with adjustment costs may simply be one of the justifications for such an increase.

Based on these five A4T benefits, eight simulations are run, which are summarised in Table 5.2. The first simulation introduces an aid increase of 3 percent of GDP without any A4T benefits, i.e. considering only the demand side of an aid inflow. In the remaining seven simulations, it is proposed that within the 3 percent of GDP increase in aid, some A4T benefits are incorporated.[13]

The next five simulations introduce each of the five benefits in isolation, namely cutting margins for exporters, cutting margins for all production, increasing the productivity of skilled labour, increasing the productivity of all factors and increasing the world price of exports. The final two simulations are combinations of these five.

In the simulations involving a cut in margins, a 30 percent cut has been made, which seems a plausible reduction considering the weak initial state of physical and institutional infrastructure in Ethiopia.[14] The cut focused solely on exporters could reflect improvements in the institutional arrangements for exporters, or a more efficient service for exporters at the sea port or airport. Increases in factor productivity were set at 10 percent, which could be achieved through training and updating of production processes. The rise in export price (simulating a shift in the demand for exports) could be achieved through better knowledge of foreign markets, new markets opening due to improved standards or better trade deals. A modest price increase of 5 percent has been simulated.[15]

6. Results

The results are summarised in Tables 5.3 to 5.7. Starting with the main effects on the economy (Table 5.3), compared with the base run, one can see that the AIDONLY simulation shows the anticipated effects. The extra inflow of aid, without any compensating effects on the supply side, is sufficient to cause an 11 percent fall in exports (the largest of any of the simulations). This suggests that if aid delivers no

[13] In future, it would be interesting to simulate cost/benefit analysis of different types of A4T. Though, to date, no study directly evaluating the direct impact of trade assistance in the reduction of trade transaction costs has been published (Suwa-Eisenmann and Verdier, 2007:501-2), there are studies that can give useful indications of the orders of magnitude. The largely qualitative study by the OECD and WTO (2007a & 2007b), and another qualitative study by Duval (2006). There is also work by Brenton and von Uexkull (2006,2007), cited elsewhere, but as yet unpublished.

[14] Note that these are comparative static simulations, which play out over a number of years. The increase of 3 percent of GDP would become a permanent increase in annual flow, whereas the 30 percent reduction in margins may take time to achieve. Dynamising the current model would allow the effects to be realised gradually, and this would be an interesting extension to the analysis.

[15] The magnitude of these effects is believed to be reasonable. Sensitivity analysis has been carried out, making the effects larger or smaller, and the same essential story holds.

benefits to exporters, it appears to be structurally damaging to the economy in that there is a shift away from exports, which tend to be high productivity activities. On the other hand, absorption rises, suggesting that the extra aid alone does deliver some welfare benefits, despite the fact that GDP at market prices rises by less than half a percent.

All other simulations assume that at least some of the aid is channelled in such a way as to assist exporters (and often non-exporters also). These seven simulations are compared with the base run in Table 5.3, however, the focus of the paper is how these simulations compare with the introduction of aid without supply side effects (i.e. with the AIDONLY simulation). Therefore, in order to isolate the impact of the A4T elements, Table 5.4 shows each of the remaining seven simulations compared to the AIDONLY simulation.

The first thing to note from Table 5.4 is that all of the simulations do show an improvement in exports compared with the AIDONLY simulation, so to this extent, the interventions do qualify as A4T. Taking each scenario in turn, cutting export margins (AIDEXMARG) boosts exports by 5 percent, but has little additional impact on overall absorption. As anticipated, the model shows further appreciation of the exchange rate as the economy shift resources even further towards the production of tradable goods. Cutting all margins (AIDALLMARG) does bring large overall benefits, with absorption rising by around 10 percent, which in turn helps to boost exports. Without the shift in production towards tradables (as occurred in AIDEXMARG), the scenario suggests a substantial depreciation of the real exchange rate, which also increases exports. This suggests that improving infrastructure across the board can raise overall welfare *and* have a positive structural impact on the economy.

If A4T includes an element for training skilled labour to make it more productive (AIDLABPRD), gains are widely seen across the board, however the export sector benefits disproportionately as it utilises a higher proportion of skilled labour. If however, A4T succeeds in promoting productivity across all factors (AIDPROD) substantial increases are shown across the economy, again with the export sector taking particular advantage (rising by around 18 percent).

The modest five percent increase in the world price of exports, simulated in AIDEXPRICE, does boost exports but not dramatically as elasticities are believed to be moderately low. As in AIDEXMARG above, further appreciate of the real exchange rate is observed.

The first of two combinations of these scenarios, AIDLABEX, includes a lowering of export margins, raising skilled labour productivity and the small rise in export price. Considering the elements of the change, the result is unsurprising: exports rise substantially despite further real appreciation, and the overall economy grows somewhat.

Lastly, AIDALL proposes that all the desirable A4T effects are achieved: margins are cut for all production, productivity rises for all factors and the export price rises. In this case, the economy would grow substantially with GDP at market prices up by around 24 percent. It is important to point out that the appreciation from AIDONLY

is reversed into a depreciation further benefiting the export sector, which rises by around 39 percent.

Turning the effects on the different productive sectors of the economy, shown in Table 5.5, one can begin to see the differential effects that the interventions have on each sector, depending on its characteristics. The increase in aid alone has varying effects on different sectors, which overall roughly balance each other such that the total value of output is almost unchanged. Taking a few activities as examples, the growing of oil seeds (aoils) experiences the largest percentage reduction in production (28 percent), which is driven by the fact that 54 percent of output is exported (and a further 24 percent is used as an input into the activity), therefore the sector is dramatically hit by the appreciation of the exchange rate. Some other sectors that experience large reductions in output, such as mining (amining) and transport and communication (atrncom), also export much of their production.

A handful of large sectors experience large absolute increases in productivity (even if the percentage change is fairly modest). These include construction (acons), wholesale and retail (atrad), public administration (apadmin), and education and health (aeduhea). As these sectors produce nontradables, following the appreciation, they are relatively cheap to produce. Further changes are driven by changes to the relative price of intermediate inputs, skilled labour and capital.

Cutting trade and transport margins (AIDEXMARG and AIDALLMARG) is predictably more beneficial for those sectors that have higher margins to cut. Raising productivity of all factors (AIDPROD), raises production across the board, always at least matching any loss caused by the aid inflow. Raising only the productivity of skilled labour (AIDLABPROD) also benefits all sectors, though not always by quite the amount of the reduction caused by the aid inflow.

A small rise in the export price does help those industries that export, and a certain amount of substituting inputs away leaves a few sectors slightly worse off than under the aid inflow alone. The combination of a margin cut for exports, skilled labour productivity increase and a rise in the export price (AIDLABEX) is sufficient for almost every industry to raise production beyond the base scenario. Recall that this was the scenario under which the appreciation was the largest, which explains why nontradable sectors, such as wholesale and retail (atrad), are so successful.

The final combination scenario (AIDALL) shows widespread benefits across sectors with almost all producing more than the base. The largest absolute increase is in livestock and animal products (alivst), which increases by Birr 1.2 billion in value, and the total value of production rises by 12 percent.

The remaining two tables (5.6 and 5.7) show the differential effects by type of household and type of factor. Table 5.6 shows that the benefits from the simulations are shared between rural and urban households, though in all cases, urban households benefit more. This reflects the greater proportion of skilled workers in urban areas, whose wages rise, and the fact that urban households consume more tradable goods. Table 5.7 shows how the changes tend to harm the proportion of income going to unskilled labour, despite the fact that every scenario involves an increase in employment of this factor. (For example, in the AIDALL scenario, unskilled

employment increases by 31 percent.) Note that the results here are driven by the closure rules chosen, namely that the wage of unskilled labour is fixed, whereas the quantity of capital and skilled labour in fixed and their rental and wage rates are allowed to rise.

7. Conclusions and Recommendations for Future Research

The model presented here simulates an increased inflow of foreign aid that may include aid for trade (A4T) components. All five of the possible A4T benefits considered (cutting margins for exporters and generally across the economy, raising efficiency of skilled labour and for all factors, and a rise in the price of exports) did raise exports in the simulations, and at least partially offset any reduction in exports caused by an increase in the aid flow.

The analysis can offer tentative suggestions for donors and recipient governments. When aid policy is being designed, due consideration for the supply-side impacts can ensure that exports and other productive sectors are promoted. Counteracting the negative consequences of aid can be attempted, such that aid not only provides more resources in the short term, but can also assist positive structural changes in the economy, and that exports can be encouraged to grow alongside a rising aid budget.

Regarding future research, it would be interesting to incorporate more precise information about the costs and benefits of A4T interventions (once it is available, perhaps through studies in progress cited above). This would not only allow more precise analysis within the current framework, but also comparisons could be made with other aid flows, and trade offs and complementarities could analysed.

A second avenue for future research would involve dynamising the current model. In particular, this would allow for the changes to be introduced gradually: gradual rises in aid flows and/or gradual realisation of A4T benefits. Aspects such as the optimal sequencing of types of aid could then be analysed.

Bibliography

Adam, Christopher, and David Bevan (2006) "Aid and the Supply Side: Public Investment, Export Performance and Dutch Disease in Low Income Countries," *World Bank Economic Review*, 20, 261-90, May.

Bevan, David (2005) An Analytic Overview of Aid Absorption: Recognizing and Avoiding Micro-Economic Hazards, International Monetary Fund Seminar on Foreign Aid and Macroeconomic Management, Maputo, March 14-15 2005

Brenton, P. & E. von Uexkull (2006), 'Product Specific Technical Assistance for Exports—Has it been Effective?' Washington, DC, World Bank, mimeo.

Brenton, P & J.E. von Uexkull. 2007. "Does Aid for Trade Really Work?" World Bank, forthcoming.

Duval, Y. (2006), 'Cost and Benefits of Implementing Trade Facilitation Measures under Negotiations at the WTO: An Exploratory Survey', Asia-Pacific Research and Training Network on Trade Working Paper Series, 3.

Ferede, Tadele (2008) 'Growth linkages and policy effects in a village economy in Ethiopia: An analysis of interactions using a social accounting matrix (SAM) framework,' paper presented at the Centre for the Study of African Economies (CSAE) Conference, University of Oxford, March

IMF and World Bank (2005) 'Aid for Trade: Competitiveness and Adjustment,' Joint Note by the Staffs of the IMF and the World Bank, April.

IMF and World Bank (2007) 'Aid for Trade: Harnessing the Global Economy for Economic Development,' Development Committee (Joint Ministerial Committee of the Boards of Governors of the Bank and the Fund on the Transfer of Real Resources to Developing Countries), DC2007-0019, September.

Killick, Tony and Mick Foster (2007) 'The Macroeconomics of Doubling Aid to Africa and the Centrality of the Supply Side,' *Development Policy Review*, 25 (2): 167-192, Overseas Development Institute.

Lofgren, Hans, Rebecca Lee Harris and Sherman Robinson with Marcelle Thomas and Moataz El-Said (2002) *A Standard Computable General Equilibrium (CGE) Model in GAMS*, International Food Policy Research Institute (IFPRI): Washington DC.

Nega, Berhanu (2003) "The Ethiopian National Synthesis Report" Roles of Agriculture Project, PowerPoint Presentation prepared for the Roles of Agriculture International Conference, 20-22 October, 2003 – Rome, Italy, Agricultural and Development Economics Division (ESA), Food and Agriculture Organization of the United Nations

Nielson, Julia (2006) "Aid for Trade," in Richard Newfarmer (ed.) *Trade, Doha, and Development: A Window into the Issues*, World Bank Trade Department, Poverty Reduction and Economic Management Vice-Presidency, Washington D.C., First Printing: November 2005, p.323-332

OECD and WTO (2007a) *Aid for Trade at a Glance 2007: 1st Global Review*, OECD/WTO, June.

OECD and WTO (2007b) *Aid for Trade at a Glance 2007: Country & Agency Chapters*, OECD/WTO, June.

Page, Sheila (2006) *Trade and Aid: Partners or Rivals in Development Policy?* Cameron May Ltd, London.

Rajan, Raghuran and Arvind Subramanian (2005) 'What Undermines Aid's Impact on Growth?' IMF Working Paper No. 05/126, June

Seyoum, Alemayehu and Tadele Ferede (2004) 'The Structure of the Ethiopian Economy - A SAM-based Characterisation,' http://siteresources.worldbank.org/INTETHIOPIA/Resources/PREM/QuantitativeFrameworkforPublicInvestmentPoliciesInEthiopia.pdf, May.

Stiglitz, Joseph and Andrew Charlton (2006) 'Aid for Trade,' A Report for the Commonwealth Secretariat, March.

Suwa-Eisenmann, Akiko and Thierry Verdier, 'Aid and Trade,' *Oxford Review of Economic Policy*, Volume 23, Number 3, 2007, pp.481–507.

World Bank (2006) Interim Country Assistance Strategy (ICAS) 2006-7, Washington DC, May.

World Bank (2007) *World Development Report 2008: Agriculture for Development*, Washington DC.

Zenawi, Meles (2006) Speech by Prime Minister of the Federal Democratic Republic of Ethiopia for the Africa Task Force, Brooks World Poverty Institute, Manchester University, UK, 3rd to 4th August

Tables

Table 5.1: Types of A4T and how they might impact on the economy

A4T category[16]	**A4T intervention**	**Result** (assuming success)	**Enters into model as…**
Technical assistance & capacity building	*improve knowledge of foreign markets*	*exogenous shift in the demand curve*	Raise price of exports
	increase capability in trade negotiations	*reduction in tariffs on export products*	Raise price of exports
	improve productivity of skilled worker	*boost the productivity of skilled labour*	Efficiency parameter for skilled labour
	updating of production processes	*boost the productivity of both labour and capital*	Efficiency parameter for all factors
	streamline government bureaucracy	*reduce transaction costs*	Reduce margins
Institutional reform	*institutional reform*	*reduce transaction costs*	Reduce margins
	introducing quality assurance	*exogenous shift in the demand curve*	Raise price of exports
Infrastructure	*improved infrastructure for importers and exporters*	*reduction in transport costs for exporters and importers only*	Reduce margins
	improved infrastructure in general	*reduction in transport costs in general*	Reduce margins
Assistance with adjustment costs	*temporary revenue replacement*	*an increase in the aid budget across the board*	Boost ROW transfers to GOV

Table 5.2: Simulations

Simulation	**Description**
1. Base	Base SAM data set for 2001/02
2. AIDONLY	Increase aid by 3% of GDP
3. AIDEXMARG	Increase aid by 3% of GDP, with 30% decrease in margins for exporters
4. AIDALLMARG	Increase aid by 3% of GDP, with 30% decrease in margins for all activities
5. AIDLABPRD	Increase aid by 3% of GDP, with 10% increase in skilled labour productivity
6. AIDPROD	Increase aid by 3% of GDP, with 10% increase in productivity of all factors
7. AIDEXPRICE	Increase aid by 3% of GDP, with 5% increase in price of exports
8. AIDLABEX	Increase aid by 3% of GDP, with above skld labour and exports effects (3, 5 and 7)
9. AIDALL	Increase aid by 3% of GDP, with all of above effects (scenarios 4, 6 and 7)

[16] These categories relate to the five categories of A4T specified in World Bank & IMF (2005:3).

Table 5.3: Real changes to value of macro variables relative to the base
('base' column is the values in Birr 100s of millions, simulation columns are percentage changes on the base)

Variable	***BASE Birr 100mn***	***AIDONLY %age chng***	***AIDEXMARG %age chng***	***AIDALLMARG %age chng***	***AIDLABPRD %age chng***	***AIDPROD %age chng***	***AIDEXPRICE %age chng***	***AIDLABEX %age chng***	***AIDALL %age chng***
Exports	80.27	-11.10	-6.51	4.06	-5.62	5.14	-9.30	0.93	23.68
Real exchange rate[17]	1.00	-6.00	-8.66	6.66	-4.91	-2.67	-8.97	-10.65	6.44
Absorption	737.01	3.00	3.43	13.53	6.48	12.08	3.67	7.68	24.59
Private consumption	490.61	3.07	3.51	15.55	6.18	12.14	3.75	7.39	26.76
Fixed investment	142.47	3.15	3.79	12.20	6.03	12.21	3.99	7.61	23.45
Government consumption	103.93	2.44	2.60	5.82	8.49	11.62	2.84	9.18	15.89
Imports	177.09	5.81	7.89	12.68	8.30	13.17	8.68	13.55	24.38
GDP at market prices	640.19	0.45	0.95	12.58	4.46	10.91	0.65	5.21	24.54
Net indirect taxes	50.95	5.20	6.67	17.12	7.51	12.87	7.27	11.26	28.66
GDP at factor cost	589.24	0.11	0.15	1.24	4.23	10.75	0.18	4.35	12.12

Table 5.4: Real changes to value of macro variables relative to giving aid without any A4T benefits
('AIDONLY' column is the values in Birr 100s of millions, simulation columns are percentage changes on 'AIDONLY')

Variable	***AIDONLY Birr 100mn***	***AIDEXMARG %age chng***	***AIDALLMARG %age chng***	***AIDLABPRD %age chng***	***AIDPROD %age chng***	***AIDEXPRICE %age chng***	***AIDLABEX %age chng***	***AIDALL %age chng***
Exports	71.36	5.16	17.05	6.17	18.26	2.02	13.53	39.12
Real exchange rate[16]	0.94	-2.82	13.47	1.16	3.55	-3.15	-4.94	13.24
Absorption	762.71	0.41	10.15	3.39	8.85	0.63	4.53	20.89
Private consumption	507.71	0.41	12.00	3.03	8.85	0.63	4.16	22.89
Fixed investment	147.44	0.61	8.77	2.79	8.78	0.81	4.32	19.68
Government consumption	107.56	0.16	3.30	5.91	8.96	0.40	6.59	13.13
Imports	187.38	1.97	6.49	2.35	6.95	2.71	7.32	17.55
GDP at market prices	646.69	0.49	11.97	4.00	10.44	0.19	4.72	23.87
Net indirect taxes	53.60	1.40	11.33	2.20	7.29	1.97	5.77	22.30
GDP at factor cost	602.51	0.05	1.08	4.12	10.61	0.08	4.25	11.92

[17] Note: initial value set to one in the model; a negative change is an appreciation of Ethiopian currency.

Table 5.5: Real changes in value of output by productive activity

(Base column gives value in Birr 100s of millions; simulations give percentage deviation from the base)

Activity code	**Description**	BASE Birr 100mn	AIDONLY %age chng	AIDEXMARG %age chng	AIDALLMARG %age chng	AIDLABPRD %age chng	AIDPROD %age chng	AIDEXPRICE %age chng	AIDLABEX %age chng	AIDALL %age Chng
atef	Growing of Teff	5.84	0.88	0.60	7.50	7.28	11.93	1.53	7.71	20.22
abar	Growing of Barley	9.44	1.58	1.36	5.25	9.04	12.43	1.52	8.78	16.43
awhea	Growing of Wheat	11.47	-3.79	-6.26	-0.59	7.38	10.55	-6.45	1.72	10.51
amaiz	Growing of Maize	32.56	1.31	1.02	4.83	8.85	12.33	1.17	8.43	16.05
apul	Growing of Pulses	29.97	-0.65	-1.30	1.27	6.18	11.17	-0.76	5.31	12.86
avegfr	Growing of Vegetables and Fruits nec	39.15	0.08	0.06	0.41	0.70	10.25	0.07	0.67	10.59
aoils	Growing of oil seeds	4.10	-27.58	-30.75	-14.19	-4.16	0.04	-26.55	-9.23	16.04
acash	Growing of cash crops nec	14.04	-1.66	-0.50	8.07	3.26	9.81	-1.80	4.47	20.19
acrop	Growing of crops nec	2.73	-0.82	-1.73	5.07	5.44	10.68	-1.85	3.51	15.99
acoff	Growing of coffee	25.94	-0.41	-0.55	-0.29	0.16	9.98	-0.38	0.04	10.08
alivst	Livestock farming, animal products	73.79	0.95	1.21	5.57	4.89	11.58	0.97	5.24	16.79
amining	Mining and quarrying	4.34	-5.09	-0.35	4.98	-0.75	8.20	-4.64	4.42	18.77
ameatfv	Meat products	0.67	-3.28	6.59	48.84	2.93	9.08	-3.42	16.23	82.32
aofood	Manufacture of other food products nec	11.42	-0.69	0.05	11.06	3.80	10.05	-0.86	4.52	23.11
abev	Manufacture of beverages	6.37	0.93	0.83	4.63	4.63	10.64	0.94	4.55	14.78
atext	Manufacture of textiles	5.61	-2.75	3.80	15.93	2.03	8.99	-3.14	8.92	29.11
apaperp	Manufacture of paper products; printing	2.00	-4.28	-6.31	-2.89	2.98	8.60	-6.77	-1.82	6.87
aomanu	Manufacturing nec	8.93	-1.48	-2.03	12.27	2.75	9.40	-2.80	0.90	23.07
aelect	Electricity	15.58	0.26	0.28	1.05	1.46	10.27	0.25	1.49	11.15
acons	Construction	31.25	2.88	3.40	11.80	5.82	12.10	3.57	7.12	23.03
atrad	Wholesale and retail trade	72.94	1.15	1.88	-13.67	4.36	10.97	1.75	5.73	-4.60
atrncom	Transport and communication	36.46	-2.28	-3.34	-1.82	0.61	9.27	-2.38	-0.68	9.68
afserv	Financial intermediation	8.95	-2.37	-3.51	-3.45	1.12	9.06	-2.90	-0.65	7.02
apadmin	Public administration	40.70	1.38	1.15	4.74	7.98	11.10	2.00	8.41	15.50
aeduhea	Education, health and social work	26.80	2.32	2.36	4.79	8.63	11.53	2.58	9.03	14.61
aoserv	Other services nec	68.17	0.15	0.07	-0.78	2.16	10.50	0.27	2.19	9.62
Total		589.24	0.11	0.15	1.24	4.23	10.75	0.18	4.35	12.12

Table 5.6: Equivalent variation changes to consumption by type of household
(Base column gives value in Birr 100s of millions; simulations give percentage deviation from the base)

	BASE Birr 100mn	***AIDONLY %age chng***	***AIDEXMARG %age chng***	***AIDALLMARG %age chng***	***AIDLABPRD %age chng***	***AIDPROD %age chng***	***AIDEXPRICE %age chng***	***AIDLABEX %age chng***	***AIDALL %age chng***
Rural Households	171.29	1.83	2.56	11.47	5.36	11.36	2.73	7.09	23.21
Urban Households	319.32	3.68	3.91	16.12	6.54	12.55	4.19	7.36	26.96
Total	490.61	3.03	3.44	14.50	6.13	12.13	3.68	7.26	25.65

Table 5.7: Disaggregated factor income distribution, proportion of total income
(Base column gives percentage share of total income; simulations give percentage deviation from the base)

	BASE Birr 100mn	***AIDONLY %age chng***	***AIDEXMARG %age chng***	***AIDALLMARG %age chng***	***AIDLABPRD %age chng***	***AIDPROD %age chng***	***AIDEXPRICE %age chng***	***AIDLABEX %age chng***	***AIDALL %age chng***
Skilled Labour	40.37	0.09	0.13	1.36	-0.10	0.14	0.06	-0.08	1.41
Unskilled Labour	8.45	-0.06	-0.10	-0.07	-0.11	-0.23	-0.11	-0.21	-0.29
Capital	51.18	-0.02	-0.03	-1.29	0.21	0.08	0.06	0.29	-1.12
Total	100.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00

Appendix One: Ethiopia SAM Agents

atef	Growing of Teff
abar	Growing of Barley
awhea	Growing of Wheat
amaiz	Growing of Maize
apul	Growing of Pulses
avegfr	Growing of Vegetables and Fruits nec
aoils	Growing of oil seeds
acash	Growing of cash crops nec
acrop	Growing of crops nec
acoff	Growing of coffee
alivst	Livestock farming, dairy farming, production of animal products
amining	Mining and quarrying
ameatfv	Production, processing and preserving of meat and meat products
aofood	Manufacture of other food products nec
abev	Manufacture of beverages
atext	Manufacture of textiles
apaperp	Manufacture of wood, paper and paper products; publishing; printing
aomanu	Manufacturing nec
aelect	Electricity
acons	Construction
atrad	Wholesale and retail trade
atrncom	Transport and communication
afserv	Financial intermediation
apadmin	Public administration
aeduhea	Education, health and social work
aoserv	Other services nec
ctef	Teff
cbar	Barley
cwhea	Wheat
cmaiz	Maize
cpul	Pulses
cveg	Vegetables nec
coils	Oil seeds
ccane	Sugar cane sugar beet
cfruit	Fruit Crops
ctea	Tea
cchat	Chat
ccoff	Coffee
ccrop	Cereal grains and other crops nec
cfibre	Plant-based fibers
ccatt	Cattle
cpoul	Poultry; Other small livestock
cmilk	Raw milk
ccott	Raw cotton, Wool, silk-worm cocoons
caprod	Animal products nec
cfors	Forestry
cfish	Fishing
ccoal	Coal
cngas	Gas
cmin	Minerals nec
cmeat	Meat products
cvprod	Vegetable products; animal oils and fats
cdairy	Dairy products
csug	Sugar and sugar confectionary
cgmill	Grain mill products
cfood	Food products nec; animal feeds
cbev	Beverages
ctob	Tobacco Products
ctext	Textiles
capar	Wearing apparel
cleath	Leather products
cwood	Wood products
cpaper	Paper products publishing
coilptrl	Petroleum coal products
cfert	Fertilisers
cchem	Chemicals, rubber and plastic products
cminprod	Mineral products nec
cferr	Ferrous metals
cmetal	Metals nec
cmprod	Metal products
cveh	Motor vehicles and parts; other transport equipment
cmach	Machinery and equipment nec
comanu	Manufactures nec
celect	Electricity
cwater	Water
ccons	Construction
ctrad	Trade and repair services
chotel	Hotels and restaurants
ctrans	Transport services
ccomm	Communication
cfserv	Financial services
cbserv	Business services nec
cpadmin	Public administration and defence
ceduc	Education
cheal	Health
coserv	Recreation and other services
crest	Real estate and renting services
Tradmrgm	Trade margins – imports
Transmrgm	Transport margin – imports
Tradmrgd	Trade margins – domestic goods
Transmrgd	Transport margin – domestic goods
Tradmrge	Trade margins – exports
Transmrge	Transport margin – exports
skldlab	Skilled workers
unsklab	Unskilled workers
Capital	Capital and Land
Gov	Government
HH-Rural	Rural households
HH-Urban	Urban households
ExpTx	Export taxes
CmdtyTx	Commodity taxes
ImportTx	Import taxes
InsttnTx	Direct taxes (on domestic institutions)
S-I	Savings and Investment
RoW	Rest of the world
Total	Totals

Appendix Two: Sensitivity analysis

As there was limited Ethiopia-specific elasticities estimates, sensitivity analysis was carried out, dramatically changing the size of the elasticities, first increasing by fifty percent and then decreasing by fifty percent.

The overall message of the paper regarding the direction of impacts remains unchanged even after extreme changes in values. In particular, the overall impact on the economy is remarkably constant, as shown in Table 5.4, which includes just the impact on absorption and export levels under higher, actual and lower elasticities.

In all cases, absorption is somewhat higher when the economy is more flexible. Total exports display more variation: the more flexible the economy, the more able resources are to reallocate away from exporting in the AIDONLY scenario, and then typically, the more able resources are to return to exports, when A4T benefits are introduced. Whilst there is some variation in the magnitude (especially in the combination scenarios AIDLABEX and AIDALL), the story of the paper is not being driven by the elasticity estimates.

Table A2: Sensitivity analysis showing large changes in elasticities

		BASE	AIDONLY	AIDEXMARG	AIDALLMARG	AIDLABPRD	AIDPROD	AIDEXPRICE	AIDLABEX	AIDALL
Elas*1.5	absrptn	737.01	3.02	3.53	14.15	6.59	12.38	3.74	7.95	25.86
Actual	absrptn	737.01	3.00	3.43	13.53	6.48	12.08	3.67	7.68	24.59
Elas*0.5	absrptn	737.01	2.97	3.36	13.12	6.31	11.79	3.61	7.40	23.61
Elas*1.5	exports	80.27	-11.75	-5.59	5.78	-5.89	5.35	-8.85	3.73	29.16
Actual	exports	80.27	-11.10	-6.51	4.06	-5.62	5.14	-9.30	0.93	23.68
Elas*0.5	exports	80.27	-9.20	-5.82	4.84	-4.48	5.60	-8.33	-0.23	21.14