Systematic review

What is the evidence of the impact of tariff reductions on employment and fiscal revenue in developing countries?

A systematic review

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List of abbreviations

ACP	African, Caribbean, Pacific
AfT	Aid for Trade
ASEAN	Association of South East Asian Nations
CAC	Central American countries
CGE	Computable general equilibrium
DFID	Department for International Development
EPA	Economic partnership agreement
EU	European Union
FE	Full employment
FTA	Free trade agreement
LIC	Low-income country
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary least square
PTA	Preferential trade agreement
RG	Review Group
RoW	Rest of the World
RTA	Regional trade agreement
SACU	Southern African Customs Union
SAM	Social accounting matrix
SSA	Systematic sensitivity analysis
UE	Unemployment closure
WC	Wage curve
WTO	World Trade Organization

Executive summary

Most countries have traditionally imposed import tariffs to protect domestic producers from international competition and increase government revenue. Tariffs create price distortions that allow inefficient sectors to continue producing at the expense of increasing consumer prices. The last two decades, however, have seen the proliferation of regional trade agreements in developing countries. This has reduced tariffs among regional partners. In addition, in some cases, preferential liberalisation has been accompanied by domestic trade reform where countries reduced tariffs unilaterally.

Despite substantial progress towards trade reform, a major constraint for further liberalisation in developing economies is the perception of potentially large adjustment costs. Reducing tariffs may produce adjustment costs in terms of loss of employment in protected inefficient sectors, if these are not absorbed by growth in sectors with comparative advantage, and in terms of government revenue loss. Uncertainty regarding the size of adjustment costs and reallocation of resources, especially when these are also influenced by other policies such as exchange rate, labour market or investment policies, implies more reluctance to sign new trade agreements and especially to further liberalise trade restrictions. The purpose of this review is to synthesise the evidence of the impact of tariff reductions on employment and tax revenue, and thus reduce this uncertainty.

The last two decades have seen the proliferation of regional trade agreements in developing countries. In some cases, preferential liberalisation has been accompanied by domestic unilateral trade reform. However, despite substantial progress towards trade reform, a major constraint for further liberalisation in developing economies is the perception of potentially large adjustment costs. Uncertainty regarding adjustment costs and reallocation of resources implies more reluctance to sign new trade agreements and especially to unilaterally liberalise trade restrictions. As a result, the main objective of this review is to synthesise the empirical evidence regarding two main elements of adjustment to tariff reductions in developing countries: the impacts on employment and the impact on tax revenue.

This review is a synthesis of quantitative studies. We include quantitative evaluations in developing countries that control for other factors affecting employment and tax revenue. We also include computable general equilibrium (CGE) studies, and compare simulation results to the econometric evidence. In addition, given the large number of specifications within papers and the fact that different authors employ different reduced form equations, we combine several methodologies to synthesise the results. First, we use a two-stage methodology. In the first stage, we compute a single estimate by study. Then we cluster studies according to the use of the same variable for employment/tax and trade policy. In this second stage, we perform meta-analysis between studies at each cluster. The synthesis results for all the clusters are then combined to derive conclusions and policy implications. The second methodology uses the same cluster method but using all the available observations by study and controlling for covariates that may impact on the impact of trade policy on employment and tax revenue using meta-regression. Furthermore, we analyse what factors may impact on the statistical significance of the coefficients.

In total, from a sample of 3,487 searched studies, we include 109 studies, 67 econometric and 42 CGE. The ex post econometric evidence on revenue effects is available in 22 studies. The remaining econometric studies (45) examine employment effects. There are no econometric studies that look at both of these variables. In contrast 8 CGE studies included in this review look at both the employment and revenue impacts of trade liberalisation. The rest of the CGE studies either exclusively look at employment effects (22) or at revenue effects (12).

The results from the synthesis indicate that:

- Studies that use tariffs to measure trade policy find an ambiguous effect on employment. When we select studies based on using tariffs as the trade policy variable and also control for potential endogeneity, we find that in general, tariff reductions tend to be correlated with reductions in employment. However, studies differ in the size of this effect.
- Studies that use trade flows to proxy trade liberalisation or use dummies to capture trade reform episodes (around 67 percent of specifications) tend to find positive effects on employment, tax revenue and labour reallocation. This result is quite robust, but it should be considered of lower quality since trade flows are a poor proxy for tariff reductions in some cases, and therefore causality is unclear.
- We find that most studies show significant employment reallocation effects, especially regarding increased employment in export sectors following liberalisation. Regarding import-competing sectors, the evidence is mixed. The body of evidence includes studies that find employment destruction, studies that find negligible effects and studies that find employment growth.
- Ex ante CGE simulation studies that allow for trade reform impacts on the level of aggregate employment commonly predict a moderately positive net job creation effect (all 36 included studies). On average, a 1 percent increase in the volume of trade due to trade reform raises aggregate employment in the reforming country by 0.34 percent (31 studies).
- Ex ante CGE simulation studies with fixed aggregate employment commonly predict job destruction in import-competing and non-traded-goods sectors and job creation in export-oriented sectors after a trade reform. For each percent of additional trade volume generated by a trade liberalisation scheme, 0.12 percent of the labour force relocates to a new job in a different sector within the liberalising country (8 studies).
- The majority of CGE simulation studies that address the fiscal effects of trade reforms involving tariff reductions report negative total tax revenue impacts or the need for increases in other tax rates in order to compensate for lost tariff revenue (24 of 28 included studies).
- While CGE studies allow a cleaner isolation of trade policy impacts from other influences compared with econometric studies, the results need to be interpreted with caution. Regarding tax revenue, CGE results allow us to look at the isolated impact on tax revenue from reducing tariffs selectively. This is very informative since econometric evidence is likely to select the impact of simultaneous interventions affecting tax revenue. However, the assumption of a frictionless

reallocation of labour and other factors across sectors is an oversimplification not always supported by the econometric evidence.

In general, our interpretation of the findings of the synthesis is that as expected, these are country and trade policy specific. However, in line with the preferred econometric evidence, overall employment is likely to decrease slightly in the short run following liberalisation, although this depends on the extent of the trade policy shock. These results are in contrast with the CGE findings, which by design incorporate projections of the medium-run economy-wide knock-on effects suggested by economic theory. In addition, the evidence points towards an expansion of employment in the export sector, but with an unclear prediction regarding the size and sign of changes in import-competing sectors.

Regarding tax revenue, tariff reductions are likely to reduce trade tax revenue in the short run. In this regard, CGE simulations predict that only in the case of very high import demand and substitution elasticities would the generated increase in imports be sufficient to compensate for the tariff cut. Thus, the likely outcome following liberalisation or implementation of a trade agreement is one of lower trade tax revenue, other things constant. The econometric evidence clearly points towards a positive impact of larger shares of trade to GDP on total tax revenue. Therefore, the impact in the medium run could be positive, especially if complementary tax policies and increases in customs tax collection efficiency are implemented, although the effects of these last two channels cannot be properly quantified from the reviewed studies.

1. Background

1.1 Aims and rationale for review

Most countries have traditionally imposed import tariffs to protect domestic producers from international competition and increase government revenue. Tariffs create price distortions that allow inefficient sectors to continue producing at the expense of increasing consumer prices. The last two decades, however, have seen the proliferation of regional trade agreements in developing countries. This has reduced tariffs among regional partners. In addition, in some cases, preferential liberalisation has been accompanied by domestic trade reform where countries reduced tariffs unilaterally.

Despite substantial progress towards trade reform, a major constraint for further liberalisation in developing economies is the perception of potentially large adjustment costs. Reducing tariffs may produce adjustment costs in terms of loss of employment in protected inefficient sectors, if these are not absorbed by growth in sectors with comparative advantage, and in terms of government revenue loss. Uncertainty regarding the size of adjustment costs and reallocation of resources, especially when these are also influenced by other policies such as exchange rate, labour market or investment policies, implies more reluctance to sign new trade agreements and especially to further liberalise trade restrictions. This has been clearly manifested, for example, during the current trade negotiations between Africa, Caribbean and Pacific (ACP) countries and the European Union (EU) under the Economic Partnership Agreements (EPA). The purpose of this review is to synthesise the evidence of the impact of tariff reductions on employment and tax revenue, and thus reduce this uncertainty.

Economic theory predicts that tariff reductions induce a reallocation of resources and factors of production from protected sectors to sectors with comparative advantage. The size of adjustment and the speed of the reallocation on new activities depend critically on the flexibility and well functioning of goods and factor markets. In addition, trade policy changes are often accompanied by other measures that impact on the economy, such as macro, exchange rate or investment policies. These also affect the magnitude of adjustment costs and the capacity of countries to take advantage of new export activities. As a result, the severity of adjustment and the ability to generate growth and employment associated with trade policy is uncertain, especially in developing countries where market inefficiencies and failures may be significant.

Uncertainty regarding adjustment costs and reallocation of resources implies more reluctance to sign new trade agreements and especially to unilaterally liberalise trade restrictions. This is especially the case when the potential new trade partners are perceived as being more competitive, and therefore it is assumed that adjustment costs will be larger, which increases the emergence of lobbies and other constituencies that tend to favour protection.

In addition, understanding the size and dynamics of adjustment costs lies at the heart of the Aid for Trade (AfT) agenda. Recent years have seen a very large increase in the number of donor-related programmes targeting export diversification and adjustment costs from trade in developing countries. Therefore, understanding the likely impact

of trade agreements and the impact of existing support programmes is essential in order to design better support policies.

As a result, the main objective of this review is to synthesise the evidence regarding the two main elements of adjustment to tariff reductions in developing countries: the impacts on employment and tax revenue.

A large number of empirical studies using different methodologies have tried to shed light on these issues. Most of the evidence on the impact of trade reform on labour markets has focused on understanding the increasing wage gap between skilled and unskilled workers in the North (see for example Freeman and Katz, 1991, Gaston and Trefler, 1997 or Wood, 1994). This review concentrates on a smaller set of studies that have analysed the impact of tariff reductions on employment and employment reallocation in developing countries.

Regarding the impact on tax revenue, due to the existing largely diversified revenue base in developed countries, this issue is mainly relevant for developing countries, where the impact is potentially much larger. The small numbers of studies that have analysed this issue focus indeed mainly on developing countries. This review will summarise the evidence provided by these studies.

An important element to consider when looking at the evidence in the field of empirical trade analysis is the coexistence of ex post evaluation methods with ex ante simulations. Concretely, when considering new membership of a trade agreement, policy is often influenced by ex ante simulation studies based on CGE models. The use of this type of quasi-experimental tool is so widespread, especially regarding evaluations of regional trade agreements (RTAs) that an additional objective of this review is to synthesise the evidence of these studies regarding the impact on employment and government revenue. While it is not common practice in systematic reviews to include simulation studies, the relative importance of this methodology in trade policy analysis merits its inclusion. However, the aim when including CGE simulation studies is to compare how this ex ante evidence relates to the preferred ex post evaluation studies, as well as highlighting the main assumptions and how these affect the impact results. To our knowledge, inclusion of both ex ante and ex post methodologies and their comparison has not been done in the past, and we hope this comparison can be useful for guiding policy makers when interpreting such evidence.

1.2 Definitional and conceptual issues

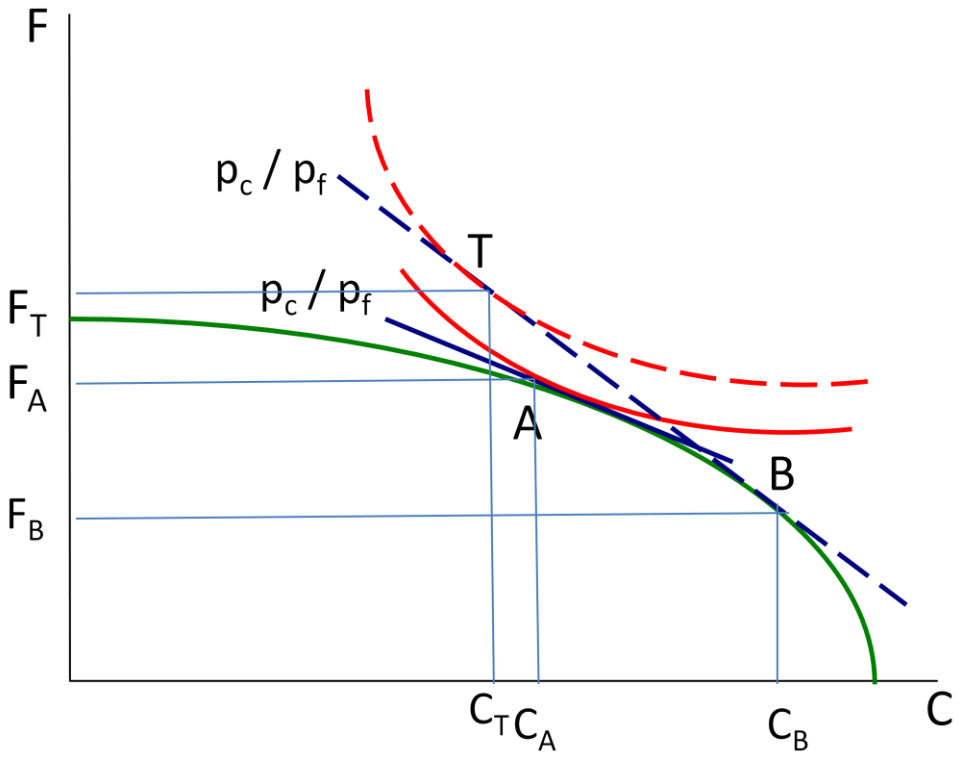
1.2.1 Employment

In traditional trade models, aggregate employment in the long run is exogenous to trade policy and is determined by macro and labour market policies. Changes in trade policy affect mainly the reallocation of resources and the remuneration of the factors of production. Therefore, the overall impact of trade policy changes on employment in the short run depends on the sources of specialisation and the dynamics of factors of production reallocation. In fact, any gains from trade depend critically on the capacity of the economy to reallocate resources from protected inefficient activities to sectors with comparative advantage.

The basic textbook diagram in Figure 1.1 highlights the forces at work on the impact of trade policy in traditional trade models. The main underlying assumptions in explaining these trade dynamics are the existence of perfect competition and free mobility of factors within countries. At autarky prices, the economy depicted in the

figure produces at A, FA units of product F and CA units of product C. Since it has comparative advantage in good C in terms of technology (Ricardian model) or due to endowments (Heckscher-Ohlin-Samuelson model), when the economy opens to trade, the relevant international prices increase the relative price of C and shift the production decisions from A to B, increasing the production of good C and decreasing the production of good F. In order to do so, labour needs to be transferred from sector F to sector C, and by producing at B, the economy is able to trade and consume on a higher indifference curve at T by exporting (CB−CT) and importing (FT−FB). The Stolper-Samuelson theorem, then predicts that trade will benefit the use of the abundant factor by increasing its return. Nevertheless, the assumption is that employment is being transferred from one sector to the other, which implies that the sectoral composition of employment will change and any employment created will be transitional and depending on labour market institutions and frictions.

Figure 1.1 Trade and reallocation



The issues regarding the impact of trade policy changes on labour reallocation are quite similar in new trade theories and new-new trade theories of heterogeneous firms. For example, in models with increasing returns to scale, tariff reductions increase agglomeration in specific geographic clusters and sectors. In addition, models of intra-industry trade explain reallocation of jobs within-sector specialisation. This effect is similar in models of trade with heterogeneous firms (Melitz, 2003), where opening up to trade implies a reallocation of resources towards more productive firms.

The key element of trade models regarding employment is, therefore, the fact that any change in employment due to tariff reductions occurs during sector reallocations

and mainly follows rigidities in labour markets. Ocampo and Taylor (1998) challenge the notion that resources can be redeployed to produce anything (Say's law) and, therefore, trade policy shocks can have long-term effects on unemployment.

Other interesting studies have linked trade reform with unemployment by introducing search costs of unemployment into trade models. Davidson et al. (1999) introduce search costs into a trade model of monopolistic competition and find an ambiguous impact of trade reform on unemployment. Felbermayr et al. (2008) introduce search frictions into the Melitz (2003) model and find a positive impact of trade reform on employment due to aggregate increases in productivity; however, the employment benefits may be small when wages are bargained collectively.

In conclusion, while predictions on the direction of sector reallocation are clear, it is less so when considering the final impact on employment. As suggested above, the role of labour market institutions and frictions is critical to understand the dynamics of labour adjustment, but at the same time, a large number of other factors related to trade and to other policies may be important.

Global trade integration is not only associated with an increase in trade flows, but also affects the way in which trade occurs and how technology is diffused. For example, the large increase in product fragmentation and outsourcing in developed countries also has implications for labour markets in both developed and developing countries. In addition, liberalisation may induce the adoption of new technologies and trigger technical change towards less labour-intensive modes of production. Alternatively, it may facilitate technology upgrading and change the demand for inputs to higher quality or skill. While the extent of this issue for developing countries is not clear, technological elements have been put forward as the main cause for increasing wage disparity in the US (see for example Freeman and Katz, 1991).

In addition to elements related to trade policy, other factors may also impact on the dynamics of factor reallocation and employment following a policy shock. Perhaps, the most important factor is the coexistence of trade policy changes with macro policy changes and capital account liberalisation. When these changes occur simultaneously, as has been the case in many developing countries, it is very difficult to disentangle the specific impact of trade reform on employment. For example, capital account liberalisation may increase the relative demand of highly skilled labour due to capital-skill complementarity (Griliches, 1969). In addition, capital account liberalisation and anti-inflationary macro policies, key components of structural adjustment policies, may trigger an exchange rate appreciation that could limit growth in the export sector and constrain the reallocation of resources.

All these factors above will determine how fast resources will shift among sectors following a trade policy shock. Furthermore, the overall effect on employment also depends on the size of the trade policy shock. This is the size of initial tariffs, the sector compositions of these initial tariffs, the extent of tariff reduction, the structure of trade partners and the type of simultaneous and complementary policies in place (see Figure 1.2 for a summary of the causal link between trade policy and employment).

A final element to consider is that comparative advantage varies according to the trade partners when selective liberalisation is implemented. As a result, the impact on sector reallocation depends on the members of the RTA.

1.2.2 Tax revenue

A key issue when looking at the impact of tariff reductions on tax revenue is the fact that tariffs have various objectives that go beyond protection of specific sectors. In addition to protection, tariffs, especially in developing countries where tax bases tend to be narrow, aim at increasing tax revenue collections. Tax collections at the border are easier to implement when there is limited institutional capacity (Ebrill et al., 1999). This explains the large reliance of many developing countries on taxes at the border.

Figure 1.2 Causal links trade policy and employment

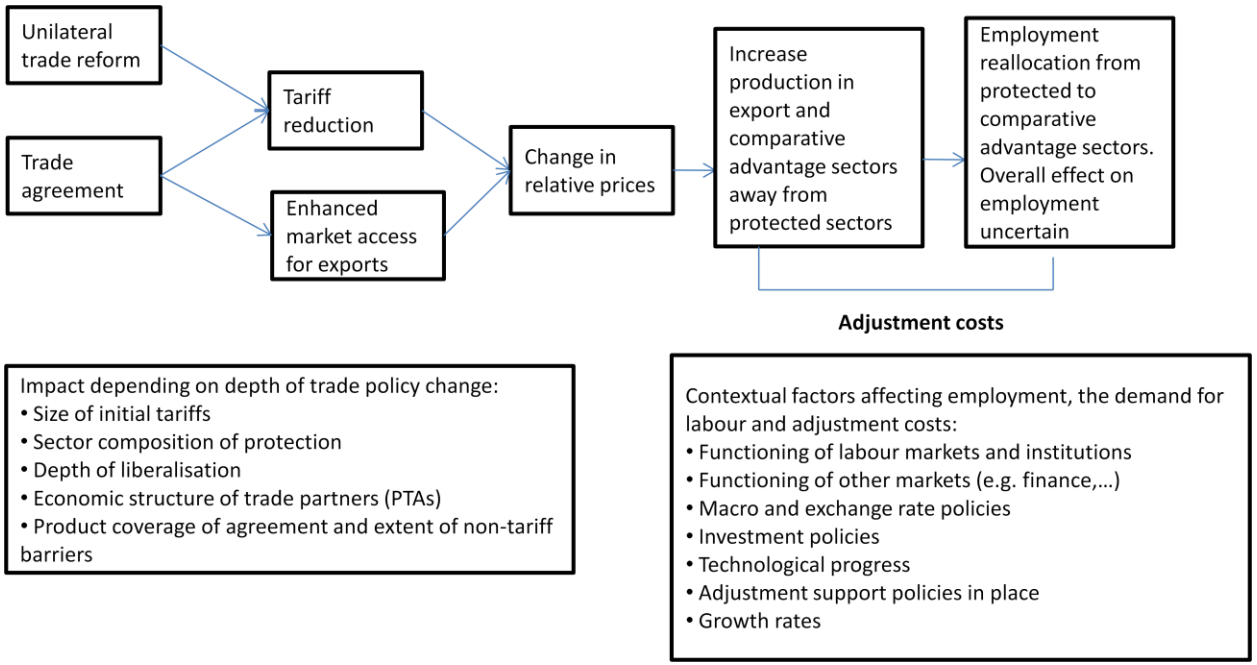
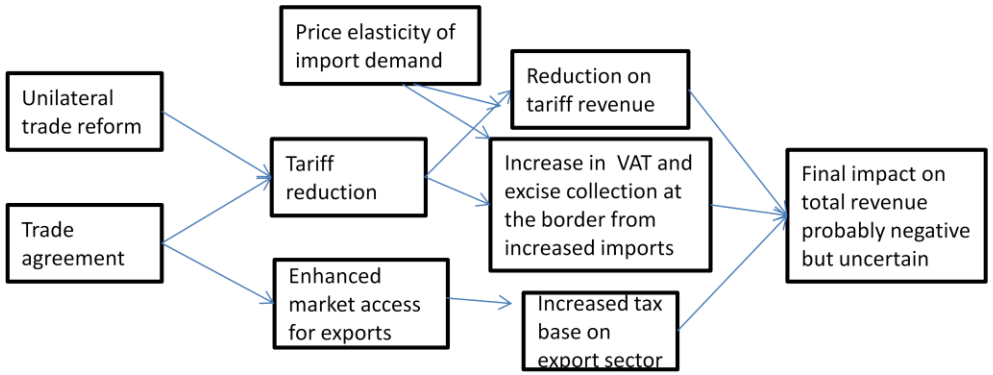


Figure 1.3 Causal links trade policy and revenue



Impact depending on depth of trade policy change:
- Size of initial tariffs
- Depth of liberalisation
- Dependency on trade-related taxes
- Size of trade diversion for PTAs
- Impact on production structure

Contextual factors affecting impact on revenue:
- Complementary tax reform
- Introduction of complementary PTA tax schemes
- Reduction in tax evasion
- Macro and exchange rate policies
- Growth rates

In addition, in large countries that have the capacity to affect international prices, tariffs are also used to affect the country's terms of trade.

The main element when considering the final effect of tariff reductions on revenue collection is the price elasticity of import demand. If import demand is price inelastic, a reduction in tariffs will have a small effect on the quantities imported, but will be translated into lower tax collections, since a lower rate is being applied to a similar tax base. On the other hand, when imports are very price elastic, reducing tariffs implies larger imported volumes, which potentially can compensate the fall in tax revenue per unit of goods imported. Thus, in the case of highly price-elastic products, there is a trade-off between the two main objectives of tariffs, protection and revenue.

The overall effect on tax revenue is also unclear due to the presence of other taxes. For example, increase in imports following liberalisation implies larger collections of VAT at the border. If these rates are large, they can also compensate from the revenue loss from reducing tariffs. Furthermore, there are other general equilibrium effects from reallocations. If tariff reductions are translated into a reallocation of resources towards export sectors, this implies larger tax collections in these sectors. Similarly, induced reallocation towards informal or formal sectors also has an impact on total tax collections. If liberalisation increases the share of the informal sector in the economy, the domestic tax base will shrink, exacerbating the reduction in revenue collections.

An important result regarding tax revenue arising from implementing selective liberalisation is the issue of trade diversion in RTAs. While under unilateral liberalisation, reduction in revenue collection may be translated into lower prices for consumers, this is not necessarily the case with selective liberalisation. Preferential treatment of less-efficient trade partners under an FTA implies that the country can still import at the same international price as was previously charged inclusive of tariff (trade diversion), but loses any tariff revenue since the new source of imports is a preferential partner. This is equivalent to a tariff revenue transfer to our trade partners.

Fisman and Wei (2004) argue that an additional positive effect from tariff reduction is that lower tariffs reduce the incentives for tax evasion. Accordingly, products with high tariffs experience larger tax evasion and cross-border smuggling. By reducing tariffs, tax evasion practices are reduced and effective tariff revenues are increased.

When looking at the impact on tax revenue, one also needs to consider the fact that episodes of trade liberalisation or implementation of PTAs have often been accompanied by complementary tax reforms. For example, many low-income developing countries introduced VAT after implementing tariff reductions; also, implementing a customs union requires some agreement on revenue sharing of the common external factors. These complementary policies can mask the true effect of tariff reductions on tax revenue collection.

Figure 1.3 summarises the main causal links between tariff reductions and government revenue. Overall, the final impact is uncertain and again depends crucially on the size of initial tariffs, the sector compositions of these initial tariffs, the extent of tariff reduction, the structure of trade partners, complementary tax policies and the price elasticity of import demand.

1.2.3 Definitional and conceptual issues

The policy question of this review can be clearly divided into two different but related sub-questions. The first question is the impact of tariff reductions on employment. This implies looking at the evidence linking tariff reductions with employment changes and reallocations between sectors. The second question is the impact of tariff reductions on government revenue. This implies looking at the evidence linking tariff reduction episodes with changes in tariff revenue and other sources of government revenue in general.

Although we are analysing these questions separately, it is possible that reductions in government revenue due to tariff reductions could affect employment, mainly via a reduction in public employment. The size of public employment in developing countries, however, tends to be small, and despite there being some literature analysing the impact of downsizing public sector on employment in developing countries, this tends to be associated with structural adjustment and fiscal consolidation, rather than trade reform (see for example Rama, 1999). In addition, any impact of tariff reductions on firms and employment will also affect tax receipts. However, evidence on this area would require very good longitudinal micro-data series, and we did not find any empirical studies linking both. Accordingly, it is better to treat both questions separately, in line with the existing evidence.

Mapping the policy question to the relevant empirical evidence requires several important delimitations and definitions.

A macro-policy experiment

Systematic reviews tend to concentrate on synthesising the results of evaluations from micro-interventions. The more focused the intervention is, the easier it is to evaluate the relevant causal channels. In the case of macro-interventions, such as trade policy, the causal links are more diverse, and as Figures 1.2 and 1.3 suggest, there is a large number of other factors that can influence the final outcome. This poses significant challenges for the review. The first challenge is related to the need to consider evaluations that formally attempt to control for some of these external factors. We have addressed this issue (described in more detail in the following section) by including for review only quantitative studies that formally try to control for other factors econometrically, or in the case of simulation studies, with CGE models. The main implication is that we have not included very rich case studies that link trade reform with employment or tax revenue, because of lack of robust causality analysis.

The second challenge is the extent to which the impact of the policy experiment is context dependent given large differences in country specificities and the trade policy experiment. This implies that the synthesis of the impact across studies needs to be interpreted with caution.

Tariff reductions

As suggested above, there are different types of trade reform or tariff reductions. There are three main trade policy processes that are normally analysed in empirical trade research: preferential trade agreements (PTAs), both unilateral and reciprocal, unilateral trade liberalisation and multilateral liberalisation. The common element of these processes is a reduction in tariffs on imports, although some PTAs go beyond tariffs and include other measures. However, the size, scope

and sector composition vary considerably from case to case, and as we have seen above, these are crucial in order to determine the impact size. To make matters more complicated, tariffs are defined at the product level, which implies that the ideal study should work with highly disaggregated data for trade flows and employment.

Unfortunately, most studies work with more aggregated data. This implies departures from the ideal measure of the policy experiment. Some studies average tariffs per sector, losing within-sector specificities with the aggregation. Other studies use more broad measures such as openness or import penetration which are more loosely related to tariff reductions or trade reform since they are largely affected by other factors.

This problem of measuring the trade policy experiment is exacerbated for countries where most liberalisation is related to specific FTAs. Very few econometric evaluations consider selective liberalisation. On the other hand, the main tool for analysing the impact of PTAs has been the use of ex ante CGE simulations. Multi-country and multi-regional models are well suited for analysing selective liberalisation episodes.

A narrow focus on those studies that better measure trade policy changes will expand the share of ex ante CGE simulation studies and exclude many ex post econometric studies.

Focus on developing countries

While social accounting matrices (SAMs) have been developed within the CGE literature for a large number of low-income countries (LICs) making simulations possible, ex post econometric evidence requires micro-data, often unavailable or of bad quality in LICs. This implies that most of the ex post evidence focuses on developed and non-LIC developing countries. While we exclude from this review the literature that focuses only on developed countries, our sample includes non-LIC developing countries in line with the review question.

Ex ante *and* ex post *methodologies*

As suggested above, the fact that the larger part of the empirical work in this area corresponds to ex ante quasi-empirical CGE papers poses an important question for this review: how to synthesise ex ante, simulation studies, and ex post, econometric evidence. These ex ante studies are empirical in the sense that they use observed data on sectoral production, employment and trade patterns prior to the policy reform along with secondary empirical information from econometric studies to determine the behavioural parameters of the simulation model.

The synthesis of CGE studies is especially difficult since most of the CGE literature lacks ex post validation of results and few papers perform systematic sensitivity analysis (Hertel et al., 2007) with respect to the assumed key parameters during simulations. For all these reasons, our approach here is to analyse both strands of the empirical literature separately. Keeping in mind that ex post evaluations are preferred, we compare the main CGE synthesis findings to econometric evidence, stressing the main assumptions and possible sources of bias of simulation studies.

Employment effects

A final important clarification relates to the fact that when looking at labour market outcomes of trade reform, one can look at the impact on employment and/or on its return, wages. In fact, most of the existing evidence has analysed the impact on wages, which tend to experience larger adjustment than employment levels (Hoekman and Winters, 2005). While the impact of trade reform on wages and income distribution merits a future systematic review in order to better understand changing patterns in income distribution, the focus of this review is exclusively on employment.

1.3 Policy and practice background

As suggested in the introduction, the potential benefits from reducing tariffs depend on the capacity of the economy to reallocate resources. It is in this process where adjustment costs may prove significant. This issue has worried policy makers working on trade and sector policies, and has been – together with 'infant industry' and 'rent-seeking' arguments - one of the main factors explaining resistance to trade reform and regional integration.

Compensating adjustment costs is one of the main components of Aid for Trade (AfT) assistance. Bilateral donors disbursed around $16 billion in AfT programmes in 2008. Some of these funds were directed towards compensating for costs from trade liberalisation or preference erosion. Therefore, understanding the magnitude of these costs is crucial for better allocation of assistance resources.

Provisions for adjustment costs have also become an important element of North-South trade agreements. For example, after a decade of negotiations, the main constraint to reaching an agreement on the economic partnership agreements (EPAs) between the EU and some ACP countries is related to the availability and size of adjustment funds to compensate for potential productive and revenue losses. As a result, a better understanding of the size effects of reducing tariffs on employment and government revenue could help inform trade negotiators.

1.4 Research background

To our knowledge, no other systematic review has been conducted in this area. A few surveys on the impact of trade liberalisation on labour markets exist (see for example Epifani, 2003; Hoekman and Winters, 2005; Saba Arbache, 2001). However, these are general surveys of the literature. More recently, Porto and Hoekman (2010) have edited a collection of papers about different aspects of adjustment costs to trade reform in developing countries.

In addition, only a few papers provide meta-analyses of specific areas of the impact of trade agreements. For example, Cipollina and Salvatici (2010) provide a meta-analysis of gravity modelling regarding the impact of reciprocal trade agreements. Also, Hess and von Cramon-Taubadel (2008) perform a meta-analysis of partial equilibrium and CGE modelling regarding the potential impact of the Doha Round.

Regarding the impact on tax revenue, some papers and books have looked at the experience of developing countries' government revenue after trade reform (see for example Ebrill et al., 1999).

There is also a very rich literature looking at the impact of trade reform and regional trade agreements on wages and wage inequality (see Goldberg and Pavcnick, 2007, for a recent survey). A lower number of studies have focused on the impact on employment.

1.5 Objectives

The objective of this review is to perform a systematic review of the existing evidence on the impact of trade agreements on employment and government revenue in developing countries. The review attempts to answer the question:

> What is the evidence of the impact of tariff reductions on employment and fiscal revenue in developing countries?

This is a review of quantitative studies, and the question is split in two sub-questions: the impact on employment and the impact on government revenue, which we answer separately. The focus on quantitative studies only relates to the need to control for other factors that may explain employment and government revenue outcomes. This is extremely important in the case of macro-interventions if one wants to infer causal relationships, since the link between instrument and outcome is affected by a larger number of factors than just micro-interventions. In addition, since the focus is on quantitative studies only, the review aims at providing quantitative estimates of the impact of tariffs reductions on employment and government revenue.

The different methodological approaches existing in the literature make it necessary to synthesise each approach separately. Thus, we have systematised the impact according to each methodology and focus, at the same time drawing conclusions on how the results differ or relate across methodologies.

This systematic review also includes ex ante general equilibrium simulation studies. The inclusion of both ex ante CGE and ex post econometric simulations is something new in the literature. The reason for doing so, as suggested above, is the fact that trade policy is often guided by simulation studies due to the ex ante nature of the policy questions (i.e. what would be the impact for the country of signing a trade agreement with country X), and therefore these studies represent a very large number of evaluations in this area. A final objective of this review is, therefore, to compare the results from the CGE synthesis with preferred econometric evidence based on observational data. While ex post evidence will always be preferred since it represents external data validation, we aim to provide some guidance on how CGE simulation results compare to ex post results, and on the key underlying assumptions and main potential sources of bias in the studies. This may provide a useful guide for policy makers in the area of trade policy in interpreting the results.

2. Methods used in the review

2.1 User involvement

2.1.1 Approach and rationale

The question of this review is of significant importance for trade policy practitioners in developing countries. As suggested above, adjustment costs to trade agreements are often one of the main reasons for policy makers to pursue further trade liberalisation. As a result it is important that the review reaches the trade policy arena.

We have communicated with our Department of International Development (DFID) lead in order to ensure that the review responds to the policy expectations. This has been crucial when narrowing and focusing the review question.

We consulted with academics in the field on our search strategy, and in addition, in order to determine the concluding searches, the final list of included studies was sent to DFID and also to the network of academics working on trade issues in the University of Sussex. This allowed us to gather additional relevant references not captured by our search strategy.

Regarding the findings of this review, we also engaged with our DFID lead to communicate preliminary findings, to make sure that the way the review is communicated is useful for policy advisers. To further engage with policy makers and development practitioners, we will be working with our information department at the Institute of Development Studies (IDS) in order to identify appropriate channels through which the review can be communicated in different policy spaces. The results will be disseminated to IDS subscribers (a large heterogeneous group formed by NGOs, development agencies, government units and embassies, academic institutions in the South, university libraries and individual development practitioners)..

Regarding academic users, we aim to present the review at our internal seminars at IDS/University of Sussex, as well as submitting it for journal publication. We also aim to have the paper reviewed by other academics that have worked in the area of trade and adjustment costs and CGE modelling.

2.2 Identifying and describing studies

2.2.1 Defining relevant studies: inclusion and exclusion criteria

We have concentrated on quantitative studies and exclude those papers where no efforts have been made to control for other factors affecting employment and government revenue. These are descriptive studies which only comment on changes in employment and revenue, but where causality is not inferred since there is no formal statistical or modelling treatment.

The following exclusion criteria were implemented:

Both employment and revenue

Ex post studies

- Exclude non-quantitative studies
- Exclude studies that do not use a proxy for tariff reduction, openness index variable or trade indicator
- Exclude studies that focus solely on developed countries.

Ex ante CGE

- Exclude studies which do not report the magnitudes of the simulated tariff changes
- Exclude studies in which tariff changes are simulated simultaneously with other policy changes and in which the results are not decomposed into effects due to tariff changes and effects due to other policy shocks
- Exclude partial equilibrium simulations
- Exclude studies that focus solely on developed countries.

Employment

Ex post studies

All those studies that analyse econometrically the impact of tariff reductions and/or openness of trade indicators on aggregate and sectoral employment in developing countries were included. These included a few papers documenting the impact of exchange rates on employment that use controls for openness indicators. In addition, another set of studies focusing on firm-level and employment data and the impact of tariff reductions on employment reallocation were also included.

Ex ante simulation studies

The focus here was on simulations of PTAs and unilateral preferences in developing countries, although we also included simulations of unilateral liberalisations in LICs, in order to make the results comparable to ex post studies. We prioritised the search for those studies that use SSA (Hertel et al., 2007) and report confidence intervals. However, only one study was found that used this methodology, and this could not be included due to a focus on welfare measures rather than employment. As a result we have included standard CGE studies. We separate studies according to models assuming full employment, so focusing on intersectoral labour reallocation effects, and those assuming wage rigidities that entail economy-wide aggregate employment effects.

We exclude studies that do not report sectoral and/or aggregate employment effects. It is worth noting that this criterion alone inevitably led to the immediate exclusion of a large proportion of the voluminous body of existing CGE trade policy studies. The primary focus of these studies is commonly on the measurement of the aggregate gains from trade liberalisation as measured by indicators of aggregate welfare. Multisectoral CGE studies simultaneously generate results for a large number of endogenous variables. Due to space constraints, impacts are commonly tabulated only for a small subset of these variables in published reports and articles. A common practice is to report only the impacts on welfare, the terms of trade, trade flows and possibly sectoral output effects and relative factor price changes.

Revenue

Ex post studies

This section will include all those studies that analyse econometrically the impact of tariff reductions and/or openness on government revenue and tariff revenue. We included both cross-country and single-country studies. We also included other studies that analyse the impact on government revenue from other policies, but that control for trade reform and/or openness.

Ex ante simulation studies

The same inclusion criteria as for ex ante simulation studies of employment listed above are applied. With regard to the treatment of tax revenue impacts, two types of approaches need to be distinguished. The first approach is to keep fixed all tax rates in the model other than import duties and export taxes/subsidies subject to change under the simulated policy reform, and let total tax revenue adapt endogenously to the policy reform. In this case, government expenditure or government savings must adjust residually to balance the government budget. The alternative is to keep government expenditure and government savings fixed and let some chosen tax rates adjust endogenously to balance the government account. As both approaches provide information about the direction of the net government revenue effects of trade policy reforms in the absence of other tax rate adjustments, we included both types of study. We excluded studies which neither report changes in total government revenue nor the direction of the simulated revenue-neutral adjustments in other tax rates.

2.2.2 Identification of potential studies: search strategy

The electronic searches used four different sets of terms. The first set refers to the policy experiment, tariff reductions. The following broad terms were combined in this set: 'tariff reduction' OR 'openness' OR 'trade reform' OR 'trade liberalisation' OR 'Preferential Trade Agreement' OR 'Free Trade Agreement' OR 'unilateral preferences' OR 'trade policy change'. We also used a list of the main PTAs in developing countries, in addition to unilateral preference schemes such as GSP (Generalised System of Preferences), GSP+, Cotonou or AGOA (African Grown and Opportunity Act). Around 200 FTAs and PTAs are in force that have been notified to the World Trade Organization and involve at least one developing country as member.[1] A search combining all of these proved prohibitively large. For this reason we focused on regional, rather than bilateral agreements, and agreements in place before 2005. The list used for this purpose is given in Appendix 2.1.

The second set of terms, corresponding to employment indicators, was: 'employment' OR 'unemployment' OR 'labour' OR 'job'. Both UK and US spelling are taken into account when conducting these searches.

The third set of terms refers to the second part of the review, the indicators of government revenue. For this, we used: 'tax revenue' OR 'fiscal revenue' OR 'budget revenue' OR 'government revenue' OR 'tariff revenue'.

The fourth set of terms refers to country focus, which was captured by the terms: 'developing countries' OR 'low income countries' OR 'less developed countries'. The set was useful to curtail the irrelevant hits when performing searches in multidisciplinary databases as opposed to specialist economics databases. These general terms used in distinguishing the country focus were supplemented by a comprehensive list of developing countries.[2] When all of these, including the country names, were added, the search string comprising the fourth set consisted of more than 2000 characters.

The above sets of terms were combined as follows to form the main search line in either of two forms:

'(first set) AND [(second set) OR (third set)] AND (fourth set)'

[1] http://rtais.wto.org/UI/PublicPreDefRepByRTAName.aspx
[2] http://en.wikipedia.org/wiki/Developing_country

'(first set) AND [(second set) OR (third set)]'

The first line is more restrictive than the second. What was more important, however, is that the first is substantially longer than the second. Length of search lines was an issue for some databases which preferred simple/short search lines. We used the second search line only when searching such databases.

The following electronic databases were searched for studies conducted after 1990 using the above strategy:

- EconLit (via CSA Illumina)
- IBSS (via CSA Illumina)
- Science Citation Index Expanded (via Web of Science)
- Conference Proceedings Citation Index- Science (via Web of Science)
- Arts and Humanities Citation Index (via Web of Science)
- IDEAS
- Google and Google Scholar

EconLit and IBSS were searched jointly within 'CSA Illumina'. However, at the point of downloading, 'CSA Illumina' allowed the search results to be separated according to the database. Thus we were able to keep track of EconLit and IBSS searches. Web of Science also permitted its databases to be searched jointly. However, it did not allow the final search result to be separated by database.

All databases, except IDEAS, were searched using the longer (and more restrictive) version of the search line which included the 'fourth set'. IDEAS did not permit search lines that exceeded 250 characters (including spaces).[3] Thus we had to looks for ways to reduce the size of the search string. After some experimentation we decided that dropping 'fourth set' was the best solution. Though this relaxed the search strategy, the IDEAS search did not result in an overwhelming number of developed country studies (for instance only 80 studies were finally excluded because they were about developed countries – see Table 3.2). We believe that this was to do with economics focus of the database. The restrictions imposed by the fourth set were more useful in searching databases with a wider social sciences focus.

We also checked Google and Google Scholar, which were screened online, since searches cannot be downloaded. This implies that only included references which were not already duplicated were integrated in our database.

After importing the search results to Endnote, we uploaded them to EPPI-Reviewer.

Incidentally, it was not possible to import IDEAS searches into Endnote and thus on to EPPI-Reviewer as no suitable filter existed. This was frustrating as we were aware that IDEAS was perhaps the most important database in view of the scope of this review. For this reason we designed a Visual Basic for Applications (VBA) routine which enabled us to generate RefMan (RIS) format files from the search pages of IDEAS. This way it was possible to upload all of the IDEAS research results into EPPI-Reviewer.

[3] The website does not say this. However, its search results made no sense when this limit was exceeded.

2.2.3 Screening studies: applying inclusion and exclusion criteria

Inclusion and exclusion criteria were applied successively to (i) titles and abstracts and (ii) full reports. Table 3.2 in Section 3 outlines the result of title/abstract screening, and Table 3.3 shows the results of the second screening.

2.2.4 Characterising included studies

Ex post studies

We extracted information from each of the included studies according to the following variables in Table 2.1. The table was created in Excel and then transferred into STATA to facilitate the analysis.

Rather than choosing a preferred estimation by study, we considered as many specifications as possible for each study. This allowed us to compare several methodologies of synthesis using a summary coefficient by study with meta-regression techniques using all potential coefficients and other covariates.

Some studies looking at employment effects addressed the question by using several trade policy proxies. Thus, the table includes, for up to five variables in each study, information on definition, coefficient, standard error and t statistic. These studies were analysed separately.

When the standard error or t statistic was not reported, we calculated it. However, we also included a variable of significance for p-values for those cases where neither standard error nor t-statistic was reported.

The fact that most studies used different variables as explanatory and dependent variables largely complicated the analysis. We summarised this information across studies with the variable Y for the dependent variable and X for the explanatory variable. Based on these two variables, we could group studies with similar specification (see below).

Table 2.1 Characterisation of ex post econometric included studies

Variable name	**Description**
Paper	Paper reference – author (year)
number_old	Reference number
Equation	Specification used in terms of proxy of Y and proxy of X
Type	Employment/tax revenue
Methodology	Econometric
Sample	Geographical sample
Period	Time period
Level	Cross-country/country/industrial sector/firm
Y	Dependent variable (in short)
dep_var	Dependent variable (detailed explanation)
X	Openness/trade instrument variable (in short)
Openness	Openness/trade instrument variable (detailed explanation)
Specification	Specification number corresponding to all specifications selected

Coef	Coefficient
std_error	Standard error
T	t-statistic
Significance	Significance when nothing else reported
sample1	Number of observations
r2	R squared
econ_meth	Econometric estimation methodology
Publication	Publication type – book, journal, working paper, thesis
Other	Other relevant information
second_var	Second variable capturing trade policy
second_coef	Coefficient second variable
second_stde	Standard error second variable
second_t	t-statistic second variable

Ex ante studies

In the case of ex ante CGE evidence, we used a similar procedure. In this case we included studies where sufficient information was reported according to Table 2.2. Then we calculated the different elasticity or percentage changes measures that allowed comparison across the different papers.

Table 2.2 Characterisation of ex ante CGE included studies

Variable	**Description**
First author (pub year)	Paper reference – author (year)
No. of regions	Number of geographic regions in the model
No. of sectors	Number of sectors considered
Time dimension	Whether a static or a dynamic model
Benchmark year	Year of database used for the numerical calibration of the model
Labour market closure	FE – Full employment: fixed labour endowments and flexible real wage; UE – Unemployment closure: infinitely elastic labour supply at a fixed real wage; WC - Wage curve closure: variable employment and variable real wage
External closure	CAFix - Current account balance fixed at benchmark level; CAFlx: Current account flexible
Scenario type	PTA – Preferential trade agreement; Unlat - Unilateral trade liberalisation; Mulat: Multilateral trade liberalisation
Description	Name of free trade area
Country /region	Country or composite developing region to which the reported results refer.

Dl%/dtrade%	Elasticity of aggregate employment with respect to the volume of trade (% change in aggregate employment / % change in volume of trade (real exports +real imports)).
Dl%/dtariff %pt	Elasticity of aggregate employment with respect to average import tariff rate (% change in aggregate employment / %-point change in import-weighted average tariff rate).
Reloc%/dtariff%pt	Percentage of total labour employment relocated intersectorally / %-point change in import-weighted average tariff rate.
Reloc%/dtrade%	Percentage of total labour employment relocated intersectorally / % change in volume of trade (real exports + real imports).
Impact on tax revenue	Impact on tax revenue
Compensatory tax rate change	Extent (in %-points or %) or direction of change in tax rate: VAT - value-added tax, TS – sales tax, TP – production tax; TY – income tax

2.2.5 Identifying and describing studies: quality assurance process

Quality assurance was done at two levels: (1) at the time of electronic searching for studies, and (2) at the time of inclusion and exclusion.

When electronic searches were conducted, where possible we discussed preliminary results among RG members. For instance Web of Science gives disciplinary breakdowns which were useful to fine-tune the searches. One example is where searches were yielding very large volumes of psychology studies; on investigation we realised that the PTA and FTA acronyms used in the searches mean something different in this field. We also looked at the number of already identified (at the time protocol was prepared) studies being picked up in our searches. The discussions among the RG members around these reports helped to focus the electronic searches and improve the quality of the search results.

At the point of applying inclusion and exclusion criteria to titles and abstracts, we implemented a rigorous piloting/pre-testing stage. During this stage, pairs of Review Group (RG) members independently included and excluded citations and then compared their results and found agreement on their differences. It was after this piloting stage that the RG members individually screened the titles and abstracts. The resource/time constraints meant that we could not extend the approach taken at the pilot stage (of working independently and then comparing) for the whole of the title/abstract screening.

The RG members, however, made other arrangements for quality assurance with regard to the work of the less-experienced member of the team, the research assistant (RA). The RA was instructed to flag the uncertain cases which the more experienced members would go through. In addition the more experienced members also went through 25 percent of the studies excluded by the RA to make sure that relevant studies were not discarded. These checks and balances helped to make the initial stage of screening free of researcher bias.

2.3 Methods for synthesis

2.3.1 Assessing quality of studies

We dealt with the issue of quality separately during the synthesis stage. We first carried out the synthesis for all included studies without quality considerations. Secondly, for the ex post econometric studies, we applied the following criteria for higher quality studies:

- Studies that correct for potential endogeneity of the trade policy variable (i.e. use instrumental variables)
- Studies that use tariffs as trade policy proxy, rather than outcome indicators such as openness or import penetration.
- Peer reviewed, including journal publications, working papers, thesis and other documents that explicitly undergo a process of peer review.

Regarding the last element, we were unable to obtain information about the degree of peer review of some of the working papers, and therefore we effectively implemented the first two criteria. These high quality studies were then synthesised separately, and the results compared with the sample that included all included studies.

For CGE studies, we also attempted to apply an additional quality filter based on the use of systematic sensitivity analysis (SSA) and peer review. Only one study found had applied SSA, and it could not be included in the review because the results were not reported in adequate form. The outcome of simulations depends critically on the size of a set of key fixed parameters. In order to improve the robustness of the simulations, SSA proposes that CGE studies should report results under alternative values for key parameters. This provides confident intervals, and would facilitate any systematic review of these coefficients since it allows the precision of the estimated effects to be considered. Unfortunately, SSA methodologies are not followed in practice, which limits the scope when synthesising simulation studies.

2.3.2 Overall approach to and process of synthesis

The overall approach to synthesis is meta-analysis. Two main methodological challenges arise. First, econometric evidence, even in the case of very similar focuses, use different proxies to measure both trade policy and employment. This means that the outcome variables are not directly comparable across studies. For example, some studies express the outcome as the tariff elasticity of employment and others as the openness elasticity of employment. Consequently, we clustered the studies according to comparable specifications defined by Y and X and apply meta-analysis at each cluster, and then proceeded to compare the signs and magnitudes across the different clusters.

In addition, most papers reported a large number of specifications. Rather than deciding that the single specification should be selected, we compared the results from different synthesis methodologies. The first methodology used a single estimate by study based on the average estimate and the methodology of aggregation established by Borenstein et al. (2009). These individual estimates were then combined and synthesised using meta-analysis for each study and clustered with the same specification (Y and X). Thus, this approach consists fundamentally of two-stages. First, we obtained one estimate for the study and avoided over-representation of single studies in the final results; then with the

obtained coefficients we synthesised the evidence in each cluster with the same specification.

The second methodology used all the information available and estimated the average effect using meta-regression for each specification (Y and X) when the number of observations was larger than five and there was more than one paper using the same specification. This allowed us to determine the sensitivity of the results to different econometric techniques and assumptions (Stanley, 2008).

A final challenge was the synthesis of the CGE results. Since these studies were deterministic and did not implement the SSA methodology, we did not have standard errors. The process of synthesis in these cases was the following. We first constructed for each study an outcome variable that was comparable across studies: comparable elasticities or percentage changes (see section 2.3.4). Then, we performed meta-analysis for the studies with the same outcome variable based on weights that depended on between-study variance. In the case of tax revenue, since we could not construct a comparable outcome variable (see below), we discussed the results of single studies.

2.3.3 Selection of studies for synthesis

Four papers from the included econometric studies were excluded from synthesis due to the trade policy proxy: Christev et al. (2005), Fajnzylber and Maloney (2005), Manda and Sen (2004) and Tosun (2005). These studies decomposed tariff reductions into a large number of interactive terms that made identification of the pure trade effect impossible.

2.3.4 Selection of outcome data for synthesis

This is explained in section 2.2.4 for econometric ex post studies.

In the case of ex ante CGE studies of employment effects, the selection of output data for the quantitative synthesis depended on the type of labour market closure assumed in the CGE model and the nature of the trade policy reform under investigation using the corresponding categories in Table 2.2.

For studies with variable aggregate economy-wide employment – these are the studies using an unemployment (UE) or wage curve (WC) closure – we extracted the percentage change in aggregate employment (dL%) and an indicator of the extent of the trade policy reform. For the latter indicator, we used the percentage-point change in the import-weighted average tariff rate (dTariff %pt) for studies simulating a unilateral trade liberalisation programme (Unlat), in which the country under consideration cuts its import duties while the tariffs imposed by the rest of the world on the country's exports remained unchanged. For studies in the Unlat category with insufficient information for the determination of dTariff%pt, we used the percentage change in the volume of trade (exports plus imports of the liberalising country) generated by the tariff cuts (dTrade%) as indicator of the extent of the reform. For Unlat studies providing information for the calculation of both indicators, we extracted both dTariff%pt and dTrade%.

For studies of preferential trade agreements (PTA) or multilateral trade reforms (Mulat) in which other regions changed their tariffs on imports from the country under consideration, dTariff%pt is not an adequate measure of the extent of the reform. Therefore, we extracted only dTrade% in these cases.

For studies with a fixed economy-wide labour endowment and full employment closure (FE), in which dL% = 0, we used the percentage of the labour force moving

jobs across sectors in response to the trade reform (Reloc%) as summary indicator of the strength of employment impacts. Note that this indicator is simultaneously an aggregate measure of job creation and job destruction. The selection of a measure for the extent of the reform is the same as above, i.e. we extracted dTariff%pt and/or dTrade% for Unlat studies and dTrade% for Mulat/PTA studies.

Finally, to create overall measures of the size of employment impacts that were broadly comparable across sub-sets of studies which differ in the extent of the trade policy reform, we divided the employment change measure by the extent-of-reform measure. In the few cases of studies employing a dynamic CGE model, the extracted measures referred to long-run impacts at the end of the simulation horizon. Table 2.3 summarises the mapping from the resulting four indicators to the corresponding sub-sets of studies.

Table 2.3 Mapping of CGE study type to employment change indicator

		Unlat	**Mulat/PTA**
Labour market closure	UE or WC	dL%/dTariff%pt and/or dL%/dTrade%	dL%/dTrade%
	FE	Reloc%/dTariff%pt and/or Reloc%/dTrade%	Reloc%/dTrade%

In most cases, the figures in both numerator and denominator of the indicators had to be calculated manually by the reviewer from various tables in the source.

Formally, the components of the selected indicators are defined as follows:

1. $dL\% = 100\ \Delta L/L$
2. $Reloc\% = 100\ \sum I\ abs(\Delta Li)/(2L)$
3. $dTariff\%pt = \sum j(Imj/Im)\Delta\tau j$
4. $dTrade\% = 100\ \Delta(Ex+Im)/(Ex+Im)$

where L is aggregate employment, Li is employment in sector i, Im denotes aggregate import volume, Imj denotes imports in commodity group j, Ex is aggregate export volume, Exj denotes exports of commodity j,τj the ad valorem import tariff rate for commodity group j in percent, and Δx is the deviation of variable x in the post-reform equilibrium from the observed initial equilibrium.

For the synthesis of tax revenue impact results from ex ante CGE studies, we extracted the reported percentage change in total tax revenue if available, or at least the sign of the change if reported in the narrative of a study. For studies that assume revenue-neutral compensatory changes in other tax rates, we recorded the magnitude of these tax rate changes (in percentage points or percent) if reported and the type of tax (VAT: value-added tax, TS: sales tax, TP: production tax, TY: income tax).

2.3.5 Process used to combine/synthesise data

As suggested above, included studies were clustered according to the following dimensions: employment or tax revenue, econometric or CGE, and dependent variable (Y) and trade proxy (X). In the cases where several specifications were reported for a single study, the procedure was to synthesise observations from the same cluster that belonged to the same study in order to obtain a single estimate by study in each cluster. Then we compared the results across clusters.

The same procedure was carried out for CGE studies. These were synthesised according to the outcome variable, and then we compared the results for each cluster.

2.4 Deriving conclusions and implications

We derive the conclusions, results and policy implications through an iterative and collaborative process of discussion between the authors of the review.

3. Search results

3.1 Studies included from searching and screening

A total of 3,517 citations were uploaded to EPPI-Reviewer. Table 3.1 provides a breakdown of this total by the database. Using EPPI-Reviewer we were able to identify 716 of these citations as duplicates which meant that 2,801 citations were unique. The duplicate and unique citations are also separated by database in Table 3.1. Notice that Google search results do not have duplicates because they were imported into EPPI-Reviewer after confirming that they are not among the identified citations. The titles and abstracts of the unique citations were then subjected to the first round of screening.

Table 3.1 Citations identified from electronic searches

Source	Uploaded	Duplicates deleted	Unique citations
Econlit (CSA)	1430	98	1332
IBSS (CSA)	586	167	419
Web of Science	707	228	479
IDEAS	764	223	541
Google	30	0	30
Total	3517	716	2801

Figure 3.1 outlines the screening process used in this study. The figure identifies that a total of 2387 references were excluded in the first round of screening. The application of various exclusion criteria at this stage is illustrated in the figure and reproduced in Table 3.2. The table outlines the result of title/abstract screening. During this process we excluded studies that analysed only developed country data (80), studies that were qualitative/descriptive or did no empirical work (127), studies that were about trade liberalisation but did not discuss the question in this review (592) and studies were are on a different broad subject (1588). The hand-searched studies (from Google), as their title and abstract had already been examined, were directly promoted to the second-level screening. Figure 3.1 identifies this as a separate channel through which the hand-searched studies were brought into this systematic review. This meant that none of the 30 hand-searched studies were excluded at the first-level screening.

Table 3.2 First screening – title and abstract

Total subjected to first screening	**2771**
Excluded: geographic location (DCs)	(80)
Excluded: methodology used	(127)
Excluded: relevance within trade liberalisation literature	(592)
Excluded: broad subject area	(1588)
Included on the basis of title and abstract	**384**

Full reports were obtained for those studies that appear to meet the criteria of the first level screening or where title and abstract was not sufficient to determine

whether they could be excluded. Though we sought full reports on 409 studies as illustrated in Figure 4 we were not able to access all of these either because of language difficulties (12 studies) or because of physical inaccessibility (76 studies) or both (12 studies). Thus a total of 100 studies were inaccessible. The remaining 314 studies were all obtained and the exclusion criteria were reapplied to these. Where soft copies were available these were uploaded to EPPI-Reviewer. Out of the 314 studies included 207 ex post studies and 107 ex ante CGE studies.

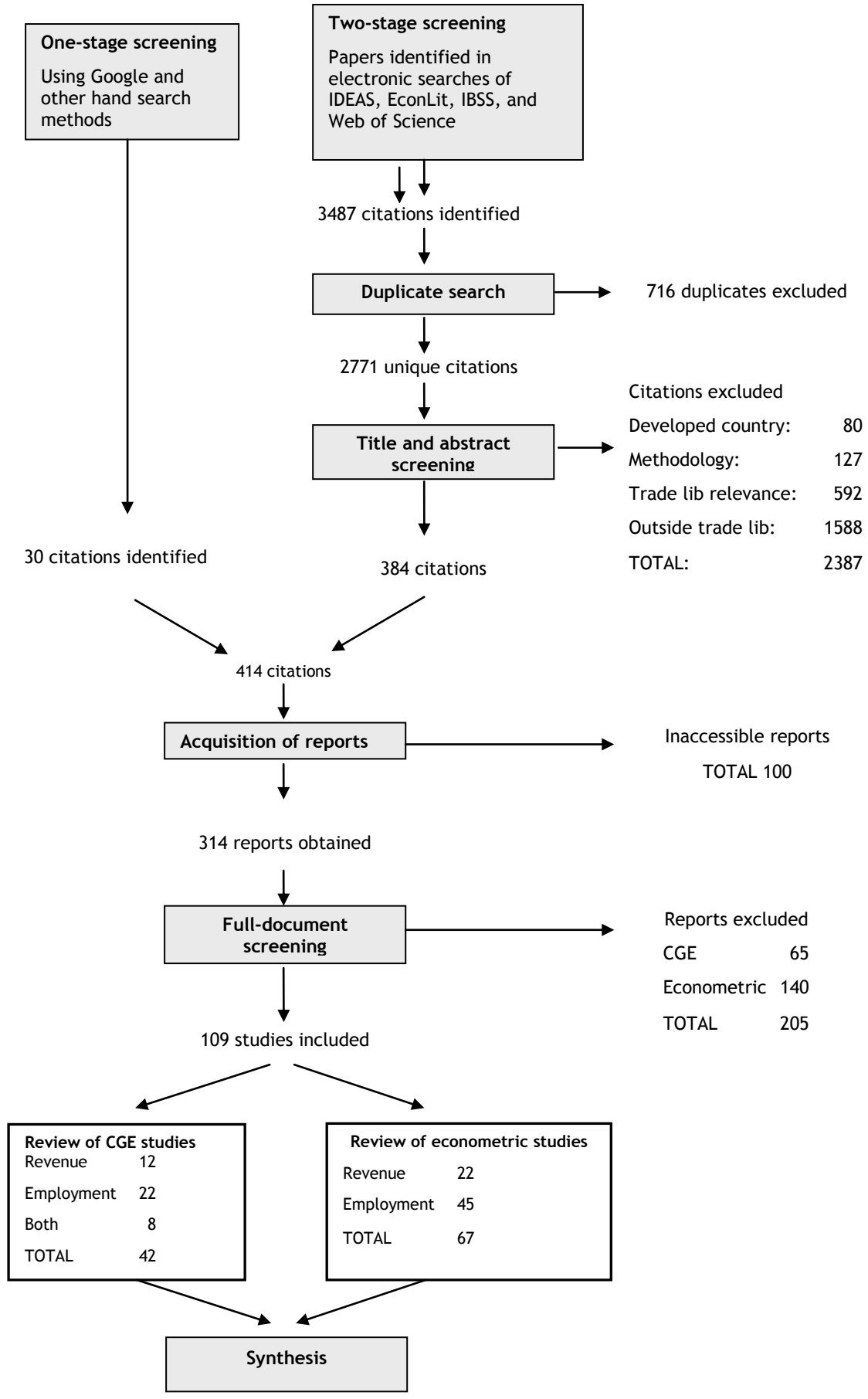
Table 3.3 summarises how the exclusionary criteria were applied to the full reports in the second round of screening. As explained earlier, 100 reports could not be accessed. From among the remaining 314 studies that were accessible, 205 were excluded after examining the full reports. These excluded studies included 140 ex post studies and 65 ex ante studies. The reasons for their exclusion are separated Table 3.3 into various criteria discussed earlier. But two are new: (1) the duplicates refer to studies/results that had been duplicated in multiple publications such as working papers, journal articles, book chapters, etc.[4] (2) In sufficient information in the case of CGE studies relates to studies that had to be excluded because the relevant sectoral details were not provided.

Table 3.3 Second screening – full document

Total selected for the second screening	**414**
Ex post studies excluded Geographic location (DCs) 8 Do not use a proxy for tariff reduction or openness 35 Methodology used 82 Duplicate 15	(140)
Ex ante CGE studies excluded Geographic location (DCs) 2 Methodology used 11 Relevance within trade liberalisation literature 11 Broad subject area 2 Insufficient information 30 Duplicate 9	(65)
Inaccessible Physical inaccessibility problem only 76 Language problem only 12 Both above issues 12	(100)
Included in the review after full text search	109

[4] This category is not the same as the duplicates eliminated in the first round, which were references to the same study in different bibliographic databases.

Figure 3.1 Filtering of papers from searching to map to synthesis



3.2 Details of included studies

Figure 3.1 also separates the 109 included studies into ex post (67) and ex ante (42). These included studies looked at the impact of trade liberalisation on either employment or revenue or both. The ex post econometric evidence on revenue effects was available in 22 studies. The remaining econometric studies (45) examined employment effects. There were no econometric studies that looked at both these variables.

In contrast, 8 CGE studies included in this review looked at both the employment and revenue impacts of trade liberalisation. The rest of the CGE studies either exclusively look at employment effects (22) or at revenue effects (12). This brings up the total CGE studies examined in the review: 8+22+12=42. In what follows we list these studies. The full reference list with all included studies is provided in section 6.1.

4. Synthesis results

4.1 Further details of studies included in the synthesis

4.1.1 Econometric studies

The final sample of included studies has 45 papers on employment and 22 on tax revenue. Of these, 3 are book chapters, 1 is a thesis, 30 are journal publications and 33 working papers.

For each study we select different specifications: in total, 121 specifications for tax revenue and 338 for employment, of which 179 specifications are based on country or cross-country level analysis, mainly for tax revenue, 187 are at sector level and 90 at firm level, and 3 look at whether workers are employed.

Regarding employment we can differentiate mainly between two types of approaches. Most studies have looked at whether employment levels at sector or firm level are correlated with proxies of trade policy. In addition, a few studies focus on employment reallocation: whether employment changes accelerate with trade policy changes. Rather than absolute levels, these studies focus on understanding whether trade policy changes shift labour resources across countries.

Tax revenue studies focus on the impact of trade policy changes on different types of tax revenue, trade taxes, total revenue, and also on the impact of collection of other taxes such as income taxes or indirect taxes. Most of the studies use tax to GDP ratios. Fewer studies also look at the impact of trade policy changes on revenue via budget spending.

One interesting element that arises from analysing the evidence is the heterogeneity of reduced form equations. Although having similar approaches, there is a large variation in the choice of variables for employment, tax revenue and trade policy. In addition some studies use log form, while others estimate the equation in levels. All the combinations of Y and X, which define our clusters for synthesis, are shown in Table A4.2 in Appendix 4.2. In total, we found 84 different combinations, which make synthesis challenging, since the summary effects in each cluster are not directly comparable.

Regarding the econometric method of estimation, there is also large heterogeneity. Less than a third of specifications included, try to address the potential problem of endogeneity between trade policy and economic performance. Better growth conditions, employment and a good government fiscal position facilitate governments engaging in trade reform. A few studies, especially regarding tax revenue, use a time-series methodology. The remaining studies are mainly ordinary least square (OLS) or panel estimates. We conduct sensitivity analysis by also presenting the results in section 4.2 for a sub-group of estimates that address the issue of endogeneity, and that are, therefore, considered of higher quality.

In general, one problem of econometric studies is that the trade policy variable is a very imperfect proxy for the trade policy experiment. Most studies use openness indicators, which depend on a varied number of factors and are an imperfect proxy for trade policy changes. While we expect that trade policy interventions tend to increase the degree of openness of the economy, when these imperfect proxies are used, changes in employment and revenue cannot be neatly attributed to specific policy interventions. This problem is even more relevant in the case of selective liberalisation under free trade agreements, where the effective change in tariff depends on the product and partner composition of imports. In addition, even in

the cases where sector tariffs are employed, rather than openness indicators, they only imperfectly indicate the size of the changes. In this regard, CGE studies have much more flexible structures to replicate the policy change, especially regarding preferential liberalisation. While the reader should keep this problem of causal attribution in mind, in order to gain robustness, section 4.2 synthesises the results using a sample that excludes studies employing other trade policy proxies than tariffs.

4.1.2 Ex ante CGE simulation studies

CGE models are theory-grounded economy-wide multisectoral numerical models for policy analysis designed to capture the circular flow of income from income generation through the transformation of inputs into outputs, to the distribution of income and to the use of income in a mutually consistent manner and in explicit structural detail. Producer and household behaviour in these models is based on theoretical micro-foundations. The applied models included in the synthesis are all calibrated to observed data sets for some benchmark reflecting the sectoral structure of production and input use, including employment by sector as well as the commodity composition of demand and international trade for the countries under investigation in that year.

While these features are common to all CGE models used in the included studies, the various models differ in a number of respects, as noted in Table 2.3 and detailed in the tables in Appendix 4.2.

First, the majority of included studies employ single-country models with a reduced-form formulation of the rest of the world (RoW) supply of imports and RoW demand for the country's exports, but a number of studies apply global multi-region models. In these cases, the same study may appear several times with results for different developing countries in the synthesis tables. The fact that only a few multi-country studies are represented is due to the dense reporting style usually adopted in these studies. As the documentation of the full results from a multi-region multi-country study would quickly fill hundreds of pages, only summary welfare effects of trade impacts are commonly tabulated, while sectoral employment and total government revenue impacts are suppressed.

Second, as noted earlier, the studies differ in their treatment of labour markets. Given the purposes of this review, the different labour market closures deserve further comment.

Under the unemployment (UE) closure, the real purchasing power of wages is held fixed and the supply of labour is infinitely elastic at the fixed real wage, i.e. unlimited supplies of unemployed surplus labour are assumed to be available. A number of studies distinguish between unskilled and skilled labour and adopt the UE closure for unskilled labour only. In this case the, dL% measure used in the quantitative synthesis takes account of the share of unskilled employment in total benchmark equilibrium employment.

Under the wage curve (WC) closure, the real wage is variable, but a positive relationship between aggregate employment and the real wage – or equivalently a negative relationship between the rate of unemployment and the real wage – i.e. a 'wage curve' is imposed. The theoretical justification for the wage curve is either based on a collective bargaining model, in which the bargaining power of workers is inversely related to the unemployment rate, or on efficiency wage theory, which suggests that the reservation wage of workers depends inversely on the rate of unemployment, or on a standard microeconomic household labour-leisure choice model.

Under the full employment (FE) closure, the aggregate supply of labour is fixed at benchmark level and real wages adapt to clear labour markets.

The UE closure is commonly associated with a short-run time horizon, while comparative-static studies using the FE closure adopt a medium-run perspective, where the medium run is the time period required for the completion of labour market adjustment processes following a trade policy shock.

Third, while most included studies adopt a comparative-static simulation approach, a small sub-set employs recursive-dynamic models, in which successive intra-temporal equilibria are linked through an equation of motion for the aggregate capital stock. In these cases, we extract the results at the end of the simulation horizon.

Finally, the studies differ with respect to the treatment of external balances. In a comparative-static setting, a model in which all domestic agents are budget-constrained would lead by Walras' Law to the implication that current account balances are fixed (CAFix). The assumption of fixed current account balances is also the only appropriate assumption for normative assessments of the welfare gains from trade liberalisation. To take the case of a unilateral tariff cut, a violation of Walras' Law by allowing a flexible current account balance amounts effectively to the gift of a 'free lunch' to the domestic economy, as the additional imports are in this case not financed through additional exports, but through a reduction of the country's net foreign asset position. However, a considerable number of studies in fact assume a flexible current account (CAFlx) by blocking the real exchange rate adjustment mechanism in the model. The justification for the choice of this external sector closure is usually that the country under consideration operates a fixed exchange rate regime. Potential theoretical objections to this justification are discussed further in section 4.2.2.

The implications of the choice of external sector closure for the size of employment effects are a priori unclear. On the one hand, the CAFlx assumption reduces the incentive for the export sectors to expand. Hence, there will be less new job creation in the export sectors than under a CAFix closure. On the other hand, the income effect of the real resource transfer from the rest of the world to the domestic economy associated with a deterioration of the current account – i.e. the 'free lunch' – allows the expansion of production for the domestic market. Hence, there will be more job creation in the inward-oriented or non-traded-good sectors of the economy than under the CAFix closure. In the meta-regression analysis reported below, we will examine whether the CAFlx closure will generate significantly different results compared to the CAFix closure.

4.2 Synthesis of evidence

4.2.1. Econometric studies

As suggested in section 2.3.5, we cluster studies along two dimensions:

- Employment vs tax revenue
- Same specification – same Y and X.

Since in many cases we have several specifications per study in each of these clusters, the first step is to obtain a single estimate by study. In order to avoid making any discretionary choice and allow them to be replicable, we use two methods to obtain a single coefficient per study. The first method employs a simple average of the coefficients and variances. The second more robust method based on Borenstein et al. (2009) uses the average coefficient by study, but corrects the variance to account for correlations between the outcomes of each

estimate. The different coefficients reported within the study and for each specification correspond to sample changes, econometric technique employed, employment measures in different sectors and, more importantly, additional controls in the specification. Therefore, the estimated variance of the average effect needs to control for the correlation between the estimates of the same study. Since studies do not report this correlation, we compare the results using a correlation of 0.5 and 1. The methodology is described in more detail in Appendix 4.1.

With one specification per study, we carry out the synthesis of results for each cluster (same Y and X) using a random effects (RE) estimator, which weights the different coefficients considering both within and between-study variance. See Appendix 4.1 for a detailed description. Table A4.1 in Appendix 4.2 shows all existing observations by cluster, with the estimated coefficient and standard error.

Given the existing number of different specifications, there are large numbers of clusters to synthesise. In total there are 82 different combinations of Y and X for both, employment and tax revenue given by the use of log forms, different proxies of trade policy, different types of tax revenue and different measures of employment (Table A4.2).[5]

In order to explain the heterogeneity in the results we also perform meta-regression using all the available information in Table A4.1 in Appendix 4.2 for those specifications with a significant number of observations and at least two different studies with estimates within the same cluster specification.

Finally, we proceed to check for the quality of the analysis by repeating the meta-analysis using only studies that attempt to correct for endogeneity in the econometric estimates and use tariffs as a trade policy variable.

In order to try to further explain the heterogeneity of the results, we also attempt to identify what covariates increase the likelihood of coefficients being statistically significant and having a positive effect on employment and revenue using a simple probit analysis.

4.2.1.1 Employment

As suggested in the previous section, we can differentiate two broad types of studies looking at employment. On the one hand, a larger proportion of studies have analysed the impact of some proxy for trade policy on levels of employment at country, industry and firm level. On the other hand fewer studies have focused on understanding the impact of trade on the reallocation of labour around sectors.

Regarding the first type, we present the results grouped according to similarities in the specification. All the results are summarised in Table A4.2 in Appendix 4.2, which shows the synthesis for the three methods for computing a single estimate by study: simple average, and Borenstein et al. (2009) method for computing the variance effect for values of correlation 0.5 and 1.

Table 4.1 focuses on those clusters looking at the impact of some tariff measure on some measure of employment. Keeping in mind that the coefficients are not directly comparable since they are expressed in different units, we focus on the sign of the coefficients. Columns (3) to (5) show the results of meta-analysis using the average effect by study, columns (6) to (8) use Borenstein et al. (2009) method with correlation r=0.5, and correlation r=1 in columns (10) to (12). **The signs vary**

[5] There are two additional specifications that use more than one trade policy proxy. The synthesis of these specifications are done separately.

across studies, in some cases reductions in tariffs are positively correlated with reductions in employment, and in some studies we obtain a negative coefficient, indicating that tariff reductions increase employment. If we focus only on those coefficients statistically significant at the 95 percent level, in rows 5, 7 and 10, the evidence remains inconclusive, with one positive coefficient and one negative. In addition, this inconclusiveness is also latent when looking at aggregate employment and sector employment.

Table 4.1 Results for employment and tariffs

Y	X	coef	lower	upper	coef05	lower05	upper05	coef	lower1	upper1
log L	lagged tariff	0.6124	-0.5525	1.7774		-0.1113	1.3361		-0.3013	1.5261
log L	log lagged tariff	0.0300	-0.0123	0.0723		-0.0123	0.0723		-0.0123	0.0723
log L	log tariff	-0.0580	-0.1450	0.0290	-0.0600	-0.2200	0.1010	-0.0550	-0.1010	-0.0100
L	tariff	-0.1060	-0.2977	0.0857		-0.3687	0.1567		-0.3816	0.1696
L change	tariff	-0.0020	-0.0040	0.0000		-0.0040	0.0000		-0.0040	0.0000
log h	tariff	-0.0003	-0.0009	0.0004		-0.0009	0.0004		-0.0009	0.0004
log L	tariff	-0.0030	-0.0040	-0.0010	-0.0030	-0.0040	-0.0010	0.0030	-0.0030	0.0100
change L share	tariff change	0.0074	-0.1720	0.1869		-0.1737	0.1886		-0.1923	0.2072
log dif L	tariff change	-0.0163	-0.0884	0.0557		-0.2344	0.2017		-0.2355	0.2028
log L	tariff in 1984 + change in tariff mean	1.2298	0.2032	2.2563		0.3159	2.1436		0.2136	2.2459
log L	log EPR	-0.0046	-0.0103	0.0010		-0.0103	0.0010		-0.0103	0.0010

L - employment, EPR – effective rate of protection

Another set of studies looks at the impact on employment of some trade policy proxy represented by openness indicators and measured as a share of exports, imports or both, over GDP. Table 4.2 shows the results of the estimates for these specifications. **In this case we mainly obtain positive coefficients, indicating that higher share of exports and imports in the economy tends to be associated with more employment.** This coefficient is negative and statistically significant in two cases, one of which is the share of female employment over male in the services sector. The results of the more common specification, the elasticity of labour with respect to openness, are positive but not statistically significant at the 5 percent level.

Table 4.2 Results for employment and openness

Y	X	coef	lower	upper	coef05	lower05	upper05	coef	lower1	upper1
L part female	log (X+M/GDP)	2.2235	-0.0142	4.4613		0.3725	4.0746		0.1602	4.2869
log L	log (X+M/GDP)	0.2850	-0.0300	0.6000	0.2760	-0.0350	0.5880	0.3100	-0.0090	0.6290
log L female agri	log (X+M/GDP)	6.2818	3.0743	9.4893		3.0743	9.4893		3.0743	9.4893
log L female agri to men	log (X+M/GDP)	1.9944	-0.3068	4.2956		-0.3068	4.2956		-0.3068	4.2956
log L	log	2.4499	1.2798	3.6200		1.2798	3.6200		1.2798	3.6200

female ind	(X+M/GDP)							
log L female ind to men	log (X+M/GDP)	2.9428	1.8624	4.0232	1.8624	4.0232	1.8624	4.0232
log L female serv	log (X+M/GDP)	-8.1294	-11.0716	-5.1872	-11.0716	-5.1872	-11.0716	-5.1872
log L female serv to men	log (X+M/GDP)	-4.3392	-6.4523	-2.2261	-6.4523	-2.2261	-6.4523	-2.2261
log L share	log (X+M/GDP)	0.1080	0.0265	0.1895	0.0265	0.1895	0.0265	0.1895
log L	log lagged openness	-0.0100	-0.0854	0.0654	-0.0854	0.0654	-0.0854	0.0654
log L	log M/GDP	0.3810	0.2757	0.4862	0.1387	0.6232	0.1373	0.6246
log L	X+M/GDP	-0.0677	-0.1623	0.0269	-0.1851	0.0498	-0.1937	0.0583
log L	X/sales	0.3743	0.2520	0.4966	0.1177	0.6310	0.1131	0.6356
log L	log X/GDP	0.2331	0.1336	0.3326	0.0035	0.4627	0.0012	0.4650

X - exports, M - imports, agri - agriculture, serv – services, ind - industry

A final set of studies analyse the impact on employment using trade taxes as a proxy for trade policy. The problem with these specifications is that as mentioned in the previous section, the impact of tariff reduction in trade taxes depends on the import demand elasticity and whether additional taxes related to trade are also introduced. However, Table 4.6 shows that, **in general, openness seems to be associated with larger trade revenue**, so the double causal link mat be appropriate.

Table 4.3 shows the results on employment. For aggregate employment, larger tax revenue over imports implies more employment, although the results are not statistically significant in most cases.

Table 4.3 Results for employment and trade taxes

Y	X	coef	lower	upper	lower05	upper05	lower1	upper1
log L share	log TT/GDP	-0.1710	-0.2956	-0.0464	-0.2956	-0.0464	-0.2956	-0.0464
log L	lagged TT/M	0.0090	-0.0607	0.0787	-0.1930	0.2110	-0.1944	0.2124
log L agri	lagged TT/M	0.0305	-0.0388	0.0998	-0.1700	0.2310	-0.1715	0.2325
log L service	lagged TT/M	0.0750	0.0203	0.1297	-0.0830	0.2330	-0.0842	0.2342
log L	TT/M	0.0225	-0.0576	0.1026	-0.1772	0.2222	-0.1792	0.2242
log L agri	TT/M	-0.0485	-0.4958	0.3988	-0.7974	0.7004	-0.8039	0.7069
log L service	TT/M	0.0825	0.0236	0.1414	-0.0837	0.2487	-0.0850	0.2500

TT - tariff revenue, M - imports

A different set of studies have focused on the impact of trade on employment reallocation across sectors and how trade policy affects employment changes. These studies focus on measures on employment change and shift across sectors, rather than net effects on employment. Wacziarg and Wallack (2004), using a dummy for trade policy at different sector levels of aggregation, find that different measures of reallocation decrease after episodes of trade liberalisation. On the other hand, Haltiwanger et al. (2004) find the opposite result, that tariff reductions increase job reallocation for a sample of Latin American countries. Konings et al. (2003) also find a positive impact of increasing trade flows and imports on net employment changes and reallocation using firm-level data in the Ukraine. Again, in this case **the evidence is not unanimous**.

Table 4.4 Results for employment reallocation

Y	X	coef	lower	upper	lower05	upper05	lower1	upper1
CH	dummy	-0.1663	-0.3352	0.0026	-0.4031	0.0705	-0.4153	0.0826
EM	dummy	-1.7293	-4.7615	1.3028	-3.7984	0.3398	-4.2142	0.7556
EXC	dummy	-1.2948	-2.5133	-0.0764	-2.2435	-0.3462	-2.3933	-0.1964
EXC	tariff	-0.4501	-0.8427	-0.0574	-0.9871	0.0870	-1.0048	0.1047
NEG	tariff	-0.1219	-0.4043	0.1606	-0.5589	0.3152	-0.5702	0.3265
NET	tariff	0.0264	-0.4004	0.4532	-0.5447	0.5975	-0.5643	0.6171
POS	tariff	-0.0955	-0.3764	0.1855	-0.5277	0.3368	-0.5390	0.3481
SUM	tariff	-0.2173	-0.5853	0.1507	-0.7311	0.2965	-0.7474	0.3128
NET	lagged tariff	0.0796	-0.0435	0.2027	-0.1363	0.2955	-0.1431	0.3023
SUM	lagged tariff	-0.0808	-0.1647	0.0031	-0.2541	0.0925	-0.2581	0.0965
NET	X+M/L/share	0.0355	0.0182	0.0528	-0.0369	0.1079	-0.0373	0.1083

CH - change in labour share; EM - change in employment as a share of total employment, EXC - excess reallocations or employment shifts across sectors min{NEG, POS}; NEG - negative employment growth; NET – net employment growth; POS - positive employment growth; SUM - POS + NEG job reallocation

Summing up, when openness measures are used, the evidence points towards a positive impact of increasing openness on increasing employment. Nevertheless, openness is likely to be endogenous to employment and growth in general, and it depends on a different set of factors, not only trade policy. Therefore, it is difficult to extrapolate this positive link to a positive impact of tariff reductions on employment. On the other hand, when tariffs are used, the evidence is not conclusive. In addition, the few studies focusing on reallocation also indicate diversity of results.

QUALITY

In order to look in more detail at the quality of the results, we reproduce the synthesis for a sub-sample of studies with perceived higher quality. As suggested above, we focus on two main elements: choice of trade policy variable and econometric method.

Regarding the first element, we select those studies that use tariffs as the trade policy index. Clearly, tariffs are a better indicator of trade reform since they are the main trade policy instrument used. Other outcome-based indicators such as openness imply using a proxy that depends on the final impact of trade policy on export, imports and GDP, which are largely determined by other micro- and macro-factors. Furthermore, the use of dummies as proxy for trade reform episodes is also a very imperfect measure, since it captures any changes occurring after a specific period when reform is implemented.

The second element of quality focuses on the type of econometric estimator. Clearly, it is very likely that trade policy is determined by the current economic environment, including levels of employment. This potential endogeneity in estimations needs to be addressed. We select papers that use instrumental variables or the generalized method of moments (GMM) estimator, and therefore attempt to correct for endogeneity. We also include estimations that used lagged variables in the analysis, since these can be used as instruments, and they control for the lagged effect of key variables.

Again, the procedure for the synthesis is to obtain one observation for each study and cluster, where each cluster is defined by the tax/employment variable (Y) and

the trade policy proxy (X). Then, for each cluster we synthesise the average estimate using the random effects estimator. The results are shown in Table 4.5.

Table 4.5 Meta-analysis high quality studies

Y	X	coef	lower	upper	coef	lower05	upper05	coef	lower1	upper1
L	quotas	-0.2275	-0.3441	-0.1109		-0.5327	0.0777		-0.5349	0.0799
L	tariff	-0.1395	-0.3306	0.0516		-0.4267	0.1477		-0.4334	0.1544
L change	tariff	48.5500	-31.5160	128.6160		-31.5160	128.6160		-31.5160	128.6160
log L	lagged tariff	0.6124	-0.5525	1.7774		-0.0998	1.3247		-0.2922	1.5170
log L	log EPR	-0.0046	-0.0103	0.0010		-0.0103	0.0010		-0.0103	0.0010
log L	tariff	0.0079	-0.0218	0.0377	0.0110	-0.0540	0.0760	0.1720	-0.2080	0.5510
log L	tariff in 1984 + change in tariff mean	1.2298	0.2032	2.2563		0.3125	2.1470		0.2105	2.2490

L – employment; EPR – effective rate of protection

The table shows **inconclusive results**, only statistically significant in two cases, the first and last specifications. **In some cases, tariffs increase employment and in others they reduce it.** When looking at individual studies, most statistically significant coefficients show a positive relationship between tariffs and different levels of employment, with the exception of Currie and Harrison (1997) for Morocco. These papers are mainly single-country studies that use sector- or firm-level employment, with the exception of Márquez and Pagés (1997), who use a panel of Latin American countries. Comparing the size effects for those studies with similar specifications, such as Márquez and Pagés (1997) and Jaramillo and Tovar (2006), shows very different results. Márquez and Pagés (1997) show a positive but low impact, while Jaramillo and Tovar (2006) show larger tariff elasticity to employment.

Muendler (2007) analyses the impact of tariffs on labour change. This is also a proxy for labour reallocation. Interestingly, the author finds a positive impact, implying that tariff reductions trigger negative changes in employment in Brazil.

HETEROGENEITY

One way of analysing the heterogeneity of results is by controlling how different elements of study design may impact on the average effect of tariff reductions on employment. Stanley (2008) proposes meta-regression, the regression of coefficients weighted by their standard error on a set of covariates that allow, among others, correction for publication bias.

An advantage of meta-regression is that it allows all the available coefficients to be used. In order to minimise over-participation of studies with large number of specifications, each study coefficient can be weighted by the number of coefficients of that specific study.

In our case, the large number of different specifications implies large fragmentation of the number of available observations for meta-regression. In only one case, the specification regressing the log of employment on tariffs, do we have enough observations for meta-regression, 34 observations from five different studies. For this specification, we regress the estimated coefficients on study dummies and whether the econometric technique is consistent with the high-quality elements outlined above. Probably due to the low number of available

observations, none of the coefficients is statistically significant, and there is not enough variation in the sample to analyse potential publication bias or other elements related to the study design.

4.2.1.2 Tax revenue

Regarding tax revenue, we decompose the evidence according to the impacts on trade taxes, total revenue and other taxes.[6] The top rows of Table 4.6 show the impact on trade taxes, tariff revenue, and also all revenue from taxes at the border (TT2). The results show that in **general, openness is associated with a larger share of trade taxes in GDP.** Although this result may seem obvious, as shown in the second section of the table, more imports do not necessarily imply more revenue, since this depends on the import demand elasticity. In addition, in one study where tariffs changes are used as a proxy for trade policy, liberalisation increases trade revenue, implying that the fall in trade revenue due to reduction in tariffs is compensated for by the increase in imports.[7]

Table 4.6 Results for trade taxes

Y	X	coef	lower	upper	coef05	lower05	upper05	coef	lower1	upper1
log TT	dummy	-0.4600	-2.3383	1.4183		-2.3383	1.4183		-2.3383	1.4183
log TT	log dif tariff	-1.3060	-2.8132	0.2012		-2.8132	0.2012		-2.8132	0.2012
log TT/GDP	log M/GDP	-0.6729	-1.1758	-0.1700		-1.1758	-0.1700		-1.1758	-0.1700
log TT2	log (X+M/GDP)	-0.3100	-1.3380	0.7180		-1.6521	1.0321		-1.6710	1.0510
log TT2/GDP	log (X+M/GDP)	0.3123	-0.6417	1.2662		-0.3452	0.9697		-0.4874	1.1119
TT/GDP	M/GDP	0.1450	0.1217	0.1683		0.1217	0.1683		0.1217	0.1683
TT2/GDP	tariff rev	-0.0004	-0.0017	0.0009		-0.0017	0.0009		-0.0017	0.0009
TT2/GDP	X+M/GDP	0.0490	-0.0530	0.1510	0.0100	-0.0440	0.0630	0.0540	-0.0480	0.1570
Results for total tax revenue										
Y	X	coef	lower	upper	coef05	lower05	upper05	coef	lower1	upper1
log T	dummy	1.8000	-1.9935	5.5935		-1.9935	5.5935		-1.9935	5.5935
log T/GDP	log (X+M/GDP)	0.2130	0.1000	0.3270	0.2100	0.0560	0.3630	0.2150	0.1970	0.2320
log T/GDP	log M/GDP	0.1600	0.0832	0.2368		0.0279	0.2921		0.0232	0.2968
T/GDP	tariff	0.3370	-0.5890	1.2630	0.3170	-0.6080	1.2420	0.3410	-0.5850	1.2670
T/GDP	tariff rev	-0.0100	-0.0313	0.0113		-0.0313	0.0113		-0.0313	0.0113
T/GDP	TT/X+M	0.4200	0.3547	0.4853		0.2532	0.5868		0.2511	0.5889
T/GDP	X+M/GDP	0.0380	-0.0170	0.0930	0.0030	-0.0150	0.0200	0.0460	0.0020	0.0890
Results for other taxes										
Y	X	coef	lower	upper	coef05	lower05	upper05	coef	lower1	upper1
INDT/GDP	X+M/GDP	-0.0020	-0.0810	0.0770	0.0290	0.0240	0.0340	-0.0120	-0.0940	0.0690
IT/GDP	tariff rev	-0.0120	-0.0241	0.0001		-0.0241	0.0001		-0.0241	0.0001
IT/GDP	X+M/GDP	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000
log BT	dummy	4.3000	-3.1584	11.7584		-3.1584	11.7584		-3.1584	11.7584

[6] We also have evidence on the impact on expenditure. This is not reported in this document, since expenditure may not be a good proxy for revenue in the short run.

[7] It is also possible that trade reform is accompanied by customs reform and increased efficiency in tax collections at the border.

log DT	dummy	1.7400	-7.2347	10.7147	-7.2347	10.7147	-7.2347	10.7147
log EXT	dummy	1.0300	-2.4507	4.5107	-2.4507	4.5107	-2.4507	4.5107
log INDT	dummy	0.2100	-2.3625	2.7825	-2.3625	2.7825	-2.3625	2.7825
log IT	dummy	-3.8900	-6.3735	-1.4065	-6.3735	-1.4065	-6.3735	-1.4065
non-TT/GDP	X+M/GDP	0.0158	0.0032	0.0283	-0.0287	0.0602	-0.0291	0.0606
OT/GDP	tariff rev	0.0080	-0.0293	0.0453	-0.0293	0.0453	-0.0293	0.0453
OT/GDP	X+M/GDP	0.0100	-0.0075	0.0275	-0.0075	0.0275	-0.0075	0.0275

TT - tariff revenue; TT2 - trade taxes; T - total taxes; EXT – excise; IT - indirect taxes; INDT – alternative definition of Indirect taxes; BT - corporate taxes; DT - direct taxes; OT - other taxes

For total trade revenue, openness largely increases government revenue. Nevertheless, the only specification using tariffs indicates that a tariff reduction decreases total revenue, although the coefficient is not statistically significant. On the other hand, the specification that measures trade reform with a dummy finds a positive impact on government revenue after trade reform; however, the coefficient is not statistically significant. The table also shows the results for other taxes; they vary according to the type of taxes considered.

Summing up, the results indicate a positive impact of openness on government revenue. More open countries have larger trade tax and total tax shares of GDP. Again, the problem of the potential endogeneity of openness limits any extrapolation of causality to trade policy. **On the other hand the specification that uses tariffs as a measure of trade policy has no statistically significant results.**

QUALITY

As for the case of employment, we perform meta-analysis for a selected sample of studies that use tariffs and correct for potential endogeneity. The results are shown in Table 4.7. Only one study shows a statistically significant coefficient at the 95 percent confidence level: Muriithi and Moyi (2003) for Kenya. This study suggests that tariff reductions reduce the share of total taxes to GDP. This result is in line with the results shown in Table 4.6.

Table 4.7 Tax revenue meta-analysis: quality studies.

Y	X	coef	std_error	lower	upper	lower05	upper05	lower1	upper1
IT/GDP	tariff rev	-0.0120	0.0062	-0.0241	0.0001	-0.0241	0.0001	-0.0241	0.0001
OT/GDP	tariff rev	0.0080	0.0190	-0.0293	0.0453	-0.0293	0.0453	-0.0293	0.0453
T/GDP	tariff	0.8157	0.1483	0.5250	1.1064	0.3218	1.3095	0.3172	1.3141
T/GDP	tariff rev	-0.0100	0.0109	-0.0313	0.0113	-0.0313	0.0113	-0.0313	0.0113
TT2/GDP	tariff rev	-0.0004	0.0007	-0.0017	0.0009	-0.0017	0.0009	-0.0017	0.0009
log TT	log dif tariff	-1.3060	0.7690	-2.8132	0.2012	-2.8132	0.2012	-2.8132	0.2012

IT - indirect taxes; OT - other taxes; T - total taxes; TT2 - trade taxes; TT - tariff revenue

4.2.1.3 Studies that use more than one proxy for trade policy

Some authors use more than one proxy to identify the impact of trade policy on employment and tax revenue. These results need to be discussed separately, since the impact of trade policy depends on different coefficients that cannot be synthesised using meta-analysis. The results are shown in Table 4.8. We follow the same two-step methodology and synthesise a single coefficient for each paper that uses the same specification. Dunne and Edwards (2006) and Economic Commission

of Africa (2004) are excluded because they do not report standard errors or t-ratios. Below, we discuss some of the studies.

Regarding employment, Casacuberta et al. (2004) find that higher international exposure in Uruguay represented a small amount of job creation and greater job destruction. Bottini and Gasiorek (2009) find significant job creation and destruction for Morocco. Milner and Wright (1998) find for Mauritius an expansion of employment in the export sector following trade liberalisation, but also an expansion in the import-competing sector. Jenkins (2004) also finds an increase in employment in the export sector following trade liberalisation in Vietnam, and destruction in some sectors due to increased competition. So in general, there is some evidence in these studies supporting reallocation.

Regarding tax revenue, Eltony (2002), Stotsky and WoldeMariam (1997) and Suliman (2005) find that an increase in the share of imports to GDP increases tax ratios, while the evidence regarding export shares to GDP on revenue is mixed. Suliman (2005) finds, however, that tariff reductions reduce trade taxes. **This supports the idea that imports and trade flows in general increase tax revenue, while tariff reductions tend to reduce trade tax revenue.**

Table 4.8 Studies with multiple indicators of trade policy

Paper	Y	X	coef1	std_error1	second_var	coef2	std_error2	third_var	coef3	std_error3	fourth_var	coef4	std_error4
Aleman Castilla (2006)	L share	tariff	-0.001	0.011	US tariffs	-0.031	1.824	IOM tariff	-0.451	0.674			
Aleman Castilla (2006)	log L	tariff	-0.400	0.449	US tariffs	-0.761	1.076	IOM tariff	7.711	0.641			
Bottini (2009)	EXC	M/sales	-0.005	0.020	export share	0.050	0.027						
Bottini (2009)	NEG	M/sales	-0.013	0.018	export share	0.045	0.031						
Bottini (2009)	POS	M/sales	-0.075	0.030	export share	0.179	0.063						
Bottini (2009)	SUM	M/sales	-0.077	0.033	export share	0.200	0.055						
Casacuberta (2004)	NEG	tariff change	-0.013	0.003	2nd lag	0.049	0.010	3rd lag	0.009	0.004			
Casacuberta (2004)	NEG - blue	tariff change	-0.009	0.003	2nd lag	0.039	0.010	3rd lag	0.007	0.004			
Casacuberta (2004)	NEG - white	tariff change	-0.008	0.004	2nd lag	0.055	0.013	3rd lag	0.012	0.005			
Casacuberta (2004)	NET	tariff change	0.010	0.002	2nd lag	-0.046	0.007	3rd lag	-0.007	0.003			
Casacuberta (2004)	NET - blue	tariff change	0.010	0.002	2nd lag	-0.042	0.007	3rd lag	-0.007	0.003			
Casacuberta (2004)	NET -white	tariff change	0.007	0.003	2nd lag	-0.051	0.009	3rd lag	-0.004	0.003			
Casacuberta (2004)	POS	tariff change	-0.007	0.002	2nd lag	-0.014	0.006	3rd lag	0.002	0.002			
Casacuberta (2004)	POS - blue	tariff change	-0.007	0.002	2nd lag	-0.016	0.007	3rd lag	0.003	0.003			
Casacuberta (2004)	POS - white	tariff change	-0.009	0.003	2nd lag	-0.023	0.011	3rd lag	-0.001	0.004			
Dunne (2006)	log L	IP			L.R. export orientation								
Ebrill (1999)	log TT/GDP	M/GDP	0.697	0.091	X/GDP	-0.300	0.095	QR dummy	0.131	0.064	tariff reduction dummy	-0.033	0.058
Ebrill (1999)	log TT2/GDP	M/GDP	0.249	0.086	X/GDP	0.151	0.090	QR dummy	0.128	0.061	tariff reduction dummy	0.062	0.055
ECA (2004)	TT2/GDP	X+M/GDP			openness squared								
Eltony (2002)	T/GDP	M/GDP	0.068	0.041	X/GDP	-0.089	0.052						
Jenkins (2004)	log L	change ratio of imports to gross output			change ratio of exports to gross output								
Jenkins (2008)	log dif L	log difference lagged 2 periods imports/total	-0.004	0.001	lagged log dif export/output	-0.002	0.001						

Paper	Y	X	coef1	std_error1	second_var	coef2	std_error2	third_var	coef3	std_error3	fourth_var	coef4	std_error4
		demand											
Kien (2009)	log L	log dif IP	0.041	0.028	lagged log difference import penetration	-0.002	0.024	log difference export intensity	0.061	0.031	lagged log difference export intensity	0.008	0.042
Manda (2004)	dif L	lag dif IP	0.000	0.303	lagged difference in export orientation	-0.001	0.757						
Milner (1998)	log L	log dif M	-0.070	0.031	log difference in real exports	0.040	0.030						
Milner (1998)	log L	log dif IP	-0.070	0.034	log difference in export ratio	0.050	0.055						
Narayanan (2005)	log L textile	dummy MFA	0.009		average percentage utilisation of MFA quotas of apparel exports	1.000							
Narayanan (2005)	log L textile	dummy MFA	-0.007		average percentage utilisation of MFA quotas of apparel exports	0.000		log customs data collection	0.025				
Nordas (2003)	log L women	log M	-0.234	0.024	log of exports	0.205	0.022						
Onaran (2006)	log dif L	log dif EI	0.006	0.012	lagged log difference export intensity sector	-0.036	0.031	log difference import intensity sector	-0.004	0.005	lagged log difference in import intensity	-0.007	0.009
Sen (2009)	log L	IP	0.040	0.036	X/Y	-0.005	0.006						
Stotsky (1997)	T/GDP	M/GDP	0.032	0.010	X/GDP	0.173	0.013						
Suliman (2005)	log TT2	tariff	2.850	0.228	M/GDP	0.790	0.065	dummy lib	0.031	0.031			

L – labour, M - imports, X - exports, EXC - excess reallocation, NEG - negative employment change, POS - positive employment change, blue - blue collar workers, white - white collar workers, TT – tariff revenue, TT2 - trade taxes, IP - import penetration, MFA - dummy for Multifiber Agreement period, EI - export intensity

4.2.2 Ex ante CGE simulation studies

4.2.2.1 Employment

AGGREGATE EMPLOYMENT EFFECTS

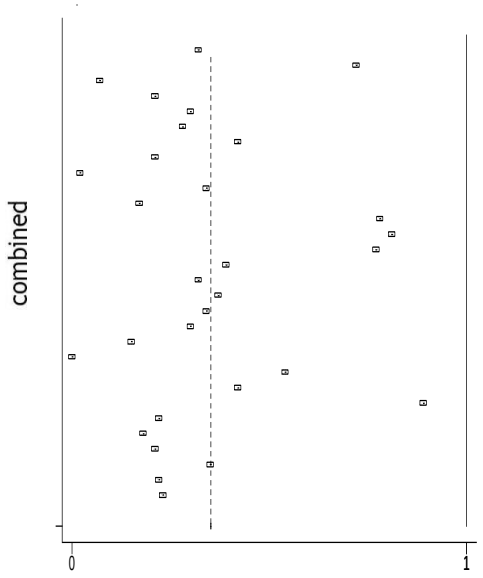
The majority of studies included in the quantitative synthesis of simulated employment effects allow for variations in the level of aggregate employment in response to trade policy shocks by adopting either the UE or the WC labour market closure.

The main result is clear-cut: In all cases under consideration, the aggregate employment effect associated with the reduction or removal of tariff barriers to trade is moderately positive. The simple average of the elasticity of aggregate employment with respect to the volume of additional trade generated by trade policy reform (dL%/dTrade% in Table A4.3 in Appendix 4.2) is +0.34. We also perform meta-analysis and weight existing studies according to between-study variance only, since these are deterministic results without associated standard error. The estimated coefficient is a similar 0.35. In other words, on average a 1 percent increase in the volume of trade due to liberalisation raises aggregate employment by 0.35. In all cases, the value of this elasticity remains well below unity, and the range varies from +0.002 to +0.89, as shown in the forest plot in Figure 4.1 top left (a) panel.

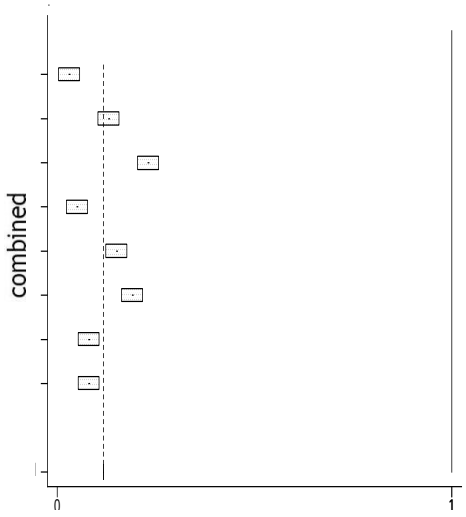
For the subset of studies that analyse unilateral tariff cuts (Unlat), the estimated coefficient suggests that a 1 percentage-point reduction in the import-weighted average tariff rate yields a 0.29 percent increase in economy-wide employment, ranging from 0.04 to 1.11 percent across studies as shown in panel (b). Furthermore, the study with elasticity 1.11 is well on the right-hand side and greatly increases the estimated coefficient.

Especially in the case of unilateral tariff cuts, the noteworthy absence of any studies reporting negative-signed aggregate employment effects may come as a surprise for non-economists as well as for development economists trained in the use of partial-analytic methods or traditional Keynesian textbook fixed-price models. The partial-analytic view focuses exclusively on the loss of jobs in import-competing sectors, while the Keynesian textbook model conceives any increase in the propensity to import as a 'leakage' from aggregate demand for domestic output that entails a drop in aggregate employment. Therefore, it appears worth pointing out why all the general equilibrium model results reviewed here lead in fact to the opposite conclusion.

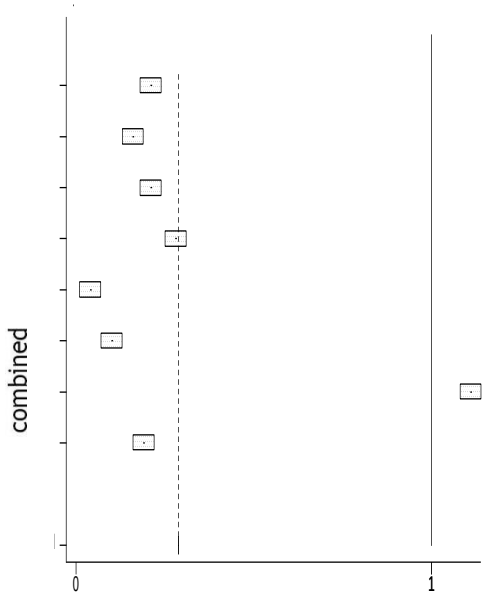
Figure 4.1 Forest plots of CGE estimates



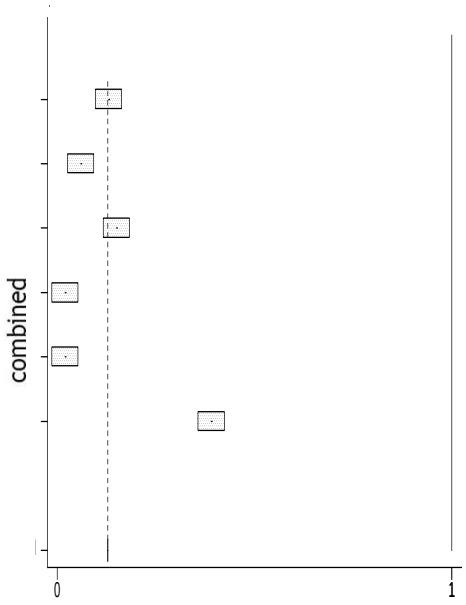
(a) Employment to trade elasticity



(c) Reallocation to tariff elasticity



(b) Employment to tariff elasticity



(d) Reallocation to trade elasticity

The reason is that both the partial-equilibrium perspective and the Keynesian textbook model do not account for the economy-wide real income gains and the incentives towards increased export production associated with a cut in import tariffs. The substitution effect of the import price drop entails that the prices of goods produced for the home market falls relative to the prices of export goods (i.e. the real exchange rate depreciates), and this provides an incentive for increased production and employment in the export sector. At the same time, the drop in the aggregate price level defined over domestic and import goods (relative to the prices of domestic goods) stimulate demand for both imports and domestic goods. Under the UE closure, where the real wage is fixed in terms of its purchasing power over all goods, nominal wages fall relative to the domestic producer price index, and as a result aggregate employment rises in the new equilibrium.

INTERSECTORAL LABOUR REALLOCATION EFFECTS WITH FULL EMPLOYMENT

In models with the FE closure, aggregate employment is assumed to be fixed at full employment level and real wage adjustments re-establish labour market equilibrium after a trade policy shock. In this case, we compare the simulated employment effects across studies by measuring the percentage of the labour relocated intersectorally (Reloc%) in response to the trade policy reform and scale this measure by the extent of the reform.

For the studies simulating a unilateral tariff cut, we again use the import-weighted average percentage-point reduction in import duties (dTariff%pt) as indicator for the extent of the reform if available. The estimated coefficient weighted by between-study variance for Reloc%/dTariff%pt is 0.12. That is, for each percentage-point reduction in the average tariff, 0.12 percent of total labour moves to a job in a different sector of the economy. The indicator varies across studies from a minimum of 0.03 to a maximum of 0.19.

For studies analysing multilateral or preferential trade liberalisation schemes, we scale Reloc% by the simulated volume of additional trade generated after liberalisation (dTrade%). The estimated Reloc%/dTrade% coefficient across studies included in the synthesis is incidentally similar, 0.13, i.e. for each percent of additional trade volume generated by the liberalisation scheme, 0.13 percent of the labour force relocates to a new job in a different sector within the country under consideration. The observed minimum level for this elasticity is 0.02 and the maximum is 0.39.

Thus, **the 'evidence' from ex ante CGE simulation studies suggests that from an economy-wide perspective, the extent of job creation and job destruction induced by trade liberalisation appears to be far from dramatic.** However, it should be borne in mind that the indicators used do not take account of within-sector labour reallocation processes, in particular movements from inward-oriented towards export-oriented firms within the same sector.

4.2.2.2 Tax revenue

Reporting practices of tax revenue impacts in the CGE studies are unfortunately too diverse to determine comparable indicators for a quantitative meta-analysis across the included studies. Only very few studies report the percentage change in total tariff revenue after a trade policy reform. In the case of studies containing simulations of revenue-neutral changes in other tax rates, the type of tax chosen to adjust differs across studies and comprises a broad range, including value-added taxes, general sales taxes, production taxes, consumption taxes, and income taxes, and the tax base may differ widely across countries. Moreover, many studies report percentage changes in these tax rates rather than percentage-point changes, which

is uninformative without knowledge of the initial tax rate in the benchmark equilibrium.

For example, one study for Bangladesh reports a required rise in the model's income tax rate by 300 percent in order to compensate for lost tariff revenue after a unilateral tariff cut, but without knowledge of the initial tax rate in the stylised tax system of the model, it remains unclear how dramatic this tax rise is actually. If the model income tax rate is calibrated as observed total income tax revenue over total observed household income, as is common practice in these models, the initial rate may be very low in an LIC like Bangladesh and the percentage-point increase in the tax may actually be quite moderate.

Given the limited comparability across studies, the synthesis focuses primarily on the signs rather than the magnitudes of the tax revenue or compensatory tax rate changes tabulated in Table A4.3 in Appendix 4.2.

The synopsis shows that in all except four studies, **total tax revenue declines after trade liberalisation or there is a need for compensatory increases in other tax rates, which implies that without such compensatory increases in other tax rates, total tax revenue would decline.** Thus, with few exceptions, this finding confirms the analysis of Devarajan et al. (1999), who explore a stylised general equilibrium model under which different trade elasticity configurations and import tariff cuts generate a rise in tariff revenue or in total tax revenue in the presence of other indirect taxes. The authors estimate econometrically the size of the elasticities required to generate a positive impact on tariff and tax revenue for a large number of countries. They conclude that the estimated substitution elasticities between domestic and imported goods and transformation elasticities between non-traded goods and exports are in most cases far too low for tariff cuts to be self-financing.

Three of the four exceptional findings refer to simulations of Vietnam's World Trade Organization accession, and it appears that in this case the tariff cuts happen to trigger factor reallocation processes towards sectors in which indirect tax rates are relatively higher, but one of these studies also reports rises in direct tax revenue as a result of income gains associated with trade reform.

QUALITY

For the CGE simulation studies, quality concerns may relate to the quality of the raw data used for the compilation of the benchmark data set, the level of care adopted at the numerical calibration stage, the integrity of the computer code, the theoretical consistency and plausibility of the model assumptions, the clarity of the documentation of assumptions and results and the validity of the interpretation of results.

The first three quality dimensions in this list cannot be ascertained on the basis of the published outputs. However, the CGE methodology itself has built-in checks and balances that ensure at least the internal consistency of the dataset in a macroeconomic accounting sense and the internal consistency of the model, since the use of a data set which violates macroeconomic accounting identities, as well as the use of an inconsistent model set-up or incorrect code, usually entails computational error messages and model crashes or non-convergence to an equilibrium at the simulation stage. Moreover, virtually all models share essentially the same established standard assumption with regard to producer and household behaviour.

One potential concern with regard to theoretical consistency relates to the widespread practice of assuming current account flexibility by blocking real exchange rate adjustments. The aim is usually to accommodate the fact that the

country under consideration operates a fixed nominal exchange rate system. A theoretical objection is that in this case the money supply would drop after tariff liberalisation, as the central bank would have to defend the nominal exchange rate by selling foreign currency. Hence the real exchange rate would depreciate through the deflationary effect on the price of non-traded goods. If the central bank intervention is sterilised by buying up bonds, the domestic saving rate would have to drop. But since CGE trade models are real-sphere models without monetary assets, neither of these follow-on mechanisms is captured in the theoretical set-up. However, at present there is obviously no consensus among modellers in this respect, so we have not excluded models with a CAFlx closure on the basis of this particular concern, and the meta-analysis suggests that the choice of external sector closure does not systematically bias the results for the key variables of interest in this review.

Some studies were excluded at the second stage on the basis of poor reporting standards, e.g. because the meaning of reported figures was unclear. However, we have no strong objective reasons for discriminating among the finally included studies in terms of quality.

A final exercise regarding quality on CGE evidence was to use meta-regression. We ran a regression of estimated coefficients for the elasticity of employment to trade (30 observations in total) on a set of dummies indicating: the current account closure assumption; whether the study was based on a regional model; whether the simulation was unilateral or multilateral liberalisation vis-à-vis a regional trade agreement; and whether the paper was a journal publication. None of the coefficients was statistically significant. The results are shown in Table 4.9. While journal publication coefficients, flexible current account closure and studies that simulate unilateral or multilateral tariff reductions tend to have larger elasticities on average, none of the coefficients is statistically significant, probably as a result of the sample size.

Table 4.9 Meta-regression of CGE results: elasticity employment to trade

	Coef.	Std. Err.
Caflex_d	0.0228	0.1128
Regional	-0.1086	0.2018
Multilateral	0.0257	0.1273
Unilateral	0.0357	0.1465
Journal	0.0878	0.1434
Constant	0.3297	0.0751

4.2.3 Robustness of results

A final check of the robustness of the results is to test whether certain study design variables are associated with the outcomes. In effect, we focus on statistical significance, the sign of the selected coefficients and the size effect. We use a multinomial logit model to attempt to explain whether certain study characteristics predict statistically positive or negative outcomes. We also test statistical significant by looking at whether study characteristics explain the size of t-values. Finally, we look at whether the same variables related to study design are associated with effect size.

As covariates, we use whether the study focuses entirely on Latin American (LA) or Sub-Saharan African countries (Africa), whether the econometric method is of high

quality by considering endogeneity (quality), whether a tariff variable is used as proxy for trade policy (good_open) and if the study is published in a journal (journal). We also control for sample size, since this is correlated with significance

Table 4.10 shows the results for the t-values OLS regressions. We perform the estimations for the whole sample (all), only tax studies and only employment studies. In order to control for over-representation of studies with large number of coefficients we also estimate the specifications using weights corresponding to the inverse of the number of observations by study, n, times the standard error.

Table 4.10 OLS estimates: t-values

	All	All-weight	Tax	Tax weight	Employment	Employment weight
Tax	2.2527	-1.1071				
	8.5256	20.2923				
Sample size	0.0001	-0.0002	-0.0002	-0.0001	0.0001	-0.0004
	0.0001	0.0006	0.0005	0.0003	0.0002	0.0008
Latin Am	-29.3132	-5.7228			-15.2924	92.1397
	65.8161	18.8542			38.9173	193.1201
Africa	-2.0666	-6.2800	-3.3033***		-15.0749	
	8.7438	20.1711	0.8985		40.6566	
Journal	0.2611	0.4218	11.0369***	2.8837	14.3662	-112.4295
	7.2939	12.2651	0.9846	3.2726	38.8761	212.0812
Quality	-0.9427	-0.0815	0.2652	0.7452	-2.0403	-11.7835
	3.3653	4.0887	0.6096	0.4288	5.3648	18.4290
good_open	-1.0682	2.4552	-0.8665		-14.0764	21.0271
	8.7439	11.7691	1.4902		39.1963	41.7837
_cons	0.1242	3.3234	2.2132***	-0.2456	0.1250	-0.2596
	5.4059	19.7798	0.7184	2.9935	6.2524	24.7590
N	280	280	71	71	209	209
r2	0.6533	0.9241	0.9005	0.9405	0.6466	0.9236

***significant at 1%. Coefficients and standard errors are reported. Study dummy coefficients and specification dummy coefficients are omitted from table.

The results show mainly non-statistical coefficients, indicating that the **study characteristics considered do not explain the degree of statistical significance**. Only two coefficients appear statistically significant in one of the tax specifications, the dummy for Africa and for journal publication. The dummy for Africa indicates that studies that focus on Sub-Saharan Africa tend to have lower t-values on the impact of tariff reductions on tax revenue. In addition, the journal publication dummy has a positive sign, indicating potential publication bias, since coefficients in published papers tend to have larger t-values. The coefficients, however, are not significant when we weight observations according to the number of observations per study.

Table 4.11 Multinomial logit estimates: sign determinants

	All	All-weight	Employment
Negative significant Y=1			
Sample size	-0.0001	-0.0001	-0.0001

	0.0001	0.0001	0.0001
Tax	-0.1721	0.1902	
	1.2707	1.0523	
Latin Am	0.9709	2.8806**	0.9718
	1.5094	1.3897	1.5094
Africa	-1.9534	-1.9947	23.8859
	7761.1068	15300.4370	117291.7600
Journal	17.4522	19.7073	18.2656
	5736.5838	3688.1050	8615.6299
Quality	0.3867	2.0940	0.3868
	1.6099	1.4680	1.6100
good_open	0.3772	0.3041	0.2881
	8355.5742	7292.9167	4560.1756
_cons	-18.3786	-20.5905	-19.1920
	5736.5837	3688.1049	8615.6299
Positive significant Y=2			
Sample size	0.0001	0.0001	0.0001
	0.0000	0.0001	0.0000
Tax	0.1871	0.2038	
	3603.7351	20931.5400	
LA	-16.6291	0.8404	-5.6676
	67470507	30201	172871
Africa	14.4494	18.4481	1.1298
	4955.2993	21903.3680	256864.6300
Journal	-0.0312	0.5974	0.1782
	3784.1438	21293.5970	7067.6446
Quality	0.8603	1.5658***	16.0393
	1.0199	0.2998	2569.3020
good_open	15.5770	20.0747	16.8633
	1041.4358	8037.5408	1981.3050
_cons	-17.3959	-21.7999	-18.6825
	3401.1882	6451.9983	6470.9200
N	280	280	209
r2_p	0.5600	0.9198	0.5056
Ll	-105.5217	-333.7196	-82.1032

***significant at 1%; **significant at 5%. Coefficients and standard errors reported. Study dummy coefficients and specification dummy coefficients omitted from table.

Table 4.11 shows the results for the multinomial logit evaluating the association of study design variables with the sign of the coefficients, compared to the baseline of statistically not significant coefficient. The sample only allows an estimation of the model for all the observations and also for one of the employment specifications. Again, most **study covariates used do not seem to impact on the robustness of the results**. Only the Latin American dummy is significant in one of the specifications, predicting a negative impact of tariff reductions on employment and tax revenue. On the same specification, specifications that use methods that

attempt to correct for potential endogeneity are likely to predict a positive effect. However, these results are not statistically significant across specifications.

Finally, we focus on the potential impact of study design variables on explaining the size of the coefficients in Table 4.12. As in the case of t-values, we use study and specification dummies. This last set of dummies attempt to correct for the fact that different specifications use different units of measurement. The main assumption, therefore, is that these differences can be controlled using dummies. Although most of the coefficients lack statistical significance, good quality econometric technique is statistically significant and positively affects size in two specifications. Sub-Saharan country studies tend to have lower coefficients, but only in one specification is the coefficient statistically significant. When tariffs are used as policy variables, the results suggest a lower size effect than openness or dummy variables, but the results are only statistically significant for one coefficient.

Table 4.12 OLS regression: impact on size.

	All	All-weight	Tax	Tax_ weight	Employment	Employment _weight
Tax	1.5072	-0.4829				
	2.5049	0.3779				
Sample size	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
Latin Am	10.0036	-0.5357			5.6400	3.3131
	19.3374	0.3512			10.8678	3.5691
Africa	-4.1825	-1.2685***	-0.1255		-4.3005	
	2.5690	0.3757	0.1809		11.3535	
Journal	-1.3743	0.1406	0.0661	-0.1238	-5.6151	-4.0046
	2.1430	0.2284	0.1982	0.1598	10.8563	3.9195
Quality	4.9036***	-0.0002	0.0550	0.0162	9.2661***	-0.2352
	0.9887	0.0762	0.1227	0.0209	1.4981	0.3406
good_open	-3.5146	-0.0096	-1.5890***		-3.6331	0.7521
	2.5690	0.2192	0.3000		10.9457	0.7722
_cons	-0.0199	0.4552	0.3539**	0.2368	-0.0237	-0.0100
	1.5883	0.3684	0.1447	0.1461	1.7460	0.4576
N	280	280	71	71	209	209
r2	0.3683	0.5910	0.5454	0.8703	0.4301	0.5714

***significant at 1%; **significant at 5%. Coefficients and standard errors are reported. Study dummy coefficients and specification dummy coefficients are omitted from table.

In general, probably as a result of the low number of available observations, we cannot clearly identify specific study design variables that may affect the robustness of the results.

4.3 Comparing CGE results with econometric evidence

Capturing unilateral, multilateral and preferential trade agreements with one variable is extremely challenging. This has been a problem for empirical trade research. A common practice in econometric evaluations, as seen in the previous section, and due to its simplicity in calculation, is to use the level of trade flows to GDP as a proxy for countries engaged in trade liberalisation. The assumption is that

trade liberalisation implies, other things constant, a larger share of trade to GDP. The main problem with this measure as seen in the literature on trade and growth (see Winters, 2004) is the fact that other factors and policies may largely influence trade flows, such as trade costs or income levels. As a result, openness indicators can be a bad proxy for specific trade agreements.

The main challenge when interpreting the econometric evidence is this reliance on openness indicators for quantifying the trade policy experiment. In general, when openness variables are used, these tend to be associated with a positive employment and government revenue effect. However, as suggested above, other factors and policies may be behind the increase in trade flows rather than trade policy, which implies potentially wrong attribution of causality between trade policy and employment/tax revenue.

In this regard, CGE models are more flexible for modelling trade policy looking at protection changes at the sector level and across different trade partners. This most efficient representation of trade policy depends, however, on the level of aggregation of the model.

In addition to the trade policy variable used, several interesting elements arise when comparing CGE estimates to econometric evidence:

- When openness indicators based on trade flows are used, the results for both methodologies indicate a positive impact on employment and tax revenue.
- However, when tariffs are used, the results differ. CGE estimates with labour market rigidities indicate that tariff reductions increase employment, while the econometric evidence is mixed, and when quality criteria are used for inclusion, the evidence tends to point towards a negative impact of tariffs on employment levels. This is an important element, because it indicates that CGE estimates impose a certain reallocation of factors (costless and frictionless) which may be at odds with the evidence. A way of reconciling them may be by considering that they represent different time horizons, econometric short run, and CGE long run. In this case, it is unclear how useful the CGE evidence is when considering adjustment costs in the short and medium run. In addition, whether in the long-run, adjustment and reallocation is achieved is an empirical question, and therefore, the predictions of the CGE model cannot be taken as certain in the long run. Instead, they reflect the sorts of changes we should expect when reallocation occurs.
- CGE models of full employment indicate positive but small reallocation of resources following trade reform. The econometric evidence is unclear. While most studies argue that there is a positive impact on reallocation following trade reform, a few argue for no significant effect. A common ground would suggest that if positive, reallocation is not large.
- Hardly any econometric studies use tariffs when looking at the impact on tax revenue. Again, openness increases tax revenue, but it is difficult to establish the causal link with trade policy. The preferred specification indicates that tariff reductions decrease tax revenue. A challenge for the econometric evidence is how to control for other factors such as an increase in customs collection efficiency. On the other hand, CGE studies find that tariff reductions imply a negative effect on trade taxes and total revenue. A useful finding of the CGE literature is the fact that the combinations of substitution elasticities between domestic and imported goods and transformation elasticities between non-traded goods and exports should be

quite large to produce self-financing tariff reductions, and this is unlikely in reality.

Summing up, **while CGE methodologies may better model the trade policy change, their often static nature and costless and frictionless reallocation of factors of production implies the need to consider their results with caution, especially regarding employment, where the econometric evidence tends to be more mixed. Furthermore, a fundamental weakness of CGE methodologies is the lack of sensitivity to different parameter assumptions.**

4.4 Summary of results of synthesis

The results from the synthesis can be summarised as follows:

- Studies that use tariffs to measure trade policy find an ambiguous effect on employment. In addition, studies differ in the size of this effect.
- Studies that use trade flows to proxy trade liberalisation or use dummies to capture trade reform episodes (around 67 percent of specifications) tend to find positive effects on employment, on tax revenue and on labour reallocation. This result is quite robust, but should be considered of lower quality since trade flows are a poor proxy for tariff reductions in some cases, and therefore causality is unclear.
- Regarding employment reallocation, we find that most studies show significant reallocation effects, especially regarding increased employment in export sectors following liberalisation. Regarding import-competing sectors, the evidence is mixed. The body of evidence includes studies that find employment destruction, studies that find negligible effects and studies that find employment growth.
- Ex ante CGE simulation studies that allow for trade reform impacts on the level of aggregate employment commonly predict a moderately positive net job creation effect (all 36 included studies).On average, a 1 percent increase in the volume of trade due to trade reform raises aggregate employment in the reforming country by 0.34 percent (31 studies).
- Ex ante CGE simulation studies with fixed aggregate employment commonly predict job destruction in import-competing and non-traded-goods sectors and job creation in export-oriented sectors after a trade reform. For each percent of additional trade volume generated by a trade liberalisation scheme, 0.12 percent of the labour force relocates to a new job in a different sector within the liberalising country (8 studies).
- The majority of CGE simulation studies that address the fiscal effects of trade reforms involving tariff reductions report negative total tax revenue impacts or the need for increases in other tax rates in order to compensate for lost tariff revenue (24 of 28 included studies).
- While CGE studies allow a cleaner isolation of trade policy impacts from other influences compared with econometric studies, the results need to be interpreted with caution. Regarding tax revenue, CGE results allow us to look at the isolated impact on tax revenue from reducing tariffs selectively. This is very informative since the results from econometric impact studies are likely to be confounded by the existence of simultaneous interventions affecting tax revenue. However, the assumption of a frictionless reallocation of labour and other factors across sectors is an oversimplification not always supported by the econometric evidence. Therefore, these results need to be interpreted with caution.

5 Conclusion

5.1 Strengths and limitations

There are several limitations of this review. Some are associated with the existing methodologies, while others are related to the specific choices made within this review.

Regarding the methodologies used, the first and more important limitation has been extensively discussed in this report, and is the difficulty of finding a good indicator of specific tariff reductions and trade agreements in econometric studies. Second and related to the previous point, is the large heterogeneity of specifications analysing a similar question. This makes synthesis and comparison of results challenging.

Regarding the specific choices in this review, a potential limitation is the methodology used to select specifications. Papers usually report a very large number of specifications and results, and often the selection of preferred results is either absent, because results point towards similar findings, or is done based on some criteria with a certain degree of subjectivity. In this review, we opted to select most specifications and synthesise results for each study comparing a simple average with the methodology proposed by Borenstein et al. (2009). Interestingly, the results are very similar in terms of size than when fixed effects meta-analysis is implemented within a study, although the size of the coefficients differs substantially due to the weighting. While we acknowledge the need to control for within study correlation, which a method of within-study meta-analysis ignores, the assumption of a constant correlation of outcomes within study is not likely to be accurate, especially given the fact that different results are reported within study for multiple reasons, such as changes in sample, additional covariates and different econometric estimation techniques used. With these caveats in mind, it needs to be stressed that a major strength of these approaches vis-à-vis a choice of preferred specification is the lack of subjectivity from the reviewers in selecting coefficients. However, at the same time, the cost is that on a few occasions, the summary results can differ from the conclusions of the paper.

A final limitation of the review lies in the comparison between CGE and econometric evidence. Many CGE studies do not report enough data to facilitate comparison, and thus, it is possible that we have excluded important studies due to data unavailability. In addition, an important element to consider when doing the comparison of results is the potential time frame mismatch between methodologies. One can interpret CGE estimates as focusing on medium- and long-term effects, especially regarding how factors of production are reallocated across sectors, and depending on how market frictions are modelled. On the other hand, econometric evidence in this area tends to focus on short-run effects, and therefore there is a potential mismatch. While there is a considerable body of evidence suggesting important rigidities in factor markets, especially in labour markets, there is no guarantee that all rigidities disappear in the long run. As a result, it is useful to interpret CGE results as indicative of the expected general equilibrium changes when reallocation occurs and markets clear, which is more likely to happen in the medium and long run. Acknowledging these potential limitations, we believe that the main strength of this review is the inclusiveness of studies and methodologies, which allows for a more clear perspective of how country and methodology-specific the results are likely to be.

5.2. Conclusions and recommendations

In general, our interpretation of the findings of the synthesis is that as expected, these are country and trade policy specific. However, if we were to attempt to predict the most likely scenario following tariff reductions based on the conclusions of this synthesis some, likely effects emerge from the analysis.

In line with the preferred econometric evidence, overall employment is likely to decrease slightly in the short run following liberalisation, although this depends on the extent of the trade policy shock. This is consistent with the evidence that there are winners and losers from trade policy reform. These results are in contrast with the CGE findings, which by design incorporate projections of the medium-run economy-wide knock-on effects suggested by economic theory. In addition, the evidence points towards an expansion of employment in the export sector, but with an unclear prediction regarding the size and the sign of changes in import-competing sectors. In most cases, employment in import-competing sectors in the short run decreased, although the size of the effect varies and it is not large for most countries (even positive in some cases). CGE results give positive results on employment, given that some reallocation of factors is allowed to happen. While one may look at CGE results as medium or long run, one should interpret these results with care, especially when interested in immediate short-run effects and adjustment costs. If we take into account that in the medium run, tariff reductions and trade agreements trigger a significant impact on trade flows, as for example the empirical gravity model literature shows with high confidence (Cipollina and Salvatici, 2010), then the results from the econometric literature tend to converge with the CGE literature, since employment increases with larger shares of trade to GDP.

Regarding tax revenue, tariff reductions are likely to reduce trade tax revenue in the short run. In this regard, the CGE evidence is very useful since it predicts that only in the case of very high import demand and substitution elasticities, would the generated increase in imports be sufficient to compensate for the tariff cut. Thus, the likely outcome following liberalisation or a trade agreement is one of lower trade tax revenue, other things constant. Again, the econometric evidence clearly points towards a positive impact of larger shares of trade to GDP on total tax revenue. Therefore, the impact in the medium run could be positive, especially if complementary tax policies and increase in customs effectiveness are implemented, although the effects of these last two channels cannot be properly quantified from the reviewed studies.

There are several implications arising from this review. The main implication for policy is the need to provide assistance for adjustment costs in terms of employment and tax revenue in the short run. Although the evidence reviewed shows that in some cases, these costs are small and in fewer cases not significant, job losses in import-competing sectors are likely to occur, and one cannot assume automatic or fast reallocation of resources. The fact that the evidence is country specific implies that when looking at these issues, one needs to account for the type of trade agreement or tariff reduction, and the functioning of labour and other factor markets.

In terms of tax revenue, the policy implication is that tax shortfalls are likely in the short run, but total tax revenue is likely to recover in the medium run. The policy implication of this effect is less clear cut, since reducing dependency in trade taxes, which are more distortionary, should be in line with development objectives. Thus, while donors should assist in cushioning these temporary shortfalls, interventions should encourage the development of alternative tax instruments, and increase tax collection efficiency and the tax base.

In general, these policy conclusions are in line with existing Aid for Trade programmes. Perhaps, given the fact that the evidence suggests an overwhelming positive impact of larger trade shares on employment and revenue, AfT programmes should also focus on supporting and facilitating employment reallocations and transitions to other tax revenue sources.

Regarding research, there are several implications arising from this review. Future empirical work requires a much better measurement of trade reform and trade agreements, using policy indicators rather than outcome variables. Furthermore, while the literature examining employment reallocation is relatively new, the research agenda should concentrate on understanding the factors behind differences in employment changes across and within sectors and firms.

Finally, regarding the CGE literature, we would like to suggest a few recommendations for future research. First, to be able to draw robust policy conclusions from CGE simulations, it is imperative that systematic sensitivity analysis is included in CGE studies following Hertel et al. (2007). Users need to understand how sensitive the results are to different assumptions on key parameters. This would allow the construction of confidence intervals and include precision in meta-analysis estimates. Second, there are very few serious efforts at ex post validations of ex ante simulations. This ex post validation could help improve existing models by adjusting them according to observable evidence. However, we are aware that realistically this would require changes in the way in which CGE modelling work is typically funded. Finally, more work is needed in modelling frictions to reallocation processes of factors across sectors and the potential hysteresis effects arising from such frictions.

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Appendices

Appendix 1.1: Authorship of this report

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Conflicts of interest

There were no conflicts of interest in the conducting of this review.

Appendix 2.1: Search strategy for electronic databases

Search lines – Web of Science

Web of Science did not allow more that 50 Boolean operator in a single search. Therefore the four sets were searched using separate blocks of search strings that did not use more than 50 Boolean operators. For example, the first set was constructed by merging the three searches using OR.

First Set
TS=(tariff* reduction* OR tariff* change* OR Trad* Openness OR Trade reform* OR Trade liberalisation OR Trade liberalisation OR Preferential Trade Agreement* OR Trade PTA* OR Free Trade Agreement* OR Trade FTA* OR Unilateral Preferences OR Trade Policy Change)

TS=(Andean Community CAN OR ASEAN AFTA OR Asia Pacific APTA OR CARICOM OR Central America* (CACM) OR East* South* Africa* COMESA OR Commonwealth CIS OR CAFTA DR OR East Africa* EAC OR ((EC OR EU) AND Mexico) OR ((EC OR EU) AND Morocco) OR ((EC OR EU) AND 'South Africa') OR ((EC OR EU) AND Tunisia) OR ('Association Agreement' or EU AA))

TS=(Economic Monetary Africa* CEMAC OR Economic West Africa* ECOWAS OR Economic Cooperation Organization ECO OR Eurasian Economic Community EAEC OR MERCOSUR OR North America* NAFTA OR Pacific Island PICTA OR Pan-Arab PAFTA OR South Asia* SAPTA OR South* Pacific SPARTECA OR South* Africa* SACU OR South* Africa* SADC OR West Africa* WAEMU)

Second Set
TS=(employment OR unemployment OR labor OR labour OR job*)

Third Set
TS=(tax revenue* OR fiscal revenue* OR budget revenue* OR government revenue* OR tariff revenue*)

Fourth Set
TS=('developing countr*' OR 'low income countr*' OR 'less developed countr*')

TS=(Afghanistan OR Albania OR Algeria OR Angola OR Antigua Barbuda OR Argentina OR Armenia OR Azerbaijan OR Bahamas OR Bahrain OR Bangladesh OR Barbados OR Belarus OR Belize OR Benin OR Bhutan OR Bolivia OR Botswana OR Bosnia Herzegovina OR Brazil OR Bulgaria OR Burkina Faso OR Burma OR Burundi)

TS=(Cameroon OR Cape Verde OR 'Central African Republic' OR Chad OR Chile OR China OR Colombia OR Comoros OR Congo OR Costa Rica OR Cote d'Ivoire OR Croatia OR Djibouti OR Dominica OR Dominican OR Ecuador OR Egypt OR El Salvador OR Guinea OR Eritrea OR Estonia OR Ethiopia)

TS=(Fiji OR Gabon OR Gambia OR Georgia OR Ghana OR Grenada OR Guatemala OR Guyana OR Haiti OR Honduras OR Hungary OR Indonesia OR India OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Kuwait OR Kyrgyzstan OR Laos OR Latvia OR Lebanon OR Lesotho OR Liberia OR Libya OR Lithuania)

TS=(Macedonia OR Madagascar OR Malawi OR Malaysia OR Maldives OR Mali OR Marshall OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Namibia OR Nauru OR Nepal OR Nicaragua OR Niger OR Nigeria OR Oman)

TS=(Pakistan OR Palau OR Panama OR Papua New Guinea OR Paraguay OR Peru OR Philippines OR Poland OR Qatar OR Romania OR Russia OR Rwanda OR 'Saudi Arab*' OR Samoa OR Sao Tome Principe OR Senegal OR Serbia OR Seychelles OR Sierra Leone OR Solomon Islands OR 'South Africa' OR Somalia OR 'Sri Lanka' OR 'Saint

Kitts Nevis' OR 'Saint Lucia' OR 'Saint Vincent Grenadines' OR Sudan OR Suriname OR Swaziland OR Syria)

TS=(Tajikistan OR Tanzania OR Thailand OR Timor-Leste OR Togo OR Tonga OR Trinidad Tobago OR Tunisia OR Turkey OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR 'United Arab Emirates' OR Uruguay OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR Yemen OR Zambia OR Zimbabwe OR Cuba OR Korea OR Hong Kong OR Singapore OR Taiwan OR Cyprus OR Slovenia OR Malta OR Czech Republic OR Slovakia)

Search lines – CSA Illumina

This permitted the following search in ONE go.

(((tariff* AND reduction*) OR (tariff* AND change*) OR (Trad* AND Openness) OR (Trade AND reform*) OR (Trade AND liberali?ation) OR (Preferential AND Trade AND Agreement*) OR (Trade AND PTA*) OR (Free AND Trade AND Agreement*) OR (Trade AND FTA*) OR (Unilateral AND Preferences) OR (Andean Community CAN) OR AFTA OR APTA OR CARICOM OR CACM OR COMESA OR CIS OR CAFTA-DR OR EAC OR ((EC OR EU) AND (Mexico OR Morocco OR 'South Africa' OR Tunisia)) OR ('Association Agreement' OR (EU AND AA)) OR CEMAC OR ECOWAS OR ('Economic Cooperation Organization ECO') OR EAEC OR MERCOSUR OR NAFTA OR PICTA OR PAFTA OR SAPTA OR SPARTECA OR SACU OR SADC OR WAEMU)

AND

((employment OR unemployment OR labor OR labour OR job*)

OR

((tax AND revenue*) OR (fiscal AND revenue*) OR (budget AND revenue*) OR (government AND revenue*) OR (tariff AND revenue*)))

AND

('developing countr*' OR 'low income countr*' OR 'less developed countr*' OR Afghanistan OR Albania OR Algeria OR Angola OR Antigua Barbuda OR Argentina OR Armenia OR Azerbaijan OR Bahamas OR Bahrain OR Bangladesh OR Barbados OR Belarus OR Belize OR Benin OR Bhutan OR Bolivia OR Botswana OR Bosnia Herzegovina OR Brazil OR Bulgaria OR Burkina Faso OR Burma OR Burundi OR Cameroon OR Cape Verde OR 'Central African Republic' OR Chad OR Chile OR China OR Colombia OR Comoros OR Congo OR Costa Rica OR Cote d'Ivoire OR Croatia OR Djibouti OR Dominica OR Dominican OR Ecuador OR Egypt OR El Salvador OR Guinea OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR Gambia OR Georgia OR Ghana OR Grenada OR Guatemala OR Guyana OR Haiti OR Honduras OR Hungary OR Indonesia OR India OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Kuwait OR Kyrgyzstan OR Laos OR Latvia OR Lebanon OR Lesotho OR Liberia OR Libya OR Lithuania OR Macedonia OR Madagascar OR Malawi OR Malaysia OR Maldives OR Mali OR 'Marshall Island*' OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Namibia OR Nauru OR Nepal OR Nicaragua OR Niger OR Nigeria OR Oman OR Pakistan OR Palau OR Panama OR Papua New Guinea OR Paraguay OR Peru OR Philippines OR Poland OR Qatar OR Romania OR Russia OR Rwanda OR 'Saudi Arab*' OR Samoa OR (Sao Tome AND Principe) OR Senegal OR Serbia OR Seychelles OR Sierra Leone OR 'Solomon Island*' OR 'South Africa' OR Somalia OR 'Sri Lanka' OR 'Saint Kitts Nevis' OR 'Saint Lucia' OR 'Saint Vincent Grenadines' OR Sudan OR Suriname OR Swaziland OR Syria OR Tajikistan OR Tanzania OR Thailand OR Timor-Leste OR Togo OR Tonga OR Trinidad Tobago OR Tunisia OR Turkey OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR 'United Arab Emirates' OR Uruguay OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR Yemen OR

Zambia OR Zimbabwe OR Cuba OR Korea OR Hong Kong OR Singapore OR Taiwan OR Cyprus OR Slovenia OR Malta OR Czech Republic OR Slovakia))

Search lines – IDEAS

The following two searches were done in IDEAS and then merged within Endnote. Note that all of these search lines are less than 250 characters.

('tariff reduction'|'tariff change'|'Openness'|'Trade reform'|'Trade liberalization'|'Trade liberalisation'|'Trade Agreement'|PTA|FTA|'Unilateral Preferences')+(employment|revenue)

('Andean Community'|AFTA|APTA|CARICOM|CACM|COMESA|CIS|CAFTA-DR|EAC|'Association Agreement'|CEMAC|ECOWAS|ECO|EAEC|MERCOSUR|NAFTA|PICTA|PAFTA|SAPTA|SPARTECA|SACU|SADC|WAEMU)+(employment|revenue)

Appendix 3.1: Details of econometric studies included in the review

This table summarises the main studies included in the review, the different specifications used and the methods for each study. The table is not the entire dataset, since additional specifications are included in most papers under the same categories as the table. The full Stata dataset is available upon request.

Paper	Type	Sample	Period	Dependent variable	Trade variable	Econometric method	Publication
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		income taxes as share of GDP	share of external trade in GDP	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		Taxes on goods and services as share of GDP	collected tariff	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		taxes as share of GDP	share of external trade in GDP	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		international trade taxes as share of GDP	share of external trade in GDP	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		taxes on goods and services as share of GDP	share of external trade in GDP	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		international trade taxes as share of GDP	collected tariff	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		taxes as share of GDP	collected tariff	GMM, using Ivs	Working Paper
Agbeyegbe (2004)	Tax	Sub-Saharan Africa		income taxes as share of GDP	collected tariff	GMM, using Ivs	Working Paper
Baunsgaard (2005)	Tax	Middle income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	FE	Working Paper
Baunsgaard (2005)	Tax	Middle income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	GMM	Working Paper
Baunsgaard (2005)	Tax	All developing countries	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	FE	Working Paper
Baunsgaard (2005)	Tax	Middle income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	IV	Working Paper
Baunsgaard (2005)	Tax	All developing countries	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	IV	Working Paper
Baunsgaard (2005)	Tax	Low income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	GMM	Working Paper
Baunsgaard (2005)	Tax	Low income	1975-20000	non-trade tax revenue	openness - share of	IV	Working Paper

					imports and exports in GDP		
Baunsgaard (2005)	Tax	All developing countries	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	GMM	Working Paper
Baunsgaard (2005)	Tax	All developing countries	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	RE	Working Paper
Baunsgaard (2005)	Tax	Low income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	FE	Working Paper
Baunsgaard (2005)	Tax	Low income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	RE	Working Paper
Baunsgaard (2005)	Tax	Middle income	1975-20000	non-trade tax revenue	openness - share of imports and exports in GDP	RE	Working Paper
Brafu-Insaidoo (2008)	Tax	Ghana	1965-2003	log trade tax revenue	log average tariff in differences	Time series	Working Paper
Burgess (1993)	Tax	Cross-country		import duties/GDP	imports/GDP	OLS	Journal
Combes (2002)	Tax	66 developing countries	1975-1998	budget surplus	trade openness exports and imports divided by GDP	GMM	Working Paper
Combes (2002)	Tax	66 developing countries	1975-1998	budget surplus	trade openness exports and imports divided by GDP	FE	Working Paper
Combes (2002)	Tax	66 developing countries	1975-1998	budget surplus	trade openness exports and imports divided by GDP	RE	Working Paper
Ebrill (1999)	Tax	27 countries	1980-1992	total trade tax revenue/GDP	M/GDP	FE	Book
Ebrill (1999)	Tax	27 countries	1980-1992	log import duties revenue	M/GDP	FE	Working Paper
ECA (2004)	Tax	cross-country		trade taxes/GDP	openness -X+m/GDP	OLS	Working Paper
Eltony (2002)	Tax	Arab countries		tax/GDP	M/GDP	OLS	Journal
Gupta (2007)	Tax	All countries		central gov revenue/GDP	average tariff	FE	Working Paper
Gupta (2007)	Tax	All countries		central gov revenue/GDP	average tariff	RE	Working Paper
Hitiris (1990)	Tax	105 countries		log trade taxes	log (X+M)/GDP	OLS	Book
Hitiris (1990)	Tax	106 countries		log trade taxes	log (X+M)/GDP	OLS	Book

Khattry (2002)	Tax	Low income countries	1970-2000	tax revenue/GDP	ratio of international trade taxes to the volume of total trade	FE	Journal
Khattry (2002)	Tax	Middle income countries	1970-2001	tax revenue/GDP	ratio of international trade taxes to the volume of total trade	FE	Journal
Khattry (2002)	Tax	Most countries	1970-1999	tax revenue/GDP	ratio of international trade taxes to the volume of total trade	FE	Journal
Khattry (2003)	Tax	World - 80 countries	1970-1998	capital expenditure/GDP	trade tax/trade	FE	Journal
Khattry (2003)	Tax	World - 80 countries	1970-1998	social sec expenditure/GDP	trade tax/trade	FE	Journal
Khattry (2003)	Tax	World - 80 countries	1970-1998	education expenditure/GDP	trade tax/trade	FE	Journal
Khattry (2003)	Tax	World - 80 countries	1970-1998	health expenditure/GDP	trade tax/trade	FE	Journal
Leuthold (1991)	Tax	African countries	1973-1981	tax revenue/GDP	openness -X+m/GDP	AR	Journal
Leuthold (1991)	Tax	African countries	1973-1981	tax revenue/GDP	openness -X+m/GDP	OLS	Journal
Leuthold (1991)	Tax	African countries	1973-1981	direct tax share	openness -X+m/GDP	OLS	Journal
Leuthold (1991)	Tax	African countries	1973-1981	indirect taxes share	openness -X+m/GDP	OLS	Journal
Mann (1993)	Tax	Mexico	1895-1990	foreign trade taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1940-1981	foreign trade taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1940-1981	indirect taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1895-1990	indirect taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1895-1990	direct taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1895-1990	taxes/GDP	M+X/GDP	OLS	Working Paper
Mann (1993)	Tax	Mexico	1940-1981	taxes/GDP	M+X/GDP	OLS	Working Paper
Muriithi (2003)	Tax	Kenya	1973-1989	taxes/GDP	import duties	AR	Working Paper
Muriithi (2003)	Tax	Kenya	1986-1999	taxes/GDP	import duties	AR	Working Paper
Mwakalobo (2009)	Tax	Kenya		log ratio of government revenue to GDP	log openness -X+M/Y	Cointegration	Thesis
Mwakalobo (2009)	Tax	Tanzania		log ratio of government revenue to GDP	log openness -X+M/Y	Cointegration	Thesis

Mwakalobo (2009)	Tax	Uganda		log ratio of government revenue to GDP	log openness -X+M/Y	Cointegration	Thesis
Mwakalobo (2009)	Tax	Tanzania		log ratio of trade taxes revenue to GDP	log openness -X+M/Y	Cointegration	Thesis
Mwakalobo (2009)	Tax	Kenya		log ratio of trade taxes revenue to GDP	log openness -X+M/Y	Cointegration	Thesis
Mwakalobo (2009)	Tax	Uganda		log ratio of trade taxes revenue to GDP	log openness -X+M/Y	Cointegration	Thesis
Pelzman (2004)	Tax	38 developing countries	1980-2002	share of government expenditure in GDP	international trade taxes as a share of total revenue	OLS	Working Paper
Pelzman (2004)	Tax	38 developing countries	1980-2002	share of government expenditure in GDP	international trade taxes as a share of total revenue	GLS	Working Paper
Piancastelli (2001)	Tax	79 countries	1985-1999	log total tax revenue/GDP	log X+M/GDP	OLS	Working Paper
Piancastelli (2001)	Tax	75 countries	1985-1995	log total tax revenue/GDP	log X+M/GDP	FE	Working Paper
Piancastelli (2001)	Tax	76 countries	1985-1996	log total tax revenue/GDP	log X+M/GDP	FE	Working Paper
Piancastelli (2001)	Tax	79 countries	1985-1999	log total tax revenue/GDP	log X+M/GDP	FE	Working Paper
Piancastelli (2001)	Tax	78 countries	1985-1998	log total tax revenue/GDP	log X+M/GDP	FE	Working Paper
Piancastelli (2001)	Tax	77 countries	1985-1997	log total tax revenue/GDP	log X+M/GDP	FE	Working Paper
Stotsky (1997)	Tax	46 countries	1990-95	tax revenue/GDP	M/GDP	RE preferred	Working Paper
Stotsky (1997)	Tax	30 countries	1990-95	tax revenue/GDP	M/GDP	FE	Working Paper
Stotsky (1997)	Tax	45 countries	1990-95	tax revenue/GDP	M/GDP	FE	Working Paper
Stotsky (1997)	Tax	44 countries	1990-95	tax revenue/GDP	M/GDP	RE preferred	Working Paper
Stotsky (1997)	Tax	30 countries	1990-95	tax revenue/GDP	M/GDP	RE preferred	Working Paper
Stotsky (1997)	Tax	30 countries	1990-95	tax revenue/GDP	M/GDP	FE	Working Paper
Stotsky (1997)	Tax	43 countries	1990-95	tax revenue/GDP	M/GDP	FE	Working Paper
Stotsky (1997)	Tax	30 countries	1990-95	tax revenue/GDP	M/GDP	RE preferred	Working Paper
Suliman (2005)	Tax	Sudan		log direct tax share	liberalization dummy	AR	Journal
Suliman (2005)	Tax	Sudan		log excise tax	liberalization dummy	AR	Journal
Suliman (2005)	Tax	Sudan		log personal income tax	liberalization dummy	AR	Journal

Suliman (2005)	Tax	Sudan		log import duties	liberalization dummy	AR	Journal
Suliman (2005)	Tax	Sudan		log business profit tax	liberalization dummy	AR	Journal
Suliman (2005)	Tax	Sudan		log trade revenue	tariff rate	AR	Journal
Suliman (2005)	Tax	Sudan		log indirect tax	liberalization dummy	AR	Journal
Suliman (2005)	Tax	Sudan		log total tax revenue	liberalization dummy	AR	Journal
Tanzi (1992)	Tax	Cross-country	1988	log tax revenue/GDP	log M/GDP	OLS	Book
Tanzi (1992)	Tax	Cross-country	1980	log tax revenue/GDP	log M/GDP	OLS	Book
Tanzi (1992)	Tax	Cross-country	1978	log tax revenue/GDP	log M/GDP	OLS	Book
Achy (2004)	Employment			total employment in log differences	change in nominal tariff rates at HS-4	base	Working Paper
Achy (2004)	Employment			total employment in log differences	change in nominal tariff rates at HS-6	FE	Working Paper
Achy (2004)	Employment			total employment in log differences	change in nominal tariff rates at HS-5	include size	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm timber	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm constr materials	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2005	workers per firm region 5	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2012	workers per firm region 12	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2009	workers per firm region 9	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2008	workers per firm region 8	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm light	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm metallurgi	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2003	workers per firm region 3	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2006	workers per firm region 6	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2002	workers per firm region 2	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2010	workers per firm region 10	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2004	workers per firm region 4	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm petrochem	lagged tariffs	GMM FE	Working Paper

Akhmedov (2005)	Employment	Russia	1995-2011	workers per firm region 11	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm food	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm machinery	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2007	workers per firm region 7	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2000	workers per firm other	lagged tariffs	GMM FE	Working Paper
Akhmedov (2005)	Employment	Russia	1995-2001	workers per firm region 1	lagged tariffs	GMM FE	Working Paper
Aleman Castilla (2006)	Employment	Mexico	1989-2002	employment share industry	Mexican tariff	WLS	Working Paper
Aleman Castilla (2006)	Employment	Mexico	1989-2003	log employment sector	Mexican tariff	WLS	Working Paper
Ben Mouelhi (2007)	Employment	Tunisia	1996-2003	log labour demand	log effective protection rate	GMM	Journal
Bottini (2009)	Employment	Morocco	1994-2002	SUM-job turnover	import share	FE	Working Paper
Bottini (2009)	Employment	Morocco	1994-2002	POS-job creation	import share	FE	Working Paper
Bottini (2009)	Employment	Morocco	1994-2004	excess job reallocation	import share	FE	Working Paper
Bottini (2009)	Employment	Morocco	1994-2004	NEG - job destruction	import share	FE	Working Paper
Bottini (2009)	Employment	Morocco	1994-2002	log permanent jobs - firms	export share	GMM	Working Paper
Bottini (2009)	Employment	Morocco	1994-2003	NEG - job destruction	import share	FE	Working Paper
Bussmann (2009)	Employment	Non-OECD	1980-2003	female employment agri compare to men	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1980-2004	female employment industry compare to men	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1970-2000	female labour force participation	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1980-2002	female employment service	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1970-2000	female labour force participation	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1980-2001	female employment industry	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1980-2000	female employment agri	log openness trade/GDP	GMM	Journal
Bussmann (2009)	Employment	Non-OECD	1980-2005	female employment service compare to men	log openness trade/GDP	GMM	Journal

Bussmann (2009)	Employment	Non-OECD	1970-2000	female labour force participation	log openness trade/GDP	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1997	total employment net % destruction per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1998	white collar net % change per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1998	white collar net % change per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2000	white collar net % destruction per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2003	blue collar net % destruction per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1999	white collar net % creation per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2000	white collar net % destruction per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1997	total employment net % destruction per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1996	total employment net % creation per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2002	blue collar net % creation per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1995	total employment net % change per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1996	total employment net % creation per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2003	blue collar net % destruction per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2001	blue collar net % change per sector	negative of the annual variation in	GMM	Journal

					the average tariff		
Casacuberta (2004)	Employment	Uruguay	1982-2002	blue collar net % creation per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1995	total employment net % change per sector	negative of the annual variation in the average tariff	GMM	Journal
Casacuberta (2004)	Employment	Uruguay	1982-2001	blue collar net % change per sector	negative of the annual variation in the average tariff	OLS	Journal
Casacuberta (2004)	Employment	Uruguay	1982-1999	white collar net % creation per sector	negative of the annual variation in the average tariff	OLS	Journal
Castro (2006)	Employment	Argentina	1991-2003	total employment per sector	import penetration - ratio imports to consumption	GMM	Working Paper
Christev (2005)	Employment	Ukraine	1994-2000	Two variables interacted with exchange rate			Working Paper
Currie (1997)	Employment	Morocco		firm-level employment	tariffs	GMM	Journal
Currie (1997)	Employment	Morocco		parastatals	tariffs	OLS	Journal
Currie (1997)	Employment	Morocco		industrial sector employment	quotas	OLS	Journal
Currie (1997)	Employment	Morocco		Parastatals	quotas	GMM	Journal
Currie (1997)	Employment	Morocco		industrial sector employment	tariffs	OLS	Journal
Currie (1997)	Employment	Morocco		Parastatals	tariffs	GMM	Journal
Currie (1997)	Employment	Morocco		Parastatals	quotas	OLS	Journal
Currie (1997)	Employment	Morocco		firm-level employment	tariffs	OLS	Journal
Currie (1997)	Employment	Morocco		firm-level employment	quotas	GMM	Journal
Currie (1997)	Employment	Morocco		firm-level employment	quotas	OLS	Journal
Dunne (2006)	Employment	South Africa	1970-2002	log employment sector	L.R. import penetration	GMM	Working Paper
Dutt (2003)	Employment	India	1980-2000	industry employment growth	tariffs	FE	Journal
Dutt (2003)	Employment	India	1980-1999	log industry employment	tariffs	FE	Journal
Edwards (1998)	Employment	Chile	1976-1982	dummy being unemployed	1979 change in sector liberalisation index	Probit	Working Paper

Edwards (1998)	Employment	Chile	1976-1983	dummy being unemployed	1981 change in sector liberalisation index	Probit	Working Paper
Edwards (1998)	Employment	Chile	1976-1981	dummy being unemployed	1976 change in sector liberalisation index	Probit	Working Paper
Edwards (2004)	Employment	South Africa	1993-2000	change labour demand large firms unskilled	change in tariffs 93-00	OLS	Journal
Edwards (2004)	Employment	South Africa	1993-2000	labour demand large firms	tariff 1997	OLS	Journal
Edwards (2004)	Employment	South Africa	1994-1998	change labour demand large firms	change in tariffs 94-98	OLS	Journal
Edwards (2004)	Employment	South Africa	1993-2000	labour demand large firms non-skilled	tariff 1997	OLS	Journal
Edwards (2004)	Employment	South Africa	1997-1998	change labour demand large firms	change in tariffs 97-98	OLS	Journal
Edwards (2004)	Employment	South Africa	1993-2000	labour demand large firms skilled	tariff 1997	OLS	Journal
Edwards (2004)	Employment	South Africa	1993-2000	change labour demand large firms skilled	change in tariffs 93-00	OLS	Journal
Fajnzylber (2005)	Employment	Latin America					Journal
Feliciano (2001)	Employment	Mexico	1986, 1988, 1990	log full time workers	tariff	OLS	Journal
Feliciano (2001)	Employment	Mexico	1986, 1988, 1990	log average workers hours	tariff	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2004	change in industry share of total employment - 6 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2008	change in log employment 6 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2000	change in industry share of total employment - 6 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2010	change in log employment 2 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2007	change in log employment 4 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2002	change in industry share of total employment - 2 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2005	change in industry share of total employment - 8 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-1999	change in industry share of total employment - 4 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2011	change in log employment 4 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2003	change in industry share of total employment - 4 years	change in tariffs	OLS	Journal

Goldberg (2005)	Employment	Colombia	1984-2006	change in log employment 2 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-1998	change in industry share of total employment - 2 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2001	change in industry share of total employment - 8 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2012	change in log employment 6 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2009	change in log employment 8 years	change in tariffs	OLS	Journal
Goldberg (2005)	Employment	Colombia	1984-2013	change in log employment 8 years	change in tariffs	OLS	Journal
Haltiwanger (2004)	Employment	Argentina, Brazil, Chile, Colombia, Mexico and Uruguay	varies by country between 1980-2000	Net-Job creation-job destruction	lagged tariff	country effects, year effects, sector effects and country specific	Journal
Haltiwanger (2004)	Employment	Argentina, Brazil, Chile, Colombia, Mexico and Uruguay	varies by country between 1980-2000	Sum - job creation minus job destruction. Job creation is defined as the sum of new employment	lagged tariff	country effects, year effects, sector effects and country specific	Journal
Haltiwanger (2004)	Employment	Argentina, Brazil, Chile, Colombia, Mexico and Uruguay	varies by country between 1980-2000	Sum - job creation plus job destruction. Job creation is defined as the sum of new employment	lagged tariff	country effects, year effects, sector effects and country specific	Journal
Haltiwanger (2004)	Employment	Argentina, Brazil, Chile, Colombia, Mexico and Uruguay	varies by country between 1980-2000	Sum - job creation minus job destruction. Job creation is defined as the sum of new employment	lagged tariff	country effects, year effects, sector effects and country specific	Journal
Haouas (2005)	Employment	Tunisia	1971 to 1996	log number of employees at sector level	liberalisation index	OLS	Journal
Haouas (2005)	Employment	Tunisia	1971 to 1996	log number of employees at sector level	liberalisation index	GMM	Journal
Hasan (2001)	Employment	48 developing countries	1970-1997	log manufacturing sector employment	log average tariff	OLS with country and year dummies	Working Paper
Hasan (2001)	Employment	48 developing countries	1970-1997	log manufacturing sector employment	log openness - share of imports and exports in GDP	OLS with country and year dummies	Working Paper
Hasan (2001)	Employment	48 developing countries	1970-1997	log manufacturing sector employment	log lagged average tariff	OLS with country and year dummies	Working Paper
Hasan (2001)	Employment	48 developing countries	1970-1997	log manufacturing sector employment	log lagged openness	OLS with country and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-1999	log employment	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-2001	log employment skilled	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-2000	log employment skilled	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-2003	log employment unskilled	tariff	OLS with industry and year dummies	Working Paper

Hasan (2003)	Employment	Philippines	1988-2002	log employment skilled	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-1997	log employment	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-2005	log employment unskilled	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-1998	log employment	tariff	OLS with industry and year dummies	Working Paper
Hasan (2003)	Employment	Philippines	1988-2004	log employment unskilled	tariff	OLS with industry and year dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2003	log employment	tariff in 1984 + change in tariff mean	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2008	log employment	tariff alt* 5	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2009	log employment	tariff alt 6	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2007	log employment	tariff alt 4	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2011	log employment	tariff alt 8	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2001	log employment	tariff in 1984 + change in tariff mean	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2006	log employment	tariff alt 3	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2000	log employment	tariff in 1984 + change in tariff mean	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2004	log employment	tariff alt 1	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2005	log employment	tariff alt 2	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-1999	log employment	tariff	OLS with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2010	log employment	tariff alt 7	IV with year and sector dummies	Working Paper
Jaramillo (2006)	Employment	Colombia	1984-2002	log employment	tariff in 1984 + change in tariff mean	IV with year and sector dummies	Working Paper
Jenkins (2004)	Employment	Vietnam	1995-1999	log employment	change ratio of imports to gross output	FE	Journal

Jenkins (2008)	Employment	South Africa	1980-2002	log difference manufacturing employment	log difference lagged 2 periods imports/total demand	2SLS	Journal
Jenkins (2008)	Employment	South Africa	1980-2004	log difference manufacturing employment	log difference lagged 2 periods imports/total demand	2SLS year dummies	Journal
Jenkins (2008)	Employment	South Africa	1980-2005	log difference manufacturing employment	log difference lagged 2 periods imports/total demand	2SLS both industry FE and year dummies	Journal
Jenkins (2008)	Employment	South Africa	1980-2003	log difference manufacturing employment	log difference lagged 2 periods imports/total demand	2SLS Industry FE	Journal
Jenkins (2008)	Employment	South Africa	1980-2001	log difference manufacturing employment	log difference lagged 2 periods imports/total demand	OLS	Journal
Kambhampati (1997)	Employment	India	1987-1993	log sector labour demand	liberalisation dummy	RE	Journal
Kambhampati (1997)	Employment	India	1987-1996	log sector labour demand	liberalisation dummy	RE	Journal
Kambhampati (1997)	Employment	India	1987-1994	log sector labour demand	liberalisation dummy	RE	Journal
Kambhampati (1997)	Employment	India	1987-1995	log sector labour demand	liberalisation dummy	RE	Journal
Kambhampati (1997)	Employment	India	1987-1997	log sector labour demand	liberalisation dummy	RE	Journal
Kee (2005)	Employment	Singapore	1968–2000	change in unemployment rate	lag of growth rate of relative export price	Cointegration	Journal
Kien (2009)	Employment	Vietnam		log employment	log difference import penetration	GMM	Journal
Kien (2009)	Employment	Vietnam		log employment	log difference import penetration	FE	Journal
Konings (2003)	Employment	Ukraine	1998-1999	net employment growth rate in manufacturing	average exports and imports sector/trade total/share of sector in total employment	OLS	Working Paper
Manda (2004)	Employment	Kenya		difference in employment	lagged difference in import penetration	OLS with industry dummies	Journal
Márquez (1997)	Employment	Latin America	1970-1996	log manufacturing employment	average tariffs	IV	Working Paper

Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment	average tariffs	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment (control output)	dummy	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment (control output)	average tariffs	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment	dummy	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log manufacturing employment	dummy	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment (control output)	openness -X+m/GDP	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log aggregate employment	openness -X+m/GDP	IV	Working Paper
Márquez (1997)	Employment	Latin America	1970-1996	log manufacturing employment	openness -X+m/GDP	IV	Working Paper
Matlanyane (2002)	Employment	South Africa	1974-2000	log customs revenue/GDP	log M/GDP	Cointegration	Journal
Milner (1998)	Employment	Mauritius	1981-1992	log sectoral employment	log difference in import penetration ratio	GMM	Journal
Milner (1998)	Employment	Mauritius	1981-1992	log sectoral employment	log difference in real imports	GMM	Journal
Mitra (2001)	Employment	India		log labour demand	liberalisation dummy	RE	Working Paper
Mollick (2009)	Employment	Mexico	1984-2000	log labour demand	NAFTA dummy	GLS with FE	Journal
Muendler (2007)	Employment	Brazil	1990-1998	labour demand changes establishment	product tariffs	FE	Working Paper
Muendler (2007)	Employment	Brazil	1990-1998	labour demand changes establishment	product tariffs	FE-IV	Working Paper
Narayanan (2005)	Employment	India	1973/4–1997/8	log of employment textile sectors	dummy for phasing out of MFA quotas	GMM	Working Paper
Narayanan (2005)	Employment	India	1973/4–1997/8	log of employment textile sectors	dummy for phasing out of MFA quotas	GMM	Working Paper
Nordas (2003)	Employment	Peru		log of women's employment by sector	log of imports	FE	Journal
Nordas (2003)	Employment	Sri Lanka		log of women's employment by sector	log of imports	FE	Journal
Nordas (2003)	Employment	Mauritius		log of women's employment by sector	log of imports	FE	Journal
Nordas (2003)	Employment	Philippines		log of women's employment by sector	log of imports	FE	Journal
Nordas (2003)	Employment	Mexico		log of women's employment by sector	log of imports	FE	Journal

Onaran (2006)	Employment	Turkey	1973-2001	log difference sector employment	log difference export intensity sector	SUR FE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log aggregate employment	log M/GDP	OLS	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X+M/GDP	FE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X+M/GDP	RE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log M/GDP	RE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X/GDP	RE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log M/GDP	OLS	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log aggregate employment	log X/GDP	Prais-Winsten	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log M/GDP	FE	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X/GDP	OLS	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log aggregate employment	log X+M/GDP	Prais-Winsten	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X+M/GDP	OLS	Working Paper
Orbeta (2002)	Employment	Philippines	1980-2000	log sector employment	log X/GDP	FE	Working Paper
Revenga (1997)	Employment	Mexico	1984-1992	log average workers per year industry	log tariffs	OLS with FIRM dummies	Journal
Revenga (1997)	Employment	Mexico	1984-1991	log average workers per year industry	log tariffs	FE	Journal
Revenga (1997)	Employment	Mexico	1984-1990	log average workers per year industry	log tariffs	OLS	Journal
Revenga (1997)	Employment	Mexico	1984-1993	log average workers per year industry	log tariffs	OLS with firms and year dummies	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	Net-POS minus NEG	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	SUM- Positive + Negative	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	Excess job reallocation - 2 min{pos,neg}	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	POS Positive employment growth	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	Excess job reallocation - 2 min{pos,neg}	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	NEG - negative employment growth	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	POS Positive employment growth	tariffs	FE	Journal

Ribeiro (2004)	Employment	Brazil	1992-1998	SUM- Positive + Negative	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	NEG - negative employment growth	tariffs	FE	Journal
Ribeiro (2004)	Employment	Brazil	1992-1998	Net-POS minus NEG	tariffs	FE	Journal
Sen (2009)	Employment	India	1975-1999	log sector employment	M/demand	GMM	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH5 -absolute value labour share difference -5 years	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH5 employment shifts across sectors	dummy liberalisation dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	EM5 -change in employment as a share of total employment	dummy liberalisation past 5 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH2 employment shifts across sectors	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	EM2 -change in employment as a share of total employment	dummy liberalisation past 5 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH2 employment shifts across sectors	Dummy liberalization dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH5 employment shifts across sectors	dummy liberalisation past 5 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH2 -absolute value labour share difference - 2 years	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH2 -absolute value labour share difference - 2 years	Dummy liberalization dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH5 employment shifts across sectors	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	EM5 -change in employment as a share of total employment	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH5 -absolute value labour share difference -5 years	Dummy liberalization dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	SH2 employment shifts across sectors	dummy liberalisation past 5 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH5 -absolute value labour share difference -5 years	dummy liberalisation past 5 years	OLS	Journal

Wacziarg (2004)	Employment	cross-country	ILO sample	EM2 -change in employment as a share of total employment	dummy liberalisation **	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	EM2 -change in employment as a share of total employment	Dummy liberalization dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	EM5 -change in employment as a share of total employment	Dummy liberalization dummy past 2 years	OLS	Journal
Wacziarg (2004)	Employment	cross-country	ILO sample	CH2 -absolute value labour share difference - 2 years	dummy liberalisation past 5 years	OLS	Journal
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment agriculture all countries	import duties/M	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment services all countries	import duties/M	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment services developing countries	import duties/M lagged	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment agriculture developing countries	import duties/M lagged	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment industry all countries	import duties/M	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment agriculture developing countries	import duties/M lagged	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment services developing countries	import duties/M lagged	SUR	Working Paper
Yanikkaya (2008)	Employment	cross-country	1980-1999	log employment industry developing countries	import duties/M lagged	SUR	Working Paper
Yasmin (2006)	Employment	Pakistan	1959-2003	log employment as share of lab force	Log (X+M)/GDP	AR	Journal
Yasmin (2006)	Employment	Pakistan	1959-2003	log employment as share of lab force	log import duties/GDP	AR	Journal

* The authors use alternative tariffs measures based on different levels of aggregation weights and groups.

** This is dummy with value one after liberalisation is introduced and for the remaining of the sample period.

Appendix 4.1: Methodologies used for synthesis

The average estimate by study is calculated as the simple average of the *n* estimated coefficients S_i for each study.

$$\overline{S} = \frac{1}{n}\sum_{i}^{n} S_i \quad .$$

In order to calculate the variance, we correct for the correlation between outcomes of the different estimates based on the equation proposed by Borenstein et al. (2009):

$$W_S = \left(\frac{1}{n}\right)^2 (\sum_{i}^{n} v_i + \sum_{i \neq j} r_{ij} \sqrt{v_i} \sqrt{v_j}$$

where v_i is the coefficient variance and r_{ij} is the correlation between *i* and *j* outcomes.

For the meta-analysis, there are two main estimators. The fixed effect estimator assumes that all estimates from different samples or studies share a common 'true' effect size, and provided the sampling error is considered for each estimate, the coefficient should be the same (Borenstein et al. 2009). This assumption seems appropriate in a context within study where sample and design is almost identical. As a result, the weights only consider within-study variance. The FE estimator is calculated as the following weighted average:

$$S^{FE} = \frac{\sum_{i}^{k} W_i \beta}{\sum_{i}^{k} W_i}$$

where the weights assigned to each specification depend on the inverse of the within-specification variance:

$$W_i = \frac{1}{\mathrm{var}(\beta)_i} \quad .$$

In the context of our review, the random effects estimator seems more appropriate since it allows for differences in impact size according to different specifications and samples. This estimator is based on minimising both within-study variance and between-study variance.

$$S^{RE} = \frac{\sum_{i}^{k} W^*_i \beta}{\sum_{i}^{k} W^*_i}$$

$$W^*_i = \frac{1}{\mathrm{var}^*(\beta)_i} \quad .$$

Appendix 4.2 Synthesis tables

Table A4.1 Observations for meta-analysis

Paper	Type	Y	X	coef_sel	stderror_sel
Achy (2004)	Employment	log dif L	tariff change	0.0040	0.0071
Agbeyegbe (2004)	Tax	IT/GDP	X+M/GDP	0.0000	0.0000
Agbeyegbe (2004)	Tax	IT/GDP	tariff rev	-0.0120	0.0062
Agbeyegbe (2004)	Tax	OT/GDP	X+M/GDP	0.0100	0.0089
Agbeyegbe (2004)	Tax	OT/GDP	tariff rev	0.0080	0.0190
Agbeyegbe (2004)	Tax	T/GDP	X+M/GDP	0.0010	0.0091
Agbeyegbe (2004)	Tax	T/GDP	tariff rev	-0.0100	0.0109
Agbeyegbe (2004)	Tax	TT2/GDP	X+M/GDP	0.0020	0.0087
Agbeyegbe (2004)	Tax	TT2/GDP	tariff rev	-0.0004	0.0007
Akhmedov (2005)	Employment	log L	lagged tariff	0.3030	0.0510
Baunsgaard (2005)	Tax	non-TT/GDP	X+M/GDP	0.0070	0.0015
Ben Mouelhi (2007)	Employment	log L	log EPR	-0.0046	0.0029
Bottini (2009)	Employment	log L	X/sales	0.3510	0.0327
Brafu-Insaidoo (2008)	Tax	log TT	log dif tariff	-1.3060	0.7690
Burgess (1993)	Tax	TT/GDP	M/GDP	0.1450	0.0119
Bussmann (2009)	Employment	L part female	log (X+M/GDP)	2.2200	0.6515
Bussmann (2009)	Employment	log L female agri	log (X+M/GDP)	6.2818	1.6365
Bussmann (2009)	Employment	log L female agri to men	log (X+M/GDP)	1.9944	1.1741
Bussmann (2009)	Employment	log L female ind	log (X+M/GDP)	2.4499	0.5970
Bussmann (2009)	Employment	log L female ind to men	log (X+M/GDP)	2.9428	0.5512
Bussmann (2009)	Employment	log L female serv	log (X+M/GDP)	-8.1294	1.5011
Bussmann (2009)	Employment	log L female serv to men	log (X+M/GDP)	-4.3392	1.0781
Castro (2006)	Employment	log L	IP	-0.0810	0.0316
Combes (2002)	Tax	BUD	X+M/GDP	0.0410	0.0143
Currie (1997)	Employment	L	quotas	-0.0990	0.0143
Currie (1997)	Employment	L	tariff	-0.0280	0.0250
Dutt (2003)	Employment	L change	tariff	-0.0020	0.0010
Dutt (2003)	Employment	log L	tariff	-0.0030	0.0010
Edwards (1998)	Employment	dummy	X+M/GDP change	-0.4920	0.0026
Feliciano (2001)	Employment	log L	tariff	-0.0013	0.0020
Feliciano (2001)	Employment	log h	tariff	-0.0003	0.0003
Goldberg (2005)	Employment	change L share	tariff change	-0.0050	0.0026
Gupta (2007)	Tax	T/GDP	tariff	-0.1300	0.0352
Haltiwanger (2004)	Employment	NET	lagged tariff	0.0270	0.0260
Haltiwanger (2004)	Employment	SUM	lagged tariff	-0.0790	0.0184
Hasan (2001)	Employment	log L	log (X+M/GDP)	0.0870	0.0393
Hasan (2001)	Employment	log L	log lagged	-0.0100	0.0385

Paper	Type	Y	X	coef_sel	stderror_sel
			openness		
Hasan (2001)	Employment	log L	log lagged tariff	0.0300	0.0216
Hasan (2001)	Employment	log L	log tariff	0.0030	0.0179
Hasan (2003)	Employment	log L	tariff	0.0080	0.0041
Hitiris (1990)	Tax	log TT2	log (X+M/GDP)	0.5470	0.1133
Jaramillo (2006)	Employment	log L	tariff	0.3890	0.1306
Jaramillo (2006)	Employment	log L	tariff in 1984 + change in tariff mean	1.2280	0.2617
Kambhampati (1997)	Employment	log L	dummy	0.0400	0.0153
Kee (2005)	Employment	change U rate	Lag of growth rate of relative export price	-0.0350	0.0100
Khattry (2002)	Tax	T/GDP	TT/X+M	0.3750	0.0163
Khattry (2003)	Tax	CEXP/GDP	TT/X+M	0.0200	0.0200
Khattry (2003)	Tax	EDU EXP/GDP	TT/X+M	-0.0100	0.0100
Khattry (2003)	Tax	HEA EXP/GDP	TT/X+M	0.0030	0.0200
Khattry (2003)	Tax	SS EXP/GDP	TT/X+M	-0.0300	0.0100
Konings (2003)	Employment	NET	X+M/L/share	0.0270	0.0026
Leuthold (1991)	Tax	DT/GDP	X+M/GDP	0.0190	0.0085
Leuthold (1991)	Tax	INDT/GDP	X+M/GDP	0.0290	0.0025
Leuthold (1991)	Tax	T/GDP	X+M/GDP	0.0430	0.0143
Manda (2004)	Employment	dif L	lag dif IP	0.0000	0.2133
Mann (1993)	Tax	DT/GDP	X+M/GDP	0.0040	0.0175
Mann (1993)	Tax	INDT/GDP	X+M/GDP	-0.0470	0.0255
Mann (1993)	Tax	T/GDP	X+M/GDP	0.0600	0.0281
Mann (1993)	Tax	TT2/GDP	X+M/GDP	0.1070	0.0245
Márquez (1997)	Employment	log L	X+M/GDP	-0.0580	0.0112
Márquez (1997)	Employment	log L	dummy	0.0060	0.0026
Márquez (1997)	Employment	log L	tariff	0.0120	0.0031
Matlanyane (2002)	Employment	log TT/GDP	log M/GDP	-0.6729	0.2566
Mollick (2009)	Employment	log L	dummy	1.3620	0.0245
Muendler (2007)	Employment	L change	tariff	2.7930	6.9112
Muriithi (2003)	Tax	T/GDP	tariff	0.4050	0.0128
Mwakalobo (2009)	Tax	log T/GDP	log (X+M/GDP)	0.1350	0.0546
Mwakalobo (2009)	Tax	log TT2/GDP	log (X+M/GDP)	0.2040	0.1240
Orbeta (2002)	Employment	log L	log (X+M/GDP)	0.0180	0.0036
Orbeta (2002)	Employment	log L	log M/GDP	0.0100	0.0051
Orbeta (2002)	Employment	log L	log X/GDP	0.0530	0.0082
Pelzman (2004)	Tax	EXP/GDP	TT/T	-0.0490	0.0087
Piancastelli (2001)	Tax	log T/GDP	log (X+M/GDP)	0.1820	0.0168
Revenga (1997)	Employment	log L	log tariff	-0.0270	0.0168
Ribeiro (2004)	Employment	EXC	tariff	-0.4500	0.1418
Ribeiro (2004)	Employment	NEG	tariff	-0.1210	0.1020

Paper	Type	Y	X	coef_sel	stderror_sel
Ribeiro (2004)	Employment	NET	tariff	0.0260	0.1541
Ribeiro (2004)	Employment	POS	tariff	-0.0950	0.1015
Ribeiro (2004)	Employment	SUM	tariff	-0.2170	0.1327
Suliman (2005)	Tax	log BT	dummy	4.3000	3.8053
Suliman (2005)	Tax	log DT	dummy	1.7400	4.5789
Suliman (2005)	Tax	log EXC	dummy	1.0300	1.7759
Suliman (2005)	Tax	log INDT	dummy	0.2100	1.3125
Suliman (2005)	Tax	log IT	dummy	-3.8900	1.2671
Suliman (2005)	Tax	log T	dummy	1.8000	1.9355
Suliman (2005)	Tax	log TT	dummy	-0.4600	0.9583
Tanzi (1992)	Tax	log T/GDP	log M/GDP	0.1420	0.0112
Wacziarg (2004)	Employment	CH	dummy	-0.1370	0.0332
Wacziarg (2004)	Employment	EM	dummy	-1.3740	0.5781
Wacziarg (2004)	Employment	EXC	dummy	-0.9970	0.2378
Yanikkaya (2008)	Employment	log L	TT/M	0.0280	0.0286
Yanikkaya (2008)	Employment	log L	lagged TT/M	0.0130	0.0245
Yanikkaya (2008)	Employment	log L agri	TT/M	-0.1080	0.0500
Yanikkaya (2008)	Employment	log L agri	lagged TT/M	0.0380	0.0245
Yanikkaya (2008)	Employment	log L service	TT/M	0.0830	0.0209
Yanikkaya (2008)	Employment	log L service	lagged TT/M	0.0770	0.0194
Yasmin (2006)	Employment	log L share	log (X+M/GDP)	0.1080	0.0416
Yasmin (2006)	Employment	log L share	log TT/GDP	-0.1710	0.0636

Table A4.2 Meta-analysis results

			simple average method			Borenstein et al. method (r=0.5)			Borenstein et al. method (r=1)		
Type	**Y**	**X**	**coef**	**lower**	**upper**	**coef05**	**lower05**	**upper05**	**coef**	**lower1**	**upper1**
Employment	CH	dummy	-0.1663	-0.3352	0.0026		-0.4031	0.0705		-0.4153	0.0826
Employment	EM	dummy	-1.7293	-4.7615	1.3028		-3.7984	0.3398		-4.2142	0.7556
Employment	EXC	dummy	-1.2948	-2.5133	-0.0764		-2.2435	-0.3462		-2.3933	-0.1964
Employment	EXC	tariff	-0.4501	-0.8427	-0.0574		-0.9871	0.0870		-1.0048	0.1047
Employment	L	quotas	-0.0782	-0.2044	0.0480		-0.3053	0.1489		-0.3117	0.1553
Employment	L	tariff	-0.1060	-0.2977	0.0857		-0.3687	0.1567		-0.3816	0.1696
Employment	L change	tariff	-0.0020	-0.0040	0.0000		-0.0040	0.0000		-0.0040	0.0000
Employment	L part female	log (X+M/GDP)	2.2235	-0.0142	4.4613		0.3725	4.0746		0.1602	4.2869
Employment	NEG	tariff	-0.1219	-0.4043	0.1606		-0.5589	0.3152		-0.5702	0.3265
Employment	NET	X+M/L/share	0.0355	0.0182	0.0528		-0.0369	0.1079		-0.0373	0.1083
Employment	NET	lagged tariff	0.0796	-0.0435	0.2027		-0.1363	0.2955		-0.1431	0.3023
Employment	NET	tariff	0.0264	-0.4004	0.4532		-0.5447	0.5975		-0.5643	0.6171
Employment	POS	tariff	-0.0955	-0.3764	0.1855		-0.5277	0.3368		-0.5390	0.3481
Employment	SUM	lagged tariff	-0.0808	-0.1647	0.0031		-0.2541	0.0925		-0.2581	0.0965
Employment	SUM	tariff	-0.2173	-0.5853	0.1507		-0.7311	0.2965		-0.7474	0.3128
Employment	change L share	tariff change	0.0074	-0.1720	0.1869		-0.1737	0.1886		-0.1923	0.2072
Employment	change U rate	lag of growth rate of relative export price	-0.0350	-0.0546	-0.0154		-0.0546	-0.0154		-0.0546	-0.0154
Employment	dif L	lag dif IP	0.0000	-0.5880	0.5880		-0.5880	0.5880		-0.5880	0.5880
Employment	dummy	X+M/GDP change	-1.2910	-1.4700	-1.1120		-1.4785	-1.1036		-1.4802	-1.1018
Employment	log L	IP	-0.0810	-0.1429	-0.0191		-0.1429	-0.0191		-0.1429	-0.0191
Employment	log L	TT/M	0.0225	-0.0576	0.1026		-0.1772	0.2222		-0.1792	0.2242
Employment	log L	X+M/GDP	-0.0677	-0.1623	0.0269		-0.1851	0.0498		-0.1937	0.0583
Employment	log L	X/sales	0.3743	0.2520	0.4966		0.1177	0.6310		0.1131	0.6356
Employment	log L	dummy	0.6050	-0.2180	1.4290	0.6040	-0.2710	1.4790	0.6090	-0.1120	1.3300

Employment	log L	lagged TT/M	0.0090	-0.0607	0.0787		-0.1930	0.2110		-0.1944	0.2124
Employment	log L	lagged tariff	0.6124	-0.5525	1.7774		-0.1113	1.3361		-0.3013	1.5261
Employment	log L	log (X+M/GDP)	0.2850	-0.0300	0.6000	0.2760	-0.0350	0.5880	0.3100	-0.0090	0.6290
Employment	log L	log EPR	-0.0046	-0.0103	0.0010		-0.0103	0.0010		-0.0103	0.0010
Employment	log L	log M/GDP	0.3810	0.2757	0.4862		0.1387	0.6232		0.1373	0.6246
Employment	log L	log X/GDP	0.2331	0.1336	0.3326		0.0035	0.4627		0.0012	0.4650
Employment	log L	log lagged openness	-0.0100	-0.0854	0.0654		-0.0854	0.0654		-0.0854	0.0654
Employment	log L	log lagged tariff	0.0300	-0.0123	0.0723		-0.0123	0.0723		-0.0123	0.0723
Employment	log L	log tariff	-0.0580	-0.1450	0.0290	-0.0600	-0.2200	0.1010	-0.0550	-0.1010	-0.0100
Employment	log L	Tariff	-0.0030	-0.0040	-0.0010	-0.0030	-0.0040	-0.0010	0.0030	-0.0030	0.0100
Employment	log L	tariff in 1984 + change in tariff mean	1.2298	0.2032	2.2563		0.3159	2.1436		0.2136	2.2459
Employment	log L agri	TT/M	-0.0485	-0.4958	0.3988		-0.7974	0.7004		-0.8039	0.7069
Employment	log L agri	lagged TT/M	0.0305	-0.0388	0.0998		-0.1700	0.2310		-0.1715	0.2325
Employment	log L female agri	log (X+M/GDP)	6.2818	3.0743	9.4893		3.0743	9.4893		3.0743	9.4893
Employment	log L female agri to men	log (X+M/GDP)	1.9944	-0.3068	4.2956		-0.3068	4.2956		-0.3068	4.2956
Employment	log L female ind	log (X+M/GDP)	2.4499	1.2798	3.6200		1.2798	3.6200		1.2798	3.6200
Employment	log L female ind to men	log (X+M/GDP)	2.9428	1.8624	4.0232		1.8624	4.0232		1.8624	4.0232
Employment	log L female serv	log (X+M/GDP)	-8.1294	-11.0716	-5.1872		-11.0716	-5.1872		-11.0716	-5.1872
Employment	log L female serv to men	log (X+M/GDP)	-4.3392	-6.4523	-2.2261		-6.4523	-2.2261		-6.4523	-2.2261
Employment	log L service	TT/M	0.0825	0.0236	0.1414		-0.0837	0.2487		-0.0850	0.2500
Employment	log L service	lagged TT/M	0.0750	0.0203	0.1297		-0.0830	0.2330		-0.0842	0.2342
Employment	log L share	log (X+M/GDP)	0.1080	0.0265	0.1895		0.0265	0.1895		0.0265	0.1895
Employment	log L share	log TT/GDP	-0.1710	-0.2956	-0.0464		-0.2956	-0.0464		-0.2956	-0.0464
Employment	log TT/GDP	log M/GDP	-0.6729	-1.1758	-0.1700		-1.1758	-0.1700		-1.1758	-0.1700
Employment	log dif L	tariff change	-0.0163	-0.0884	0.0557		-0.2344	0.2017		-0.2355	0.2028
Employment	log h	tariff	-0.0003	-0.0009	0.0004		-0.0009	0.0004		-0.0009	0.0004

Tax	BUD	X+M/GDP	0.3693	0.0124	0.7261		-0.0614	0.7999		-0.0802	0.8187
Tax	CEXP/GDP	TT/X+M	0.0200	-0.0192	0.0592		-0.0192	0.0592		-0.0192	0.0592
Tax	DT/GDP	X+M/GDP	0.0160	0.0010	0.0310		0.0010	0.0310		0.0010	0.0310
Tax	EDU EXP/GDP	TT/X+M	-0.0100	-0.0296	0.0096		-0.0296	0.0096		-0.0296	0.0096
Tax	EXP/GDP	TT/T	-0.0488	-0.0737	-0.0239		-0.1609	0.0633		-0.1612	0.0637
Tax	HEA EXP/GDP	TT/X+M	0.0030	-0.0362	0.0422		-0.0362	0.0422		-0.0362	0.0422
Tax	INDT/GDP	X+M/GDP	-0.0020	-0.0810	0.0770	0.0290	0.0240	0.0340	-0.0120	-0.0940	0.0690
Tax	IT/GDP	X+M/GDP	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000
Tax	IT/GDP	tariff rev	-0.0120	-0.0241	0.0001		-0.0241	0.0001		-0.0241	0.0001
Tax	OT/GDP	X+M/GDP	0.0100	-0.0075	0.0275		-0.0075	0.0275		-0.0075	0.0275
Tax	OT/GDP	tariff rev	0.0080	-0.0293	0.0453		-0.0293	0.0453		-0.0293	0.0453
Tax	SS EXP/GDP	TT/X+M	-0.0300	-0.0496	-0.0104		-0.0496	-0.0104		-0.0496	-0.0104
Tax	T/GDP	TT/X+M	0.4200	0.3547	0.4853		0.2532	0.5868		0.2511	0.5889
Tax	T/GDP	X+M/GDP	0.0380	-0.0170	0.0930	0.0030	-0.0150	0.0200	0.0460	0.0020	0.0890
Tax	T/GDP	tariff	0.3370	-0.5890	1.2630	0.3170	-0.6080	1.2420	0.3410	-0.5850	1.2670
Tax	T/GDP	tariff rev	-0.0100	-0.0313	0.0113		-0.0313	0.0113		-0.0313	0.0113
Tax	TT/GDP	M/GDP	0.1450	0.1217	0.1683		0.1217	0.1683		0.1217	0.1683
Tax	TT2/GDP	X+M/GDP	0.0490	-0.0530	0.1510	0.0100	-0.0440	0.0630	0.0540	-0.0480	0.1570
Tax	TT2/GDP	tariff rev	-0.0004	-0.0017	0.0009		-0.0017	0.0009		-0.0017	0.0009
Tax	log BT	dummy	4.3000	-3.1584	11.7584		-3.1584	11.7584		-3.1584	11.7584
Tax	log DT	dummy	1.7400	-7.2347	10.7147		-7.2347	10.7147		-7.2347	10.7147
Tax	log EXC	dummy	1.0300	-2.4507	4.5107		-2.4507	4.5107		-2.4507	4.5107
Tax	log INDT	dummy	0.2100	-2.3625	2.7825		-2.3625	2.7825		-2.3625	2.7825
Tax	log IT	dummy	-3.8900	-6.3735	-1.4065		-6.3735	-1.4065		-6.3735	-1.4065
Tax	log T	dummy	1.8000	-1.9935	5.5935		-1.9935	5.5935		-1.9935	5.5935
Tax	log T/GDP	log (X+M/GDP)	0.2130	0.1000	0.3270	0.2100	0.0560	0.3630	0.2150	0.1970	0.2320
Tax	log T/GDP	log M/GDP	0.1600	0.0832	0.2368		0.0279	0.2921		0.0232	0.2968

Tax	log TT	dummy	-0.4600	-2.3383	1.4183	-2.3383	1.4183	-2.3383	1.4183
Tax	log TT	log dif tariff	-1.3060	-2.8132	0.2012	-2.8132	0.2012	-2.8132	0.2012
Tax	log TT2	log (X+M/GDP)	-0.3100	-1.3380	0.7180	-1.6521	1.0321	-1.6710	1.0510
Tax	log TT2/GDP	log (X+M/GDP)	0.3123	-0.6417	1.2662	-0.3452	0.9697	-0.4874	1.1119
Tax	non-TT/GDP	X+M/GDP	0.0158	0.0032	0.0283	-0.0287	0.0602	-0.0291	0.0606

Table A4.3 Synopsis of CGE modelling results

Employment impacts

First author (pub year)	No. of regions	No. of sectors	Time dimension	Benchmark year	Labour market closure	External closure	Scenario type	Description	Country /region	dL%/dTrade%	dL%/dTariff %pt	Reloc%/dTariff%pt	Reloc%/dTrade%
Adams (2004)	10	19	Dyn	2001	UE	CAFix	PTA	FTA USA-SACU	SACU	0.32			
Brown (2005)b	22	18	Stat	1997	FE	CAFix	PTA	FTA USA-CAC	CAC				0.13
Brown (2005)b	22	18	Stat	1997	FE	CAFix	PTA	FTA USA Morocco	Morocco				0.06
Carneiro (2006)	1	42	Stat	1996	UE	CAFlx	PTA	FTA Americas	Brazil				0.15
Chadha (2000)	20	16	Stat	1995	FE	CAFix	Unlat	Unilateral Tariff Cut	India			0.03	0.02
Chadha (2000)	20	16	Stat	1995	FE	CAFix	Mulat	Multilateral Tariff Cut	India				0.02
Cling (2009)	1	31	Stat	2000	FE	CAFix	Unlat	WTO Accession	Vietnam			0.13	
Cling (2009)	1	31	Stat	2000	WC	CAFix	Unlat	WTO Accession	Vietnam	0.72	0.21		
Corong (2008)	1	35	Stat	2000	FE	CAFix	Unlat	Unilateral Tariff Cut	Philippines				
Dessus (1999)	1	14	Dyn	1995	UE	CAFix	PTA	Tariff Cut on EU Imp	Egypt				
Diaz-Bonilla (2006)	1	44	Stat	1997	UE	CaFlx	PTA	FTA Americas	Argentina	0.21			
Doanh (2009)	1	17	Stat	2000	FE	CAFlx	Unlat	WTO Accession	Vietnam			0.23	
Herault (2007)	1	43	Stat	2000	UE	CAFlx	Unlat	Unilateral Tariff Cut	Sth Africa	0.30	0.16		
Hoque (2005)	1	86	Stat	2000	UE	CAFlx	Unlat	Unilateral Tariff Cut	Bangladesh	0.28	0.21		

First author (pub year)	No. of regions	No. of sectors	Time dimension	Benchmark year	Labour market closure	External closure	Scenario type	Description	Country /region	dL%/dTrade%	dL%/dTariff %pt	Reloc%/dTariff%pt	Reloc%/dTrade%
Jimenez (2006)	1	21	Stat	1996	UE	CAFlx	PTA	FTA Americas	Bolivia	0.42			
Khondker (2008)	1	26	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Bangladesh			0.05	
Kitwiwattanachai (2010)	14	14	Stat	2001	WC	CAFix	PTA	FTA East Asia	ASEAN	0.21			
Kitwiwattanachai (2010)	14	14	Stat	2002	WC	CAFix	PTA	FTA East Asia	China	0.02			
Laens (2006)	1	21	Stat	1995	UE	CAFlx	PTA	FTA Americas	Uruguay				
Lee (1994)	10	10	Stat	1985	UE	CAFix	PTA	FTA Pacific Region	China	0.34			
Lee (1994)	10	10	Stat	1985	UE	CAFix	Mulat	Multilateral Tariff Cut	China	0.17			
Lee (1994)	10	10	Stat	1985	UE	CAFix	PTA	FTA Pacific Region	Malaysia	0.78			
Lee (1994)	10	10	Stat	1985	UE	CAFix	Mulat	Multilateral Tariff Cut	Malaysia	0.81			
Lee (1994)	10	10	Stat	1985	UE	CAFix	PTA	FTA Pacific Region	Thailand	0.77			
Lee (1994)	10	10	Stat	1985	UE	CAFix	Mulat	Multilateral Tariff Cut	Thailand	0.39			
Lee (1994)	10	10	Stat	1985	UE	CAFix	PTA	FTA Pacific Region	Indonesia	0.32			

First author (pub year)	No. of regions	No. of sectors	Time dimension	Benchmark year	Labour market closure	External closure	Scenario type	Description	Country /region	dL%/dTrade%	dL%/dTariff %pt	Reloc%/dTariff%pt	Reloc%/dTrade%
Lee (1994)	10	10	Stat	1985	UE	CAFix	Mulat	Multilateral Tariff Cut	Indonesia	0.37			
Lee (1994)	10	10	Stat	1985	UE	CAFix	PTA	FTA Pacific Region	Philippines	0.34			
Lee (1994)	10	10	Stat	1985	UE	CAFix	Mulat	Multilateral Tariff Cut	Philippines	0.30			
Morley (2008)	1	24	Dyn	1997	UE/WC	CAFix	PTA	FTA Central America	Honduras		0.28		
Morley (2006)	1	19	Stat	1996	UE	CAFix	PTA	FTA Americas	Mexico	0.15			
Morley (2004)	1	nr	Stat	1996	UE	CAFix	PTA	FTA Americas	Chile	0.00			
Morley (2004)	1	nr	Stat	1999	UE	CAFlx	PTA	FTA Americas	El Salvador	0.54			
Morley (2004)	1	nr	Stat	1997	UE	CAFlx	PTA	FTA Americas	Honduras	0.42			
Morley (2004)	1	nr	Stat	1998	UE	CAFlx	PTA	FTA Americas	Paraguay	0.89			
Morley (2004)	1	nr	Stat	1996	UE	CAFix	PTA	FTA Americas	Venezuela	0.22			
Robilliard (2005)	1	23	Stat	2002	UE	CAFix	Mulat	Multilateral Tariff Cut	Indonesia	0.18			

First author (pub year)	No. of regions	No. of sectors	Time dimension	Benchmark year	Labour market closure	External closure	Scenario type	Description	Country /region	dL%/dTrade%	dL%/dTariff %pt	Reloc%/dTariff%pt	Reloc%/dTrade%
Rutherford (1993)	1	39	Stat	1979	FE	CAFix	Unlat	Unilateral Tariff Cut	Morocco			0.15	
Rutherford (1993)	1	39	Stat	1980	FE	CAFix	Unlat	Unilateral Tariff Cut	Morocco			0.19	
Sanchez (2006)	1	17	Stat	1997	UE	CAFlx	PTA	FTA Americas	Costa Rica	0.21			
Siddiqui (2008)	1	12	Stat	1990	FE	CAFix	Unlat	Unilateral Tariff Cut	Pakistan			0.08	
Terra (2008)	1	23	Stat	2000	UE	CAFix	Unlat	Unilateral Tariff Cut	Uruguay		0.04		
Vasi (2006)	1	22	Stat	1994	UE	CAFix	PTA	FTA Americas	Peru	0.35			
Vos (2006)	1	17	Stat	1993	UE	CAFlx	PTA	FTA Americas	Ecuador	0.22			
Vos (1993)	1	17	Stat	1993	UE	CAFlx	Unlat	Unilateral Tariff Cut	Ecuador		0.10		
Xu (2000)	1	6	Stat	1991	FE	CAFlx	Unlat	Unilateral Tariff Cut	China			0.08	
Xu (1994)	1	3	Stat	1991	UE	CAFix	Unlat	Unilateral Tariff Cut	China		1.11		
Zhang (2004)	1	30	Stat	1998	UE	CAFlx	Unlat	WTO Accession	China	0.23	0.19		

Explanations:

Time dimension: Stat – Static model; Dyn: Dynamic model.
Benchmark year: Year of database used for the numerical calibration of the model.
Labour market closure: FE – Full employment: fixed labour endowments and flexible real wage; UE – Unemployment closure: infinitely elastic labour supply at a fixed real wage; Wage curve closure: Variable employment and variable real wage.
External closure: CAFix - Current account balance fixed at benchmark level; CAFlx: Current account flexible.
Scenario type: PTA – Preferential trade agreement; Unlat - Unilateral trade liberalisation; Mulat: Multilateral trade liberalisation.
Description: FTA – Free trade agreement or free trade area.
Country /region: Country or composite developing region to which the reported results refer.
dL%/dTrade%: Elasticity of aggregate employment with respect to the volume of trade (% change in aggregate employment / % change in volume of trade (real exports +real imports)).

First Author (Year)	No. Regions	No. Sectors	Time Dimension	Bench-mark Year	Labour Market Closure	External Closure	Scenario Type	Description	Country /Region	Impact on Tax Revenue	Compensatory Tax Change
Boysen (2008)	1	25	Stat	1999	FE	CAFix	PTA	EPA EU-Uganda	Uganda		TS +4% to +9%
Chan (2008)	1	17	Stat	1996	?	?	Unlat	Unilateral Tariff Cut	Vietnam		VAT +3.0%pts
Cho (2006)	1	11	Stat	2001	FE	CAFix	PTA	FTA USA-Ecuador	Ecuador		VAT +1.1%pt
Cling (2009)	1	31	Stat	2000	FE	CAFix	Mulat	WTO Accession	Vietnam	+0.9%	
Cling (2009)	1	31	Stat	2000	WC	CAFix	Mulat	WTO Accession	Vietnam	+1.5%	
Corong (2008)	1	35	Stat	2000	FE	CAFix	Unlat	Unilateral Tariff Cut	Philippines		TY +
Cororaton (2008)	1	12	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Philippines		TS +2.1%pts
Dissou (2002)	1	8	Dyn	1995	FE	CAFix	Unlat	Unilateral Tariff Cut	Senegal	-19.3%	
Dissou (2002)	1	8	Dyn	1995	FE	CAFix	PTA	West African Customs Union	Senegal	-6.9%	

Doanh (2009)	1	17	Stat	2000	FE	CAFlx	Unlat	WTO Accession	Vietnam	0.1%		dL%/dTariff %pt: Elasticity of aggregate employment with respect to average import tariff rate (% change in aggregate employment / %-point change in import-weighted average tariff rate). Reloc%/dTariff%pt: Percentage of total labour employment relocated intersectorally / %-point change in
Ianchovichina (2003)	18	25	Stat	1997	FE	CAFix	Mulat	WTO Accession	China		TC +1.9%	
Ianchovichina (2003)	18	25	Stat	1998	FE	CAFix	Mulat	WTO Accession	Taiwan		TC +0.8%	
Herault (2007)	1	43	Stat	2000	UE	CAFlx	Unlat	Unilateral Tariff Cut	South Africa		TY +0.8%	
Khan (1996)	1	5	Stat	1987	FE	CAFix	Unlat	Unilateral Tariff Cut	Bangladesh		VAT +8.1%pts	
Khondker (2008)	1	26	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Bangladesh		TP +55%	
Khondker (2008)	1	26	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Bangladesh		TY +300%	
Kowalski (2005)	36	10	Stat	2001	FE	CAFix	Mulat	Doha Round	Various		TC +	
Maliszewska (2004)	5	24	Stat	1997	FE	CAFix	PTA	Albania-EU	Albania	-		
Maliszewska (2004)	5	24	Stat	1997	FE	CAFix	PTA	Albania-South Eastern Europe	Albania	+		
Maliszewska (2004)	5	24	Stat	1997	FE	CAFix	PTA	Albania-EU and Sth Eastern Europe	Albania	-		
Maskus (1997)	1	38	Stat	1994	FE	CAFix	Unlat	Unilateral Tariff Cut	Egypt		TS +77%	
Maskus (1997)	1	38	Stat	1994	FE	CAFix	PTA	FTA EU-Egypt	Egypt		TS +123%	
Robilliard (2005)	1	23	Stat	2002	UE	CAFix	Mulat	Multilateral Tariff Cut	Indonesia		TS +17%	
Rutherford (1993)	1	39	Stat	1980	FE	CAFix	Unlat	Unilateral Tariff Cut	Morocco		TS +80 to 90%	
Sapkota (2008)	1	15	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Nepal		TS +1.6%pts	
Sapkota (2008)	1	15	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Nepal		or TP +1.8%pts	
Sapkota (2008)	1	15	Stat	1996	FE	CAFix	Unlat	Unilateral Tariff Cut	Nepal		or TY +2.7%pts	
Siddiqui (2008)	1	12	Stat	1990	FE	CAFix	Unlat	Unilateral Tariff Cut	Pakistan		TY +6%	

import-weighted average tariff rate.
Reloc%/dTrade%: Percentage of total labour employment relocated intersectorally / % change in volume of trade (real exports +real imports).

Tax impacts

Explanations:
Time dimension: Stat – Static model; Dyn: Dynamic model.
Benchmark year: Year of database used for the numerical calibration of the model.

Labour market closure: FE – Full employment: Fixed labour endowments and flexible real wage; UE – Unemployment closure: infinitely elastic labour supply at a fixed real wage; Wage curve closure: Variable employment and variable real wage.
External closure: CAFix - Current account balance fixed at benchmark level; CAFlx: Current account flexible.
Scenario type: PTA – Preferential trade agreement; Unlat - Unilateral trade liberalisation; Mulat: Multilateral trade liberalisation.
Description: FTA – Free trade agreement or free trade area.
Country /region: Country or composite developing region to which the reported results refer
Compensatory tax change: TS: Sales tax, TC: Consumption tax, VAT: Value-added tax, TY: Income tax; TP: Production tax

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