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Trade contraction in the global crisis:

**Employment and inequality effects in
India and South Africa**

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Preface

The primary goal of the ILO is to contribute, with member States, to achieve full and productive employment and decent work for all, including women and young people, a goal embedded in the ILO Declaration 2008 on *Social Justice for a Fair Globalization, and*¹ which has now been widely adopted by the international community.

In order to support member States and the social partners to reach the goal, the ILO pursues a Decent Work Agenda which comprises four interrelated areas: Respect for fundamental worker's rights and international labour standards, employment promotion, social protection and social dialogue. Explanations of this integrated approach and related challenges are contained in a number of key documents: in those explaining and elaborating the concept of decent work², in the Employment Policy Convention, 1964 (No. 122), and in the Global Employment Agenda.

The Global Employment Agenda was developed by the ILO through tripartite consensus of its Governing Body's Employment and Social Policy Committee. Since its adoption in 2003 it has been further articulated and made more operational and today it constitutes the basic framework through which the ILO pursues the objective of placing employment at the centre of economic and social policies.³

The Employment Sector is fully engaged in the implementation of the Global Employment Agenda, and is doing so through a large range of technical support and capacity building activities, advisory services and policy research. As part of its research and publications programme, the Employment Sector promotes knowledge-generation around key policy issues and topics conforming to the core elements of the Global Employment Agenda and the Decent Work Agenda. The Sector's publications consist of books, monographs, working papers, employment reports and policy briefs.⁴

The *Employment Working Papers* series is designed to disseminate the main findings of research initiatives undertaken by the various departments and programmes of the Sector. The working papers are intended to encourage exchange of ideas and to stimulate debate. The views expressed are the responsibility of the author(s) and do not necessarily represent those of the ILO.

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¹ See http://www.ilo.org/public/english/bureau/dgo/download/dg_announce_en.pdf

² See the successive Reports of the Director-General to the International Labour Conference: *Decent work* (1999); *Reducing the decent work deficit: A global challenge* (2001); *Working out of poverty* (2003).

³ See <http://www.ilo.org/gea>. And in particular: *Implementing the Global Employment Agenda: Employment strategies in support of decent work, "Vision" document*, ILO, 2006.

⁴ See <http://www.ilo.org/employment>.

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Abstract

The paper estimates the effects of the 2008-09 trade contraction on employment and incomes in India and South Africa, using social accounting matrices (SAMs) in a Leontief multiplier model. Employment results are presented at aggregate and industry levels and examine gender and skills biases. Income results examine inequality at the level of rural and urban household income quintiles. The most notable finding is that India and South Africa experienced substantial employment and income declines as a result of trade contraction with the EU and the US. A large share of these declines occurred in the non-tradeable sector and resulted from income-induced effects, illustrating how a shock originated in the tradeable goods sector had strong ripple effects throughout India and South Africa.

1. Introduction

“For most nations in the world...this is not a financial crisis – it is a trade crisis” – Richard Baldwin (2009a)

Even as the global crisis of 2008-09 was ravaging financial institutions in the U.S. and Europe, high-level Government officials in India and South Africa expressed confidence that their countries could escape relatively unscathed (Kuruville, 2008; Marais, 2009; Nachane, 2009). Their confidence was not unfounded, based as it was on their financial institutions being well regulated and supervised and also based on an appreciation of the channels through which the effects of other recent financial crises had been transmitted across borders. Indeed the effects of the global crisis would have undoubtedly been much worse in India and South Africa had their financial institutions not been as well run.

But the global crisis of 2008-09 was unprecedented in the role that trade played as a transmission channel, a result of what has been referred to as “The Great Trade Collapse” (Baldwin, 2009a). As Baldwin writes, “A few facts justify the label: The Great Trade Collapse”:

Global trade has dropped before – three times since WWII – but this is by far the largest [drop since WWII].... The great trade collapse is not as large as that of the Great Depression, but it is much steeper. It took 24 months in the Great Depression for world trade to fall as far as it fell in the 9 months from November 2008.... [I]mports and exports collapsed for the EU27 and 10 other nations that together account for three-quarters of world trade; each of these trade flows dropped by more than 20 percent from 2008Q2 to 2009Q2; many fell 30 percent or more. World trade in almost every product category was positive in 2008Q2, almost all were negative in 2008Q4 and all were negative in 2009Q1 (*ibid.*, p. 1-3).

That global trade would have fallen alongside global output is unremarkable. Yet real global output is estimated to have declined by 2.2 percent in 2009 and real global trade by 12.2 percent (World Bank, 2010; WTO, 2010). That global trade declined over five times more than global output is remarkable, unforeseen not just by the Governments of India and South Africa but also by economists.

The *ex post facto* efforts of a number of economists to come to terms with the causes of the “Great Trade Collapse” resulted in an edited volume of this name (Baldwin, 2009b). Baldwin’s introductory chapter argues that there is an emerging consensus on the importance of the “compositional effect” and the “synchronicity effect.” The “compositional effect” describes how the demand shock associated with the crisis focused on “postponeable” consumer durable and investment goods, including electrical and non-electrical machinery, transport equipment, chemicals, steel and other metal products and raw materials. Since these goods make up a much larger share of traded goods than GDP, a given change in the demand for them would have a much larger effect on trade than on GDP.⁵ The “synchronicity effect” describes how the expansion of global production networks – characterized by just-in-time supply of intermediate inputs – caused the effects of falling export demand to be rapidly transmitted across borders.

Opposite to the “synchronicity effect” and influential in the early days of the crisis is the notion of “decoupling,” based on evidence that patterns of cyclic volatility in developed and emerging economies had become increasingly independent (Kose *et al.*, 2008). While the

⁵ Cf. Levchenko *et al.*, 2009 and Francois and Woerz, 2009 for supporting empirical evidence for the U.S. and China.

evidence on cyclic volatility has been called into question in its own right (Wälti, 2009), additional evidence shows the extent to which trade and investment between developed and emerging economies have become increasingly interdependent, consistent with the expansion of global production networks (Athukorala and Kohpaiboon, 2009; Kim *et al.*, 2009; Pula and Peltonen, 2009). Rather than decoupling, in other words, this evidence argues in favour of “recoupling.”

In a speech given in February 2009, the Governor of the Reserve Bank of India Duvvuri Subbarao provided a vivid sense of the disjuncture between the anticipated and actual effects of the crisis in India:

There is, at least in some quarters, dismay that India has been hit by the crisis. This dismay stems from two arguments. The first argument goes as follows. The Indian banking system has had no direct exposure to the sub-prime mortgage assets or to the failed institutions. It has very limited off-balance sheet activities or securitized assets. In fact, our banks continue to remain safe and healthy. So, the enigma is how can India be caught up in a crisis when it has nothing much to do with any of the maladies that are at the core of the crisis. The second reason for dismay is that India's recent growth has been driven predominantly by domestic consumption and domestic investment. External demand, as measured by merchandize exports, accounts for less than 15 per cent of our GDP. The question then is, even if there is a global downturn, why should India be affected when its dependence on external demand is so limited? (Subbarao, 2009).

As to why India was hit hard by the crisis in spite of mitigating factors, Subbarao cited globalization, in particular India's increased openness with respect to foreign investment and trade. The point is elaborated by Kumar and Alex, who write, “Indian exports fell in line with global trade flows. This should firmly dismiss the decoupling myth for the Indian economy. Collapsing foreign trade, capital flows, and exchange rate movements all transmitted negative impacts to the India economy” (2009, p. 221).

World trade began to recover in late-2009, and the WTO projects it will grow by 9.5 percent in 2010 (Baldwin, 2009a; WTO, 2010). It might be thought, in this regard, that studying the effects of trade contraction in the crisis is of only passing concern. Yet even short-lived shocks may have long-lasting consequences, so-called “scarring effects.” This is all the more so in countries like India and South Africa where large numbers of people have limited means to cope with temporary losses of work and income. Such losses may mean that some families are unable to keep their children in school, lowering long-run educational attainment in the country (ILO, 2010). They may mean home mortgage foreclosures or the inability to maintain premium payments for social insurance (Cameron, 2010). There is also evidence that the trade collapse weakened the bargaining positions of workers as well as of developing country governments with respect to natural resource concession agreements, both having potential long-run implications (Jansen and von Uexkull, 2010). More generally, studying the effects of the trade shock can provide a fuller appreciation of the potential costs associated with greater trade openness, which policymakers can set against the gains from trade.

The paper estimates the effects of trade contraction in the global crisis on employment and incomes in India and South Africa, using social accounting matrices (SAMs) in a Leontief multiplier model in which the change in demand is represented by the change in exports from India and South Africa to the EU and US. This modelling approach provides a *ceteris paribus* result, for which the effects of trade contraction are to a large extent isolated from other simultaneous events, both potentially negative (e.g., foreign investment) and positive (e.g., Government crisis responses). This can facilitate a clearer sense of the relative importance of the various transmission channels of the global crisis, with estimated employment changes resulting from trade contraction providing a useful point of comparison with actual employment changes during the crisis.

Different industries and types of workers may have been differently affected by trade contraction, and such distinctions can usefully inform Government crisis responses. As such, this paper evaluates employment impacts at aggregate and industry levels, with breakdowns by gender

and skills, and evaluates income effects for rural and urban households by income quintiles. These results are discussed with reference to trade policy and patterns in India and South Africa as well as actual changes in employment in the two countries during the crisis, along with aspects of Government crisis responses.

2. Trade policy and patterns

Both India and South Africa are noteworthy for their rapid pace of trade liberalization and because they figure importantly in debates on the role of trade liberalization in economic development.⁶ Regarding India, Kumar and Mishra write that “the 1991 trade reform...represented one of the most dramatic trade liberalizations ever attempted in a developing country” (2005, p. 4). Trade liberalization in India began in the mid-1980s and accelerated after the balance-of-payments crisis of 1990-91. In response to the crisis, the India Government requested stand-by assistance from the International Monetary Fund (IMF) and a structural adjustment loan from the World Bank. IMF and World Bank support was made conditional on a wide range of economic reforms, including trade liberalization as embodied in the Government’s Export-Import Policy of 1992-97 (Toplova, 2005; Menon and Rogers, 2008). Between 1990 and 2000, the share of imports subject to non-tariff barriers declined from 82 to 17 percent and average tariffs for manufactured goods declined from 117 to 39 percent (Kumar and Mishra, 2005, p. 4). By 2005, average tariffs in India had declined to 19 percent for all goods, 38 for agricultural goods, and 16 percent for non-agricultural goods (UNCTAD/WTO, 2007).

Regarding South Africa, Qualmann writes that the country “has rapidly opened up its domestic markets over the past decade, both by eliminating non-tariff barriers and by substantially lowering nominal tariffs” (2008, p. 23). A turning point was the election of the African National Congress (ANC) in 1994 and the Government’s desire to re-enter the global stage after years of increasing isolation under apartheid. Trade liberalization was manifested in the country’s signing of the Marrakesh Agreement of the General Agreement on Tariffs and Trade (GATT) in 1994 and becoming – along with India – a founding member of the World Trade Organization (WTO) in 1995. Trade liberalization was also a key component of the Government’s Growth, Employment and Redistribution (GEAR) strategy, in place from 1996 to 2006 (Hayter *et al.*, 2001; Qualmann, 2008). Between 1992 and 2000, average tariffs declined from 28 to 7 percent and peak tariffs declined from 1,390 to 55 percent (Qualmann, 2008, p. 37). As of 2006, average tariffs in South Africa were 8 percent for all goods, 9 for agricultural goods, and 8 percent for non-agricultural goods (UNCTAD/WTO, 2007).

Shown in Figure 1 for the two countries is total trade (exports plus imports) of goods and services as a percentage of GDP – that is, *de facto* trade openness. By this measure, India had been much less open than South Africa, yet there was convergence between the countries up to the early-1990s, after which openness increased in both countries, from about 20 to 45 percent in India and 40 to 65 percent in South Africa. That is, both countries saw a 25 percentage point increase in *de facto* trade openness in just a decade and a half, indicating a dramatic change in their engagement with the world economy.

During this period of rapid increase in trade openness, India’s and South Africa’s global trade balances also worsened, with net exports of goods and services turning negative for both countries, as shown in Figure 2. Even before the crisis, in other words, India’s and South Africa’s trade patterns gave cause for concern. There were, at the same time, important differences between the countries, with India’s trade balance with both developed and developing countries having worsened in recent years and with South Africa’s trade balance having worsened with

⁶ See, for example, Rodrik and Subramanian (2005), Rodrik (2008), and Krueger (2008) for competing views on the role of trade liberalization in economic development in India and South Africa.

developing countries but improved with developed countries (UN Comtrade, 2007). Moreover, India relied more on domestic inputs and South Africa more on imported inputs for export production, differences that would shape how trade contraction affected them (Frye, 2009; Kumar and Vashisht, 2009).

Because of the limited availability of recent export data at a detailed industry level for India and South Africa, our study is based on mirror data on imports from the two countries reported by the EU and US. Yet these are important markets for Indian and South African exports and so provide a useful if partial account of the effects of the crisis through trade contraction. Regarding South Africa, the point is made by Marais as follows: “Ultimately, a recovery depends primarily on developments in South Africa’s main trading partners in Europe and North America” (2009, p. 3).⁷ The Rand also appreciated strongly against the Euro and US Dollar during the crisis, and exchange rate policy was widely debated in the country (Marais, 2009; SAPA, 2010). Shown in Figures 3 and 4 are exports (in constant prices) from India and South Africa to the EU and US from January 2003 to April 2009, the latter coinciding with the end of “The Great Trade Collapse.” For India, there was a substantial decline in exports from early 2008 on, driven more by trade with the US; for South Africa, the decline was sharper, driven more by trade with the EU. These differences in export patterns with respect to the EU and US are reflected, we will see, in our employment results.

3. Method

A social accounting matrix (SAM) is a representation of national accounts showing the two-way flows of economic transactions in a country. SAMs for India and South Africa – for 2003/4 and 2000, respectively – are used in a Leontief multiplier model to estimate the effects of the 2008-09 trade contraction. The analysis was conducted using both Type I and Type II multipliers, though the presentation focuses more on results using Type II multipliers. Type I multipliers address the direct effects of trade contraction on incomes and employment as well as indirect effects through forwards and backwards production (input-output) linkages. In addition to these direct and indirect effects, Type II multipliers address income-induced effects resulting from changes in household expenditures.

For employment, the Leontief multiplier model is defined as:

$$\mathbf{L} = \hat{E} [(\mathbf{I} - \mathbf{A})^{-1} \mathbf{T}],$$

where,

\mathbf{L} = the vector of changes in industry-level employment associated with the changes in trade, expressed as full-time equivalent (FTE) jobs lasting one year,

\hat{E} = the diagonal matrix of industry-level labour coefficients (employment per unit of output),

\mathbf{I} = the identity matrix,

\mathbf{A} = the average propensity to spend matrix, and

\mathbf{T} = the industry-level export demand vector.

Because the SAMs for India and South Africa provide separate commodity accounts (including imports) and production accounts (excluding imports), \mathbf{T} enters the model through the commodity account and impacts the domestic economy (i.e., domestic incomes and employment) through the production account.

⁷ Similarly, Assubuji and Luckscheiter write: “How the recession in South Africa further develops will depend on the economic performance of its key trading partners such as the United States, the European Union and China” (2009, p. 1).

T is constructed in two ways. **T1** is defined for each industry as the difference in exports between early-2008 and early-2009, coinciding with “The Great Trade Collapse.” More specifically, **T1** represents the annualized difference in exports between the three-month period from February-April of these years, shown by the shaded bars in Figures 3 and 4. Because industry values for **T1** are mainly negative, using **T1** in the Leontief multiplier model yields estimates of what we define as “jobs lost” during the crisis as a result of trade contraction. **T2** is constructed by assuming that were it not for the crisis, exports would have continued to grow at the same rate to February-April of 2009 as they had in previous years. We base this on industry-level export growth for the years 2004 to 2006 and exclude the years 2007 to 2008 to filter out possible effects of commodity and food price shocks during this latter period. **T2** is then defined for each industry as the annualized difference between this hypothetical level of endpoint exports and actual exports in February-April of 2008. As with **T1**, industry values for **T2** are for the most part negative, resulting from most industries’ favourable export growth prior to the crisis, particularly in India. In this sense, using **T2** in the model yields estimates of what we define as “jobs not created” during the crisis as a result of trade contraction.⁸

Results are presented according to two scenarios based on **T1** and **T2**:

- **Scenario A** refers to estimated “jobs lost” (based on **T1** by itself).
- **Scenario B** refers to the estimated sum of “jobs lost” and “jobs not created” (based on **T1** plus **T2**).

Income inequality results too are presented in terms of scenarios A and B, on the understanding that these results are defined with respect to household income rather than jobs.

Studies using similar methods to estimate the effects of trade on employment and incomes generally construct a trade demand vector based not on changes in exports but rather on changes in net exports (exports minus imports) relative to domestic production or domestic production for final demand plus imports (or plus net imports) (e.g. Sachs and Shatz, 1994; Wood, 1994; Kucera and Milberg, 2003). In other words, these studies estimate the effects of a changing *structure* of trade. It might be argued, on these grounds, that we overestimate the effects of the crisis, since imports into India and South Africa also declined during the period we evaluate.

We do not expect this to be a concern for scenario A, since these earlier studies were evaluating the employment impact of trend changes in the structure of trade. Trend changes in the structure of imports could be expected to have predictable effects on domestic income and employment because of substitutions between imported and domestically-produced goods. But this would not hold for an import shock, given the associated instability and uncertainty and the fact that import declines were driven by a reduction in total demand rather than substitutions between imports and domestically-produced goods. Unlike scenario A, however, scenario B is based on extrapolating a trend from a period in which *net* exports declined markedly in both India and South Africa, as shown in Figure 2, and where export growth is consistent with job loss resulting from trade expansion (Kucera and Roncolato, forthcoming). In this sense, results based on **T2** could be regarded as *gross* jobs not created rather than *net* jobs not created. On these grounds, we regard scenario A results as more definitive and rely more on them in our presentation.

T1 and **T2** are constructed from exports from India and South Africa to the EU and the US. In addition to the breakdowns between scenarios A and B and between exports to the EU and the

⁸ Note that our method differs from that of an UNCTAD study for India also using input-output analysis (UNCTAD, 2009). The UNCTAD study uses export data for 2006-07 and 2007-08 to estimate employment projections for 2008-09, 2009-10 and 2010-11.

US, employment results are further broken down between male and female workers and between more and less educated workers. In this sense, the paper evaluates the effects of trade expansion on employment inequality as well as income inequality. We use data on less educated workers as a proxy for less skilled workers, with less educated workers defined as those having no more than lower secondary education, equivalent to eight years of education in India and nine years in South Africa.

Though the Leontief multiplier model has been widely used in the literature on trade and employment, it nonetheless has well-known limitations, in particular that it is linear and non-dynamic. This study does not, for example, address positive dynamic effects through economic growth or negative dynamic effects through trade-induced labour-displacing technical change (Jonsson and Subramanian, 2001; Wood 1995). Yet we do not regard these as serious limitations on our estimates, given the short time frame considered and the contractionary effects of the crisis more generally. Note also that \hat{E} is based on employment and output data for SAMs base years, which precede the crisis by several years. Given trends towards labour-displacing technical change (more output with less employment), this suggests that our employment estimates are somewhat overestimated in this regard.

The scope of the study is necessarily limited by the databases used in the analysis. The SAMs and labour force surveys used cover both formal and informal establishments and workers, and in this sense are comprehensive. But our trade data for the EU (from Eurostat) and the US (US International Trade Commission) do not include trade in services. From 1990 to 2006, trade in services increased as a percentage of GDP from 3 to 15 percent in India and 5 to 10 percent in South Africa (WB/WDI, 2009). While trade in services during the crisis has been referred to as “the collapse that wasn’t,” service exports did decline substantially for India, though not as much as merchandise exports (Borchert and Mattoo, 2009; Kumar and Alex, 2009). In this sense, our study underestimates the effects of trade contraction in the crisis. Our study does, however, address the indirect and income-induced effects of trade contraction on service industries, which turn out to be substantial. For the sake of expediency, we define tradeable goods industries as those for which we have trade data and define all other industries as non-tradeable, including service industries. These are delineated below in industry-level results.

Further notes on data sources and definitions as well as data cleaning procedures for the construction of **T1** and **T2** are provided in an appendix, and export demand vectors (for the EU and US), labour coefficients (relative to the country average), Type II income multipliers, and industry-level data on output, employment and trade openness are shown in Appendix Table 1.

4. Employment results

4.1. Country-level results

In developing countries with extensive informal employment and underemployment, the estimation of changes in employment via changes in production is not straightforward. This holds particularly for India, where as of 1999-2000, the vast majority of workers were in the “unorganized” sector – 77 percent in urban areas and 95 percent in rural areas (Sakthivel and Joddar, 2006). In this sense, what we refer to as employment declines may in fact translate into movements from formal into informal employment or increases in underemployment, but in any case means a negative impact for workers on average through some combination of employment declines and losses of income. For example, a study of 41 middle-income countries (including South Africa but not India) finds that workers in most of these countries were affected more

through earnings than employment (Khanna, *et al.*, 2010).⁹ These qualifications should be born in mind when considering the following results.

Country-level employment results based on Type II multipliers are presented in absolute and relative terms in Table 1 for scenarios A and B, respectively. That is, this table shows the number of FTE jobs and the number of such jobs as a percentage of SAMs base year employment, broken down between trade with the EU and US and between what we define as tradeable goods and non-tradeable industries, based on the availability of trade data.

For India taking trade with the EU and US together, employment declines are estimated to be 3.9 million FTE jobs for all industries based on scenario A and 10.1 million based on scenario B – equivalent to 1.1 and 3.2 percent of base year employment. That is, trade contraction during the crisis is estimated to have resulted in 3.9 million “jobs lost” and an additional 6.2 million “jobs not created,” as we have defined these. The large estimate for “jobs not created” reflects the rapid growth of exports from India prior to the crisis. Employment declines are driven more by trade with the US than the EU. Estimated employment declines for non-tradeable industries are substantial, even though these do not include direct trade effects for these industries. These are equivalent to 17.6 and 19.1 percent of estimated employment losses for all industries based on scenarios A and B respectively.

For South Africa taking trade with the EU and US together, employment declines for all industries are estimated to be 886,000 FTE jobs based on scenario A and 963,000 based on scenario B. That is, trade contraction is estimated to have resulted in 886,000 million “jobs lost” and an additional 77,000 “jobs not created.” Though absolute employment declines are much lower for South Africa than India, relative declines are much higher, equivalent to 7.2 and 7.8 percent of base year employment based on scenarios A and B respectively. In contrast with India, employment declines are driven more by trade with the EU than the US. Estimated employment declines for non-tradeable industries are also relatively higher for South Africa, equivalent to 41.3 and 42.5 percent of estimated employment declines for all industries based scenarios A and B respectively.

How important were income-induced effects versus direct and indirect effects in accounting for these findings? Results based on Type I multipliers are presented in absolute and relative terms in Table 2 for scenario A. Additionally presented are Type I multiplier employment effects as a share of Type II multiplier employment effects, shown in the bottom panel. Income induced employment effects as a percentage of total employment effects (based on Type II multipliers) are therefore equal to 100 minus the percentage shown in this bottom panel. For India, taking EU and US trade together, the share of total employment effects resulting from income-induced effects is about one-half for tradeable goods industries, two-thirds for non-tradeable industries, and one-half for all industries; for South Africa, the comparable shares are about one-third for tradeable goods industries, two-thirds for non-tradeable industries (essentially the same as for India), and just over 40 percent for all industries.

Income induced effects play an important role in accounting for employment declines resulting from trade contraction in the crisis. It is worth noting, in this regard, that income

⁹ This overall pattern did not hold, however, for South Africa, which had similar percentage declines in the wage bill and employment, along with the sixth highest percentage decline in employment among the 41 countries (Khanna *et al.*, 2010). Note also that for South Africa, the share of informal employment *declined* overall between the second quarter of 2008 and the third quarter of 2009, with the informal sector accounting for a higher share of job losses until the third quarter of 2009, when this pattern reversed (Verick, 2010). As Verick writes, “This suggests that adjustment in the informal sector has been more rapid while employers in the formal sector are only more recently resorting to layoffs to cope with reduced demand” (*ibid.*, p. 5).

induced effects likely make up a higher share of total effects in poorer countries, a result of the combination of Engel's Law (with high shares of income spent on food) and low labour productivity in agriculture. For this we provide further detail in our discussion of agriculture in industry-level results. The implication is that analyses relying only on Type I multipliers provide a systematically less complete picture of total effects in poorer than richer countries. Also worth remark is the much lower share of Type I multiplier employment estimates in tradeable goods industries resulting from indirect effects in India (27 percent) than South Africa (53 percent). This is consistent with India's greater reliance on domestic inputs for export production and South Africa's greater reliance on imported inputs.

In sum, we estimate that India and South Africa experienced sizeable employment declines as a result of trade contraction with the EU and US during the 2008-09 global crisis, even based on our more conservative scenario A. In India and especially South Africa, a large share of these employment declines occurred in non-tradeable industries through indirect and income-induced effects originating from tradeable goods industries. Income-induced effects also accounted for sizeable shares of estimated employment losses in tradeable goods industries. An important policy consideration is that even if a country's financial institutions were relatively protected from the turmoil of the crisis, employment and incomes may be hit hard nonetheless through resulting trade contraction, with strong ripple effects throughout the economy.

4.2. Industry-level results

Country studies evaluating the industry-level effects of trade liberalization on employment commonly find patterns of winning and losing industries. Such patterns are consistent with the playing out of differences – within and among countries – in industry competitiveness in the face of market opening. Which will be a country's winning and losing industries is a central question of trade theory. As the WTO's *World Trade Report 2008* puts it, “[m]ost trade models are designed to answer two closely related questions: what goods do countries trade and why” (WTO, 2008, p. 27).

Yet “The Great Trade Collapse” is a fundamentally different phenomenon than trade liberalization, and there is less of a foundation for developing theoretical priors about industry-level effects. The “compositional effect” can provide useful guidance in this regard, however, describing as it does particularly rapid trade declines for “postponeable” consumer durable and investment goods (Baldwin, 2009a). Trade patterns for India and South Africa provide some support for the “compositional effect.” For example, the three industries with the greatest drop in exports to the EU and US (taken together) can be classified as “postponeable” consumer durable and investment goods (Appendix Table 1, based on scenario A). Indeed these are the same three industries in both countries: iron, steel and non-ferrous metals; non-electrical machinery; and misc. manufacturing (the last including jewelry and precision instruments). Yet not all industries fit neatly into this pattern, for there were increases in exports of chemicals for both India and South Africa, and large declines in exports of agriculture and manufactured food products for India. Moreover, the effect of industry-level changes in exports on industry-level changes in employment is somewhat roundabout, mediated as it is by indirect and income-induced effects as well as by differences in the labour-intensity of production across industries.

Industry-level results based on Type II multipliers are shown for India and South Africa in tables 3 and 4 respectively, expressed in absolute terms for trade with the EU and US separately and together and in relative terms for the EU and US together. Also shown are percentages of female and less-educated workers in SAMs base years. The upper panel of these tables show tradeable goods industries, with manufacturing industries shaded, and the lower panel shows non-tradeable industries. For the sake of brevity, we focus on scenario A results, with scenario B results shown in Appendix Tables 2 and 3.

For India looking at trade with the EU and US together, only two of 37 industries (23 of these tradeable goods industries) are estimated to gain employment: fishing and rail equipment

and other transport equipment, with estimated increases of about 18,000 and 12,000 jobs respectively, small in comparison to overall estimated employment declines.

In absolute terms, agriculture had far and away the largest estimated employment declines, accounting for 2.2 million of the estimated 3.9 million jobs lost economy wide. As noted above, given extensive informal employment and also subsistence agriculture in India, these estimated job losses would be made manifest in a combination of job loss and loss of income. Because the agricultural sector in India is so large, however, estimated employment declines from trade contraction relative to 2003/4 employment are actually somewhat smaller than for the economy as a whole (1.07 versus 1.10 percent).

Note that these results are based on a Type II multiplier, which accounts for income induced effects on top of direct and indirect effects. Applying a Type I multiplier indicates that 780,000 of the 2.2 million estimated employment decline in agriculture results from direct and indirect effects, with the difference of 1.4 million resulting from income induced effects. For the economy as a whole, applying a Type I multiplier indicates that 1.9 million of the 3.9 million estimated employment decline results from direct and indirect effects, with the difference of 2.0 million resulting from income induced effects (Table 2). Focusing on income induced effects, comparing the 1.4 million for agriculture with 2.0 million for the economy as a whole means that about 70 percent of economy-wide income induced effects is accounted for by the agriculture alone. This supports the notion that income induced effects make up a higher share of total effects in poorer countries, a result of a combination of Engel's Law and low labour productivity in agriculture. Note that in both India and South Africa, the labour intensity of agriculture was five times higher than for the economy as a whole (Appendix Table 1).

In relative terms, the industries with the largest estimated employment declines in India are misc. manufacturing, which includes gems and jewelry (7.8 percent of 2003/04 employment), jute, hemp and mesta textiles (4.3 percent, though with small absolute declines), iron, steel and non-ferrous metals (3.9 percent), non-electrical machinery (3.2 percent), furniture and wood products (3.2 percent) and metal products (3.1 percent). Some of these industries are of a similar type, such as iron, steel and non-ferrous metals, metal products and non-electrical machinery, all metal-based heavy industries. But these industries vary in other respects. For example, while furniture and wood products is labour-intensive and reliant on less educated workers, non-electrical machinery is capital-intensive and skills-intensive (Table 2, Appendix Table 1).

For South Africa, only construction had estimated employment gains, with a small increase of 4,000 jobs. As with India, agriculture (grouped together with hunting, forestry and fishing) had the largest absolute employment declines, with an estimated 241,000 jobs lost, equivalent to 11.6 percent of 2000 employment. In contrast with India, however, there was an increase in agriculture exports to the EU and US, taken together (Appendix Table 1, scenario A).¹⁰ Using a Type I multiplier indicates that 145,000 of the estimated jobs lost in agriculture result from (positive) direct and (negative) indirect effects, with the difference of 96,000 resulting from (negative) income induced effects. For the economy as a whole, 511,000 of the 886,000 estimated jobs lost result from direct and indirect effects and the balance of 375,000 from income induced effects (Table 2). So about one-fourth of economy-wide income induced employment declines result from agriculture, a sizeable share but less than the comparable figure of 70 percent for India.

¹⁰ Note that there was also an increase in exports from the food processing and beverages and tobacco product industries to the EU and US, taken together, which relied heavily on inputs from agriculture (Appendix Table 1, Scenario A). These positive trade effects were more than offset by negative trade effects from the textiles, rubber and plastic products, and furniture industries, which also relied heavily on inputs from agriculture.

In relative terms, the industries with the largest estimated employment declines are wood products (an impossibly high 141.5 percent of 2000 employment¹¹), glass products (60.9 percent), printing and publishing (35.5 percent) and metal products (29.6 percent). As with India, these industries vary widely in terms of their labour-intensity and skills-intensity. For example, wood products is labour-intensive and reliant on less educated workers whereas metal products is capital-intensive and skills-intensive (Table 3, Appendix Table 1).¹²

4.3. Gender and skills bias results

There are large literatures on skills and gender biases of trade liberalization (e.g. WTO, 2008; van Staveren *et al.*, 2007). Much of the skills bias literature is motivated by the Heckscher-Ohlin theorem regarding relative factor endowments as determinants of comparative advantage, with developing countries generally posited to have a comparative advantage in unskilled labour-intensive goods with respect to developed country trading partners. The question of gender bias too can be motivated along these lines, for women are commonly overrepresented among less educated workers as well as in such export-oriented labour-intensive industries as clothing and footwear.¹³ In India and South Africa, women and less educated workers are indeed disproportionately concentrated in labour intensive industries. More specifically, there are positive correlations between labour coefficients and the percentages of female and less-educated workers, though with generally weaker relationships for India than South Africa, as shown in Table 5. In the context of the crisis, the “compositional effect” may also come into play, depending on the representation of women and less-educated workers in “postponeable” consumer durable and investment goods industries. For example, the percentage of female and less-educated workers is lower than average in the non-electrical machinery and iron, steel and non-ferrous metal industries in both India and South Africa (Tables 3 and 4).

We evaluate the extent of gender and skills bias by comparing the percentages of female and less-educated workers in the SAMs base years with the percentages of female and less-educated workers estimated to have lost jobs as a result of trade contraction in the crisis. Breakdowns between male and female and more and less educated workers are based on the assumption that employment changes are proportionate to actual shares of employment in the SAMs base years.¹⁴ Regarding employees, for example, we assume that employers do not make distinctions by gender or education in the face of employment changes, maintaining the same proportions of men and women and more and less educated workers. This is, of course, a rather strong assumption, and there is a literature on how firms’ hiring and firing patterns may differ for men and women and more and less skilled workers over economic fluctuations (e.g., Rubery, 1988; Kucera, 2001;

¹¹ Such a result can arise from the heterogeneous nature of the wood products industry and a subsequent mismatch between the labour intensity of production for export to the EU and US compared with the average labour intensity of production in the industry. In addition, the number of workers in the industry may have increased between 2000 (the year of the South Africa SAM) and the crisis.

¹² With respect to the labour intensity of production, one way of addressing this is by looking at the correlation between export demand vectors and labour coefficients, that is, between \mathbf{T} and the diagonal elements of \hat{E} . For India, there is effectively no correlation between these variables, with a Pearson correlation coefficient of 0.07, based on scenario A for exports to the EU and US together. For South Africa, there is also effectively no correlation, with a comparable Pearson correlation coefficient of 0.16.

¹³ In India, 94 percent of women have no more than lower secondary education, compared with 87 percent of men as of 2003/04; in South Africa, the figures for women and men are nearly equal, with 43 percent of women and 42 percent of men having no more than lower secondary education as of 2000.

¹⁴ E.g., if trade contraction is estimated to have resulted in a loss of 500 jobs in an industry in which one-fourth of workers are female, these 500 jobs are broken down into 375 male and 125 female jobs.

Leung *et al.*, 2009). In this sense, a precise interpretation of our results on gender and skills bias is that they illustrate whether *industries* in which women and less educated workers are disproportionately represented are particularly affected by job loss as a result of trade contraction in the crisis.

Results are shown in Figure 5 regarding gender bias and Figure 6 regarding skills bias. We present results based on scenario A for all industries and for EU and US trade together. Regarding gender bias for India, an identical percentage of women workers, 27.9 percent, is estimated to have lost jobs as the actual percentage of women workers in 2003/04. That is, there effects of the crisis through the channel of trade contraction are estimated to be gender neutral.

For South Africa a somewhat lower percentage of women workers is estimated to have lost jobs than the actual percentage of women workers in 2000, 40.7 to 43.1 percent. For the economy as a whole, then, there is a gender bias in favour of women workers as a result of trade contraction in the crisis. That is, industries in which women were disproportionately concentrated were less affected by the decline in exports to the EU and US. Though the difference of 2.4 percentage points is not large, it is consistent with the results of two prior studies assessing the effects of the crisis on employment in South Africa using labour force survey data (Leung *et al.*, 2009; Verick, 2010).

Regarding skills bias for India, a slightly higher percentage of less educated workers is estimated to have lost jobs than the actual percentage of less educated workers in 2003/04, 89.6 to 88.7 percent. This might indicate a small bias against less educated workers as a result of trade contraction in the crisis, but we regard this finding as inconclusive given the magnitude of the gap and the absence of corroborating studies.

For South Africa, a higher percentage of less educated workers is estimated to have lost jobs than the actual percentage of less skilled workers in 2000 in these industries, 47.6 to 42.6 percent. That is, industries in which less educated workers were disproportionately concentrated were hit harder by trade contraction in the crisis. As with the finding on gender bias, this is consistent with the results of two other studies (Leung *et al.*, 2009; Verick, 2010).

In sum, for India we estimate that there was no gender or skills bias in employment resulting from trade contraction in the crisis. In South Africa, there was somewhat of a gender bias in favour of women workers and a stronger bias against less educated workers. The result on gender bias in favour of women workers during the crisis is usefully set against a prior study's findings of gender bias against women workers during the period of trade liberalization from 1993 to 2006 (Kucera and Roncolato, forthcoming). An important determinant of the gender bias against women workers prior to the crisis was the large numbers of jobs lost in the clothing industry as a result of trade expansion with developing countries, combined with the high share of women workers in the industry. This same study also found no skills bias against less educated workers during the period of trade liberalization prior to the crisis. In this sense, both the gender and skills biases observed in South Africa as a result of the 2008-09 trade contraction represent breaks from previous trends.

5. Income inequality results

Shown in Figures 7 and 8 for India and South Africa, respectively, are the estimated impacts of trade contraction on household income distribution relative to SAMs base year incomes, based on scenario A. Scenario B results shown in Appendix Figures 1 and 2 and are similar to scenario A results in terms of distribution, but are higher by factors of about 2.5 for India and 1.1 for South Africa. The larger difference for India results from its more rapid export growth prior to the crisis. Breakdowns are shown within urban and rural areas by household income quintiles as well as for between urban and rural areas more broadly, as well as between EU and US trade.

For India, there is little difference between rural and urban areas as well as for households within these areas, with trade contraction with the EU and US estimated to have reduced income

by between 0.7 to 0.8 percent relative to 2003/04 income. Consistent with employment results, income effects are driven more by trade with the US than the EU.

For South Africa, there is also little difference between rural and urban areas. But the effects of trade contraction on incomes are consistently weaker for lower income quintiles, indicating that world trade acted to reduce income inequality in the sense that poorer households lost less. For the poorest income quintiles, trade contraction with the EU and US is estimated to have reduced incomes by 3.1 percent in rural areas and 3.6 percent in urban areas, relative to 2000 income; for wealthiest incomes quintiles, the respective figures are 4.8 and 4.9 percent. Consistent with employment results, income effects are driven more by trade with the EU than the US.

Worth remarking is the similar effect in rural and urban areas of trade contraction on household incomes.¹⁵ As with the large employment effects in both tradeable goods and non-tradeable industries, this illustrates the wide-ranging impact of the crisis in India and South Africa through the channel of trade contraction.

6. Comparison with actual changes in employment and Government crisis responses

“The Great Trade Collapse” may have been the most important transmission through which India and South Africa were affected by the crisis, but it was not the only channel. Foreign capital flows and exchange rates also came into play, and conversely the negative effects of all transmission channels were offset to an extent by Government crisis responses (Alex and Kumar, 2009; Leung *et al.*, 2009). Our employment estimates are based on the effects of trade contraction only, further limited to trade with the EU and the US. In this sense, comparing our estimated changes in employment with actual changes in employment is an incomplete exercise. It can be a useful exercise, nonetheless, in providing a consistency check on directions of change and orders of magnitude. Already noted, in this regard, is the consistency between our results for South Africa on gender and skills bias and findings of other studies on the overall impacts of the crisis on employment (Leung *et al.*, 2009; Verick, 2010).

We have also noted that – especially for India – our estimated employment declines may in reality mean movements from formal to informal employment or increases in underemployment. Strikingly, for South Africa the share of informal employment *declined* overall between the second quarter of 2008 and the third quarter of 2009, with the informal sector accounting for a higher share of job losses until the third quarter of 2009, when this pattern reversed (Verick, 2010). As Verick writes, “This suggests that adjustment in the informal sector has been more rapid while employers in the formal sector are only more recently resorting to layoffs to cope with reduced demand” (*ibid.*, p. 5).

For India, comprehensive labour force surveys for the period of the global crisis were not available as of mid-2010, making it difficult to have a definitive sense of overall employment changes. The Government did carry out establishment surveys in eight industries that reportedly account for 60 percent of India’s GDP as of 2007-08, though these were “quick” small sample surveys addressing mainly formal employment (Government of India; ILO, 2010b). Notably, the

¹⁵ For South Africa, this finding may seem surprising in light of the estimates of larger than average relative employment losses in agriculture resulting from trade contraction (Table 4). However, there is a compositional difference between rural household incomes and agriculture, defined by non-farm rural employment as well as income earned by members of rural households in urban areas. Perhaps more fundamentally, any given change in agricultural income has a disproportionately large employment effect, given the sector’s relatively high labour intensity (Appendix Table 1).

surveys did not include agriculture, which accounted for 57 percent of employment in India as of 2005 (NSSO, 2006). Based on these surveys, there were estimated employment declines in the second quarter of 2009 of 131,000 workers for the eight industries taken together. Yet employment increased overall in these industries by 1,060,000 workers between the first quarters of 2009 and 2010. Worth noting in this regard is that while India's exports to the world declined precipitously during "The Great Trade Collapse," they began to pick up after the second quarter of 2009 (Kumar and Alex, 2009).

Results of the government survey are shown in Table 6 as average monthly percent changes at the industry-level and for the eight industries together. For the first two quarters of 2009, survey results are broadly consistent with our employment estimates for leather, metals, and transport, with employment declines in both the Government surveys and our estimates, and for automobiles (grouped with rail and other transport equipment in our estimates), with employment gains in both the Government surveys and our estimates. The remaining four industries show employment gains in the Government surveys and employment declines in our estimates, matching with the most closely corresponding industries (e.g., gems and jewelry are a component of misc. manufacturing). This discrepancy could be partially accounted for by our finding for India that "jobs not created" as a result of the global crisis was a more important factor than "jobs lost" (Table 1). In other words, even though employment grew in these sectors, it may have grown by less than it would have had there been no global crisis.

The Indian Government's crisis response was informed by the Indian Labour Conference held in February of 2009 with representatives of the Government, workers and employers organizations, and a Tripartite Expert Group was established as a follow-up. The Government initiated three fiscal stimulus packages between December 2008 and February 2009, but these were relatively small, totalling less than one percent of the country's GDP (ILO, 2010b). In addition to public works, specifically transport and electrical power infrastructure, policies included tax reductions and measures to ease credit constraints. Industries targeted for support included banking and finance, information technology, automobiles, food processing, textiles, handloom, carpets, handicrafts leather, jewelry and seafood products (ILO, 2009; ILO, 2010b). These industries overlapped to a large extent with those in the Government's "quick" establishment survey.

An important complement to the Government's crisis response was the National Rural Employment Guarantee Act (NREGA), adopted in 2005, which guaranteed to poor rural households a minimum of 100 days of paid employment. The NREGA is relevant not only for the large number of workers in agriculture estimated to have lost employment and income as a result of the crisis. As an ILO source puts it, the NREGA "provided employment for some of those migrating from urban to rural areas as a result of job losses in export industries" (ILO, 2010b, p. 3).

One potential problem with industry-level crisis responses is that they may focus unduly on industries more directly affected by the crisis, and in general, the Indian Government's industry-level policies did indeed focus on such industries. As we have observed, though, some of the largest estimated employment declines as a result of trade contraction occurred in non-tradable industries that were not targets of Government support. These include wholesale and retail trade, transport services, and other services, with employment declines in these industries resulting from the indirect and income-induced effects of trade contraction (Table 3).¹⁶

South Africa undertakes quarterly labour force surveys and publishes them shortly after the survey itself. Year-on-year changes for periods ending with the third and fourth quarters of 2009

¹⁶ For some other assessments of the Indian Government's crisis response, see Bhaskaran and Ghosh, 2010; Ghosh and Chandrasekhar, 2009; ILO, 2009; Khatiwada, 2009; Nachane, 2009 and Rakshit, 2009.

and first quarter of 2010 show overall employment declines of 770,000, 833,000 and 870,000 respectively (Stats SA). These figures are similar to our estimated employment declines of 886,000 based on scenario A and 963,000 based on scenario B. Because of the qualifications noted above, there is an element of happenstance in this similarity, but it nevertheless suggests that our estimates are of a reasonable order of magnitude.

Industry-level survey results are shown in Table 7 as year-on-year and quarter-to-quarter percent changes. These are available at a less disaggregated level in the published *Quarterly Labour Force Survey (SAQLS)* than in our results. For example, most of our industry breakdowns are within manufacturing, which is treated as one industry in the *SAQLS*. Consistent with our findings are employment declines in agriculture, mining, manufacturing, trade and transport, with agriculture being particularly hard hit. At odds with our findings are employment declines in construction (for which we estimate essentially no change in employment) and employment gains in finance (for which we estimate employment declines). That employment in finance grew in South Africa is suggestive of the sector's robustness in the face of the crisis.

The automobile and mining industries in South Africa merit additional discussion as they are reported to have been particularly hard hit by the crisis and yet our estimates show that relative employment losses are lower than average (-1.5 percent for gold mining and other mining and -3.1 percent for vehicles, compared to -7.2 percent for all industries, as shown in (Table 4) (Gabru, 2009; SARW, 2009). For the automobile industry, much of this discrepancy can be accounted by the fact that half of the industry's exports (as of 2003) were to Japan (35 percent) and Australia (15 percent), which are not included in our analysis (ECDC, 2005). Similarly for the mining industry, two of the largest export markets are China and Japan, also not included in our analysis (SARW, 2009). These two industry examples illustrate that our estimates of employment losses must be read as referring exclusively to trade with the EU and US and that the effects of global trade contraction would seem to be much more severe.

The South African Government's crisis response has been referred to as a "mega-stimulus package," equivalent to about one-fourth of the country's GDP with the largest share spent on public works (Kumar and Vashisht, 2009, p. 4; ILO, 2010c). Though some of these policies were initiated prior to the crisis, they were embodied in the *Framework for South Africa's response to the international crisis* of February 2009 as well as the *Progress report* of December 2009 (NEDLAC, 2009a, 2009b). The *Framework* was developed by the National Economic Development and Labour Council (NEDLAC), comprised of representatives of the Government, workers, employers and community organizations. The *Framework* is both ambitious and wide-ranging, addressing transport and electrical power infrastructure, macroeconomic, trade and industrial policies, job training and policies to avoid job cuts, social policies, and global coordination. This was complemented by the Government's *2010/11 – 2012/13 Industrial Action Policy Plan* of February 2010 (SA, 2010a).

Worth noting is that the *Framework* aims to not only provide support to such traceable good industries as "clothing, textiles and footwear, mining and the auto and capital equipment sectors," but also to "retail, housing construction and private services" (NEDLAC, 2009a, p. 9). In this sense, the Government's crisis response is broadly consistent with the results of both our analysis as well as with the *SAQLS*. Conspicuous by its absence from the *Framework* is agriculture, yet a "Comprehensive Rural Development Programme" was approved by the Government in August 2009 (SA, 2010b).¹⁷

The crisis responses of the Governments of India and South Africa differed in scale and scope, partly reflecting the different challenges these countries faced. For example, real GDP in

¹⁷ For some other assessments of the "Framework" and its implementation, see Frye, 2009; ILO, 2009; ILO, 2010c; Khatiwada, 2009; Marais, 2009; SEG/ILO, 2010.

India grew by 5.7 percent in 2009, down from 9.4 percent in 2007 and 7.3 percent in 2008, but still respectable nonetheless. In contrast, real GDP shrank in South Africa by -1.8 percent in 2009, compared to growth rates of 5.5 percent in 2007 and 3.7 percent in 2008 (IMF, 2010). The two countries faced more similar challenges, though, when it came to employment. This is suggested by the considerably less favorable employment growth rates for the first quarter of 2010 than the fourth quarter of 2009 for both countries. For India, the average monthly growth rate of employment was 1.7 percent in the fourth quarter of 2009 but only 0.2 percent in the first quarter of 2010, for the eight industries surveyed (Table 6). For South Africa, the quarter-to-quarter growth rate of employment was 0.7 percent in the fourth quarter of 2009 after three quarters of negative growth, but was -1.3 percent in the first quarter of 2010 (Table 7). With respect to the effects of the global crisis on employment, the Governments of both India and South Africa faced pressing challenges into 2010.

7. Concluding remarks

Earning the appellation “The Great Trade Collapse,” trade contraction was a more important cross-border transmission channel in the global crisis of 2008-09 than in any previous post-World War II crisis (Baldwin, 2009a). This development caught many policy-makers off-guard, who had reasonably focused their concerns on financial transmission channels. The magnitude of trade contraction during the crisis arguably resulted from “compositional” and “synchronicity” effects, manifestations of our current wave of globalization very much at odds with the notion of “decoupling.”

This study finds that declining exports to the EU and US during “The Great Trade Collapse” had substantial negative effects on employment and incomes in India and, more so, South Africa. The effects of trade contraction swept widely across these countries. The vast majority of industries are estimated to experience employment declines as a result of trade contraction, in both tradeable and non-tradeable sectors. Even though the shock originated in the tradeable goods sector, a large share of total estimated employment declines result from ripple effects in non-tradeable industries. Moreover, a large share of estimated employment declines are income-induced, for which we argue an important determinant is a combination of Engel’s Law (with higher shares of income spent on food in poorer countries) and low labour productivity in agriculture in India and South Africa.

Also illustrating the sweeping effects of “The Great Trade Collapse” is that households in rural and urban areas are similarly affected by income losses. Consistent with this, agriculture is estimated to be the hardest hit of all industries in terms of absolute employment declines.¹⁸ At the same time, there are some notable differences between India and South Africa regarding the pattern of employment declines across industries. For example, indirect employment effects *within* the tradeable goods sector (resulting from production linkages) are a good deal more important in India than South Africa, consistent with India’s greater reliance on domestic inputs for export production. For South Africa, we find that industries with higher shares of unskilled and male workers are disproportionately affected by employment declines, while no such evidence of skills or gender bias is found for India.

The importance of trade as a transmission channel has particular bearing on countries like India and South Africa that have rapidly opened up to international trade in recent years. International trade is arguably a necessity for developing countries aiming to narrow the technology gap with developed countries, for it enables them to earn foreign currency and purchase foreign technology. Yet the global crisis also reveals how greater trade openness can be

¹⁸ As suggested by our estimates of agriculture having the largest absolute employment declines, with this being manifested in a combination of employment and income declines.

a source of vulnerability in a volatile global economy, presenting a significant challenge to policy-makers.

Appendix: Data sources and notes

I. Data sources

Trade data. EU: Eurostat; US: US International Trade Commission. Monthly import data from India and South Africa at the Harmonized System (HS) eight-digit level.

Social accounting matrices. India: Saluja, M.R.; Yadav, B. 2006. *Social Accounting Matrix for India 2003-04*, (Haryana, India Development Foundation); South Africa: Thurlow, J. 2005. *South African Social Accounting Matrices for 1993 and 2000*, (Washington, D.C., International Food Policy Research Institute).

Employment data (including by gender and years of education). India: National Sample Survey Organisation (NSSO). 2006. *National Sample Survey: Employment-Unemployment NSS 61st Round, July 2004-June 2005* (New Delhi, Government of India National Sample Survey Organisation); South Africa: Statistics South Africa (Stats SA). 2003. *Revised estimates Labour Force Survey September 2000* (Pretoria, Statistics South Africa).

II. Data notes

Because of differences in industry classifications and levels of aggregation, it was not always possible to perfectly match the above data sources at the industry level. Whenever possible, the social accounting matrices provided the industry classifications to which other data were adapted. Documentation describing exceptions and anomalies is available from the authors upon request.

II. A. Trade data preparation

1. Data was downloaded going back to the SAMs base years, 2003/4 for India and 2000 for South Africa.
2. The constant price for each product at the HS eight-digit level was calculated as the unit value in the base year. When there were no data for the base year, data for the nearest available year were used, affecting data accounting for 25 percent of the total trade to the EU and US from India and South Africa. If no data were reported for the product for any year prior to 2008, current values were used, affecting data accounting for 3 percent of the total trade.
3. Data were converted to Rupees and Rand using the average exchange rate in the base year.
4. Data were aggregated from the HS eight-digit level to the level of aggregation used in the SAMs.

II. B. Trade data cleaning

As is common when dealing with unit values based on trade data, the initial data preparation led to substantial problems with outliers. The following cleaning steps were applied. The procedure was fine-tuned by carefully reviewing fluctuations at the product-level and sectoral-level, and – whenever possible – comparing the fluctuations in unit values with fluctuations in international commodity prices reported by the Global Economic Monitor (World Bank).

1. Most outliers resulted from unit values calculated based on very small trade flows. Therefore, for the purpose of calculating the unit values, trade flows were omitted if:
 - a. The quantity (in whichever unit it is measured) was below 1;
 - b. Non-zero trade flows were reported for less than 3 months in a given year;
 - c. Trade flows in a given year added up to less than 1/15 of total trade for the product over the entire period of observation.

As a result of this procedure, when a year other than the base year was used for the calculation of the unit values, the share of affected data increased from 25 to 42 percent of total trade to the EU and the US from India and South Africa, and when current values were used for the calculation of unit values, the share of affected data increased from 3 to 25 percent of total trade.

2. To avoid a strong impact of the few remaining outliers, a maximum of 5 and a minimum of 1/5 were imposed on the deviation of the constant price value from the current price value for any given month. This affected less than 1 percent of total trade.
3. Two ad-hoc cleaning steps were undertaken for industries where data was considered inconsistent or not credible. In these cases, the current instead of the constant values were used.
 - a. South Africa: Exports to the US of leather Products (accounting for less than 0.5 percent of total exports to the US).
 - b. India: Exports to the EU of misc. manufacturing (accounting for 9 percent of total exports to the EU).

Tables

Table 1: Country-Level Employment Effects from Trade (Type II multiplier)

Scenario A						
	Number of jobs (FTE)					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-1'163'804	-2'088'266	-3'252'070	-354'302	-166'124	-520'426
Non-tradeable industries	-195'327	-496'734	-692'061	-266'992	-99'068	-366'060
All industries	-1'359'131	-2'585'000	-3'944'131	-621'294	-265'192	-886'486
	Number of jobs as a % of SAMs base year employment					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-0.46	-0.82	-1.28	-8.30	-3.89	-12.19
Non-tradeable industries	-0.19	-0.48	-0.66	-3.32	-1.23	-4.56
All industries	-0.38	-0.72	-1.10	-5.05	-2.16	-7.21
Scenario B						
	Number of jobs (FTE)					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-3'741'618	-4'400'303	-8'141'920	-369'835	-183'822	-553'657
Non-tradeable industries	-845'412	-1'076'805	-1'922'217	-298'954	-110'290	-409'245
All industries	-4'587'030	-5'477'108	-10'064'137	-668'789	-294'113	-962'902
	Number of jobs as a % of SAMs base year employment					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-1.47	-1.73	-3.20	-8.66	-4.31	-12.97
Non-tradeable industries	-0.81	-1.03	-1.84	-3.72	-1.37	-5.09
All industries	-1.28	-1.53	-2.81	-5.44	-2.39	-7.83

Table 2: Country-Level Employment Effects from Trade (Type I multiplier)

Scenario A						
	Number of jobs (FTE)					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-690'242	-938'041	-1'628'284	-245'740	-126'787	-372'527
Non-tradeable industries	-66'781	-184'512	-251'292	-100'173	-38'621	-138'794
All industries	-757'023	-1'122'553	-1'879'576	-345'913	-165'408	-511'321
	Number of jobs as a % of SAMs base year employment					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	-0.27	-0.37	-0.64	-5.76	-2.97	-8.72
Non-tradeable industries	-0.06	-0.18	-0.24	-1.25	-0.48	-1.73
All industries	-0.21	-0.31	-0.52	-2.81	-1.34	-4.16
	Type I multiplier jobs as a % of Type II multiplier jobs					
	India			South Africa		
	EU	US	EU&US	EU	US	EU&US
Tradeable goods industries	59.3	44.9	50.1	69.4	76.3	71.6
Non-tradeable industries	34.2	37.1	36.3	37.5	39.0	37.9
All industries	55.7	43.4	47.7	55.7	62.4	57.7

Table 3: Industry-Level Employment Effects from Trade for India: Scenario A (Type II multiplier)

		Number of jobs (FTE)			No. jobs as % of 2003/4 empl.	% of 2003/4 empl.		
		EU	US	EU & US	EU & US	Female	Less Educ.	
Tradeable goods industries	1	Agriculture	-910'021	-1'290'224	-2'200'245	-1.07	35.0	95.6
	2	Forestry and logging	-5'797	-8'066	-13'864	-1.40	37.5	95.8
	3	Fishing	9'540	8'281	17'821	1.39	12.6	97.3
	4	Coal and lignite, crude petroleum and natural gas	2'539	-11'420	-8'881	-1.15	5.3	72.0
	5	Iron ore and other minerals	-21'201	-14'865	-36'065	-2.38	21.3	96.5
	6	Manufacture of food products	-32'047	-27'014	-59'061	-1.47	23.1	85.7
	7	Beverages and tobacco products	-9'434	-18'245	-27'679	-0.74	70.6	97.5
	8	Cotton textiles	-18'712	-42'312	-61'024	-2.43	31.1	90.3
	9	Wool synthetic and silk fiber textiles	-15'392	-23'242	-38'634	-2.01	27.7	94.2
	10	Jute, hemp and mesta textiles	-2'629	-5'113	-7'742	-4.30	21.2	92.4
	11	Textile products	45'891	-197'926	-152'035	-2.75	33.1	91.2
	12	Furniture and wood products	-71'170	-98'209	-169'379	-3.16	20.3	95.5
	13	Paper, paper products, printing and publishing	-2'607	-8'786	-11'392	-0.90	10.7	64.6
	14	Leather products	-1'044	-18'962	-20'006	-1.35	15.6	86.8
	15	Rubber and plastic products, petroleum products and coal tar products	4'888	-11'276	-6'388	-0.81	10.5	70.9
	16	Chemicals	-8'298	-600	-8'897	-0.52	37.3	68.6
	17	Other non-metallic mineral products and cement	-18'837	-23'463	-42'300	-1.11	24.1	93.9
	18	Iron, steel and non-ferrous metals	-18'329	-45'459	-63'788	-3.91	2.6	76.4
	19	Metal products	-17'620	-29'763	-47'383	-3.06	5.2	83.7
	20	Non-electrical machinery	-21'575	-14'483	-36'058	-3.18	4.2	60.2
	21	Electrical machinery	-15'131	-16'980	-32'111	-1.70	3.7	67.6
	22	Rail equipment and other transport equipment	53'046	-41'247	11'799	0.36	1.5	80.6
	23	Misc. manufacturing	-89'864	-148'894	-238'758	-7.82	15.3	87.2
Non-tradeable industries	24	Construction	-5'907	-14'341	-20'248	-0.09	9.9	94.3
	25	Electricity and gas	-3'361	-8'781	-12'142	-1.35	4.5	58.1
	26	Water supply	-177	-622	-799	-0.43	4.6	83.4
	27	Railway transport services	-3'400	-8'587	-11'986	-1.26	3.4	60.9
	28	Other transport services	-30'754	-76'045	-106'799	-0.83	1.3	88.1
	29	Storage and warehousing	-221	-552	-773	-0.93	0.0	75.6
	30	Communication	-4'430	-9'545	-13'975	-0.86	12.4	52.5
	31	Trade	-84'773	-211'284	-296'058	-0.94	11.5	78.9
	32	Hotels and restaurants	-10'160	-24'824	-34'984	-0.71	17.9	90.1
	33	Banking	-6'310	-16'319	-22'629	-1.15	13.5	29.8
	34	Insurance	-1'290	-3'364	-4'654	-0.90	14.1	16.2
	35	Education and research	-13'321	-32'292	-45'613	-0.46	39.2	23.1
	36	Medical and health	-5'913	-14'379	-20'292	-0.66	36.9	43.6
	37	Other services	-25'310	-75'800	-101'109	-0.74	31.5	82.1
	38	All industries	-1'359'131	-2'585'000	-3'944'131	-1.10	27.5	87.9

Table 4: Industry-Level Employment Effects from Trade for South Africa: Scenario A (Type II multiplier)

		Number of jobs (FTE)			No. jobs as % of 2000 empl.	% of 2000 empl.		
		EU	US	EU & US	EU&US	Female	Less Educ.	
Tradeable goods industrie	1	Agriculture, hunting, forestry and fishing	-155'049	-85'990	-241'038	-11.62	44.69	74.88
	2	Coal mining	-2'230	-775	-3'004	-4.03	2.08	60.04
	3	Gold mining and other mining	-6'214	-1'678	-7'893	-1.49	3.00	52.13
	4	Food processing	-10'215	-3'873	-14'088	-6.38	32.11	38.10
	5	Beverages and tobacco products	-3'397	-1'367	-4'764	-6.50	36.80	42.99
	6	Textiles	-1'635	-2'182	-3'817	-4.22	64.50	36.56
	7	Clothing	-7'969	-2'477	-10'447	-4.60	82.92	45.02
	8	Leather products	-80	-194	-273	-1.80	37.74	25.04
	9	Footwear	-1'552	-541	-2'093	-6.29	52.07	46.08
	10	Wood products	-72'933	-55'986	-128'919	-141.45	16.22	49.83
	11	Paper products	-3'254	-848	-4'102	-13.07	30.57	30.99
	12	Printing and publishing	-21'087	-2'039	-23'126	-35.46	29.97	17.31
	13	Petroleum products	-926	-324	-1'249	-5.19	12.31	10.07
	14	Chemicals	-2'445	-922	-3'367	-5.79	28.10	15.79
	15	Rubber and plastic products	-2'260	-922	-3'181	-5.31	33.34	24.24
	16	Glass products	-16'333	5'992	-10'342	-60.93	22.07	40.67
	17	Non-metal minerals	-648	-849	-1'497	-1.90	23.58	58.89
	18	Iron, steel and non-ferrous metals	-6'211	-1'419	-7'630	-8.05	10.99	35.86
	19	Metal products	-33'584	-7'819	-41'403	-29.59	8.93	37.35
	20	Non-electrical machinery	-1'417	-410	-1'827	-3.12	18.94	29.54
	21	Electrical machinery	-710	-261	-971	-2.15	21.72	13.82
	22	Communications equipment	-106	-33	-140	-1.60	51.53	15.35
	23	Scientific equipment	-125	-46	-171	-2.94	45.58	19.36
	24	Vehicles	-1'964	-378	-2'342	-3.13	19.01	24.10
	25	Transport equipment	-52	-16	-68	-1.51	4.75	43.50
	26	Furniture	-936	-390	-1'326	-3.85	21.35	36.60
	27	Misc. manufacturing	-970	-377	-1'348	-3.51	39.32	44.46
Non-tradeable industries	28	Electricity, gas and water	-2'430	-1'527	-3'958	-4.21	15.57	34.34
	29	Construction	5'387	-1'267	4'121	0.60	7.28	58.51
	30	Trade services, hotels and catering	-129'280	-47'090	-176'370	-7.42	47.79	34.55
	31	Transport and communication services	-17'994	-4'340	-22'334	-3.82	14.89	34.03
	32	Financial and business services	-28'124	-11'607	-39'730	-4.02	39.88	10.92
	33	Human health, veterinary and social work Education, other services and other activities n.e.c.	-18'417	-7'320	-25'738	-4.49	75.86	25.75
	34		-75'743	-25'689	-101'433	-4.65	69.16	44.75
	35	Government services	-391	-227	-618	-0.11	30.46	18.36
	36	All industries	-621'294	-265'192	-886'486	-7.21	43.05	42.61

Table 5: Correlation Coefficients with Labour Coefficients (SAMs base year)

	India	South Africa
% Female, tradeable goods industries	0.24	0.49
% Female, non-tradeable industries	0.54	0.71
% Female, all industries	0.30	0.59
% Less educ., tradeable goods industries	0.48	0.60
% Less educ., non-tradable industries	0.49	0.37
% Less educ., all industries	0.37	0.47

Table 6: Employment Changes in India

	Average monthly percent changes					Average
	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	
Textiles and apparel	0.96	-0.63	1.26	0.12	-0.76	0.19
Leather	-2.76	0.62	-0.70	0.94	-0.01	-0.38
Metals	-0.56	-0.03	1.22	0.43	0.09	0.23
Automobiles	0.10	1.24	1.21	0.30	1.43	0.86
Gems and jewelry	3.08	-1.65	5.07	0.74	2.70	1.99
Transport	-0.36	-0.09	0.03	-0.19	-0.18	-0.16
IT/BPO	0.83	-0.34	0.25	4.15	1.15	1.21
Handloom/powerloom	0.28	2.29	0.66	0.71	-0.37	0.71
Total	0.60	-0.29	1.03	1.70	0.16	0.64

Source: Government of India, Report on Effect of Economic Slowdown on Employment in India (October-December 2008 to January-March 2010).

Table 7: Employment Changes in South Africa

	Year-on-year percent changes					
	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	Average
Agriculture	-7.6	-10.1	-14.9	-19.5	-11.9	-12.8
Mining	0.0	-7.8	-4.8	-7.8	-11.1	-6.3
Manufacturing	-5.3	-4.8	-10.1	-10.4	-9.2	-8.0
Utilities	5.3	-4.1	-18.2	14.0	-30.0	-6.6
Construction	1.3	-1.8	-4.1	-8.9	-9.3	-4.6
Trade	-4.3	-4.6	-10.2	-9.2	-6.5	-7.0
Transport	1.3	-6.1	-4.2	-4.5	1.3	-2.4
Finance	3.5	1.4	3.1	7.5	-5.3	2.0
Community and social services	3.4	1.1	0.9	-1.2	0.2	0.9
Total	0.1	-2.6	-5.6	-6.3	-6.1	-4.1

	Quarter-to-quarter percent changes					
	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	Average
Agriculture	-3.4	-3.8	-8.0	-5.8	5.7	-3.1
Mining	3.7	-4.2	-6.3	-1.0	0.0	-1.6
Manufacturing	-3.2	-0.5	-8.0	1.1	-1.9	-2.5
Utilities	16.3	-7.0	-12.9	21.0	-28.6	-2.2
Construction	-5.5	-0.8	-5.4	2.6	-5.9	-3.0
Trade	-4.5	-2.0	-3.7	0.7	-1.7	-2.2
Transport	-2.2	-4.0	1.4	0.3	3.8	-0.1
Finance	5.4	-0.9	-1.6	4.6	-7.2	0.1
Community and social services	-0.4	0.5	-1.4	0.0	1.1	0.0
Total	-1.5	-2.0	-3.6	0.7	-1.3	-1.5

Source: Statistics South Africa, *Quarterly Labour Force Survey* (Quarter 1, 2009 to Quarter 1, 2010).

Appendix Table 1: Trade demand vectors and other industry-level data, India

	Export demand vectors (in 2003/04 Rupees)				Trade Openness ¹	Output (2003/04, in Rupees, lakhs)	Employment (2003/04)	Labour Coefficient (2003/04, rel. to avg.)	Income Multiplier (Type II)
	Scenario A		Scenario B						
	EU	US	EU	US					
Agriculture	-7'107'214'460	-3'111'736'075	-10'997'328'375	-4'172'180'815	3.8	67'461'718	205'076'487	5.60	38.07
Forestry and logging	-841'084'344	-540'547'158	-878'002'564	-1'391'469'224	14.0	2'968'800	990'055	0.61	3.87
Fishing	3'156'188'550	3'635'734'760	1'729'745'916	4'378'717'185	15.5	3'167'200	1'285'097	0.75	3.37
Coal and lignite, crude petroleum and natural gas	3'248'678	0	3'682'228	0	130.4	6'504'200	770'568	0.22	5.44
Iron ore and other minerals	-5'256'199'934	-1'526'938'399	-5'593'769'740	-1'492'178'025	259.5	1'467'700	1'517'992	1.90	1.64
Manufacture of food products	-12'354'879'747	-3'681'023'455	-16'898'422'990	-6'603'468'370	12.2	20'905'354	4'024'149	0.35	12.20
Beverages and tobacco products	-186'787'650	264'748'063	-379'616'743	311'924'661	1.0	6'204'518	3'763'220	1.12	5.14
Cotton textiles	-5'188'456'330	-1'083'767'070	-6'415'712'259	-1'193'876'635	15.0	6'908'655	2'506'482	0.67	5.91
Wool synthetic and silk fiber textiles	-3'738'908'026	-1'216'355'639	-4'237'960'758	-1'478'479'341	22.4	3'730'466	1'917'877	0.95	3.55
Jute, hemp and mesta textiles	-829'157'431	-263'793'942	-668'591'377	-225'762'919	26.2	506'326	180'198	0.66	2.37
Textile products	8'255'057'471	-24'526'228'364	-17'229'663'526	-62'494'987'320	49.8	6'250'338	5'537'224	1.63	4.10
Furniture and wood products	-1'457'252'179	-1'503'196'779	-2'292'575'227	-2'878'572'632	8.8	1'620'211	5'365'221	6.10	2.97
Paper, paper products, printing and publishing	246'868'000	-780'865'054	-867'786'935	-905'957'668	52.3	4'677'914	1'270'760	0.50	4.21
Leather products	39'749'055	-1'218'836'030	-4'620'575'659	-1'736'128'896	46.4	1'678'410	1'483'528	1.63	2.93
Rubber and plastic products, petroleum products and coal tar products	23'979'880'462	-21'518'572'927	-4'717'477'751	-26'025'711'301	16.1	24'476'318	788'369	0.06	13.10
Chemicals	-5'238'101'925	16'287'909'280	-27'917'534'669	-22'152'447'451	38.5	21'807'480	1'706'108	0.14	12.19
Other non-metallic mineral products and cement	-2'736'166'258	-2'867'675'248	-4'947'490'818	-5'722'469'073	74.4	5'908'883	3'805'059	1.19	2.90
Iron, steel and non-ferrous metals	-5'476'681'870	-23'941'843'386	-50'919'657'727	-55'734'070'216	30.4	19'154'309	1'631'677	0.16	9.29
Metal products	-4'577'719'605	-5'179'097'683	-7'275'196'414	-6'301'984'877	25.0	4'085'337	1'546'798	0.70	3.29
Non-electrical machinery	-22'778'614'907	-12'224'943'829	-39'748'655'130	-28'839'158'341	62.1	8'182'869	1'133'599	0.25	3.20
Electrical machinery	-8'563'547'733	-7'970'921'069	-21'143'183'341	-17'951'587'441	63.4	8'965'653	1'890'295	0.39	3.43
Rail equipment and other transport equipment	17'556'077'382	-9'537'651'396	6'907'106'188	-16'503'701'622	13.0	10'136'379	3'274'241	0.59	4.29
Misc. manufacturing	-35'997'063'072	-57'885'305'091	-47'819'074'846	-72'045'974'627	89.4	8'231'662	3'051'896	0.68	3.60
Construction	N/A	N/A	N/A	N/A	N/A	38'408'700	22'325'425	1.07	4.73
Electricity and gas	N/A	N/A	N/A	N/A	N/A	13'501'235	898'739	0.12	10.72
Water supply	N/A	N/A	N/A	N/A	N/A	960'065	186'421	0.36	2.30
Railway transport services	N/A	N/A	N/A	N/A	N/A	4'256'267	948'540	0.41	4.07
Other transport services	N/A	N/A	N/A	N/A	N/A	33'581'098	12'850'267	0.70	17.29
Storage and warehousing	N/A	N/A	N/A	N/A	N/A	253'934	82'802	0.60	2.13

Export demand vectors (in 2003/04 Rupees)

	Scenario A		Scenario B		Trade Openness ¹	Output (2003/04, in Rupees, lakhs)	Employment (2003/04)	Labour Coefficient (2003/04, rel. to avg.)	Income Multiplier (Type II)
	EU	US	EU	US	(X+M/Output)				
Communication	N/A	N/A	N/A	N/A	N/A	5'815'013	1'616'377	0.51	4.87
Trade	N/A	N/A	N/A	N/A	N/A	42'830'337	31'361'699	1.35	21.10
Hotels and restaurants	N/A	N/A	N/A	N/A	N/A	7'931'804	4'930'116	1.14	5.60
Banking	N/A	N/A	N/A	N/A	N/A	18'265'163	1'975'962	0.20	11.94
Insurance	N/A	N/A	N/A	N/A	N/A	3'823'881	515'730	0.25	3.78
Education and research	N/A	N/A	N/A	N/A	N/A	13'981'500	9'826'241	1.29	6.15
Medical and health	N/A	N/A	N/A	N/A	N/A	10'010'300	3'077'439	0.57	6.16
Other services	N/A	N/A	N/A	N/A	N/A	15'753'554	13'632'895	1.59	8.71

Appendix Table 1: Trade demand vectors and other industry-level data, South Africa

	Export demand vectors (in 2000 Rand)				Trade Openness ¹	Output (2000, in 2000 Rand, millions)	Employment (2000)	Labour Coefficient (2000, rel. to avg.)	Income Multiplier (Type II)
	Scenario A		Scenario B						
	EU	US	EU	US					
Agriculture, hunting, forestry and fishing	518'144'898	-84'162'931	545'784'725	-123'368'942	18.9	53'402	2'075'212	5.06	12.79
Coal mining	759'874'328	0	793'207'075	0	46.5	20'176	74'536	0.48	4.11
Gold mining and other mining ²	-1'343'342'315	-629'692'683	-2'100'936'846	-648'610'651	140.6	82'403	529'111	0.84	5.49
Food processing	-63'463'346	464'620'325	23'878'384	353'050'161	19.8	67'744	220'884	0.42	15.11
Beverages and tobacco products	961'543'345	-56'107'714	1'051'169'810	-176'618'927	14.2	28'326	73'246	0.34	6.66
Textiles	-69'344'086	-56'042'085	-31'473'676	-58'316'774	49.1	12'533	90'412	0.94	3.76
Clothing	-19'285'359	-57'781'518	36'963'666	-7'847'999	30.8	8'773	227'049	3.37	2.45
Leather products	-39'943'285	-40'515'903	-35'780'258	-91'408'874	84.8	2'409	15'163	0.82	2.29
Footwear	930'628	-578'823	3'312'609	-2'978'951	55.8	2'799	33'257	1.55	1.77
Wood products	-30'008'308	-10'680'423	15'165'396	-6'274'573	32.1	10'382	91'138	1.14	3.53
Paper products	199'147'194	-12'334'457	250'908'447	-60'801'898	36.2	25'105	31'395	0.16	6.23
Printing and publishing	-8'621'880	10'392'688	1'917'658	11'765'682	25.1	13'257	65'224	0.64	3.66
Petroleum products	-79'867'783	-124'159'209	-289'157'485	-149'905'930	30.8	36'038	24'058	0.09	6.45
Chemicals	332'677'272	-263'609'734	275'670'237	-278'420'707	60.5	61'300	58'184	0.12	10.56
Rubber and plastic products	-117'272'156	7'871'186	-80'038'110	4'360'688	38.0	16'150	59'933	0.48	3.95
Glass products	62'934'187	-16'131'898	55'898'937	-6'642'053	43.5	2'523	16'972	0.88	2.20
Non-metal minerals	-116'455'226	-37'235'418	-201'411'947	-42'240'785	26.8	12'479	78'989	0.82	2.73
Iron, steel and non-ferrous metals	-8'472'033'975	-6'607'051'391	-7'775'681'467	-7'218'369'260	59.9	57'856	94'792	0.21	6.92
Metal products	-256'824'709	-123'702'362	-224'242'072	-143'378'756	26.0	26'758	139'919	0.68	4.22
Non-electrical machinery	-5'334'461'255	-322'341'672	-6'064'748'374	-821'263'529	189.8	22'758	58'503	0.33	2.82
Electrical machinery	-176'528'853	-43'327'737	-150'685'511	-95'477'292	59.1	14'280	45'232	0.41	2.97
Communications equipment	-205'401'785	-77'043'877	-339'225'658	-90'086'281	284.8	5'228	8'717	0.22	1.60
Scientific equipment	-20'331'491	-89'995'687	-29'882'937	-145'187'283	422.9	1'725	5'820	0.44	1.28
Vehicles	-3'383'187'089	1'349'620'374	-3'902'024'219	1'819'744'598	71.7	57'897	74'844	0.17	6.31
Transport equipment	-12'573'199	-93'852'980	115'999'304	-152'698'155	265.5	3'967	4'522	0.15	1.59
Furniture	-751'914'668	-96'427'616	-530'218'467	-167'709'536	50.5	6'880	34'387	0.65	2.10
Misc. manufacturing	-7'484'875'942	-1'642'839'392	-9'180'884'313	-1'573'945'281	103.9	6'609	38'433	0.76	2.07
Electricity, gas and water	N/A	N/A	N/A	N/A	N/A	41'366	94'013	0.30	8.25
Construction	N/A	N/A	N/A	N/A	N/A	75'856	692'124	1.19	3.83
Trade services, hotels and catering	N/A	N/A	N/A	N/A	N/A	187'309	2'376'767	1.65	32.67
Transport and communication services	N/A	N/A	N/A	N/A	N/A	144'770	585'062	0.53	18.44
Financial and business services	N/A	N/A	N/A	N/A	N/A	247'025	988'649	0.52	31.36

	Export demand vectors (in 2000 Rand)				Trade Openness ¹ (X+M/Output)	Output (2000, in 2000 Rand, millions)	Employment (2000)	Labour Coefficient (2000, rel. to avg.)	Income Multiplier (Type II)
	Scenario A		Scenario B						
	EU	US	EU	US					
Human health, veterinary and social work	N/A	N/A	N/A	N/A	N/A	31'250	573'466	2.39	5.41
Education, other services and other activities n.e.c.	N/A	N/A	N/A	N/A	N/A	48'613	2'181'860	5.85	7.70
Government services	N/A	N/A	N/A	N/A	N/A	181'030	541'169	0.39	2.50

Note 1: Trade openness is construction from SAMs data on income from exports, expenditures on imports and output in SAMs base year.

Appendix Table 2: Industry-Level Employment Effects from Trade for India: Scenario B (Type II multiplier)

		Number of jobs (FTE)			No. jobs as % of 2003/4 empl.	% of 2003/4 empl.		
		EU	US	EU & US	EU & US	Female	Less Educ.	
Tradeable goods industries	1	Agriculture	-2'650'426	-2'765'788	-5'416'215	-2.64	35.0	95.6
	2	Forestry and logging	-13'956	-18'311	-32'267	-3.26	37.5	95.8
	3	Fishing	-4'267	4'347	81	0.01	12.6	97.3
	4	Coal and lignite, crude petroleum and natural gas	-13'694	-21'456	-35'150	-4.56	5.3	72.0
	5	Iron ore and other minerals	-34'584	-25'252	-59'836	-3.94	21.3	96.5
	6	Manufacture of food products	-67'886	-56'661	-124'548	-3.10	23.1	85.7
	7	Beverages and tobacco products	-36'964	-41'056	-78'020	-2.07	70.6	97.5
	8	Cotton textiles	-66'322	-96'323	-162'645	-6.49	31.1	90.3
	9	Wool synthetic and silk fiber textiles	-38'703	-48'820	-87'523	-4.56	27.7	94.2
	10	Jute, hemp and mesta textiles	-7'053	-11'359	-18'413	-10.22	21.2	92.4
	11	Textile products	-166'101	-493'198	-659'299	-11.91	33.1	91.2
	12	Furniture and wood products	-151'526	-190'748	-342'273	-6.38	20.3	95.5
	13	Paper, paper products, printing and publishing	-14'879	-18'288	-33'168	-2.61	10.7	64.6
	14	Leather products	-57'082	-31'199	-88'281	-5.95	15.6	86.8
	15	Rubber and plastic products, petroleum products and coal tar products	-11'039	-19'662	-30'700	-3.89	10.5	70.9
	16	Chemicals	-40'612	-42'635	-83'247	-4.88	37.3	68.6
	17	Other non-metallic mineral products and cement	-40'867	-47'915	-88'781	-2.33	24.1	93.9
	18	Iron, steel and non-ferrous metals	-73'391	-87'001	-160'391	-9.83	2.6	76.4
	19	Metal products	-45'416	-49'595	-95'011	-6.14	5.2	83.7
	20	Non-electrical machinery	-41'116	-33'043	-74'159	-6.54	4.2	60.2
	21	Electrical machinery	-39'845	-37'168	-77'013	-4.07	3.7	67.6
	22	Rail equipment and other transport equipment	5'399	-74'717	-69'318	-2.12	1.5	80.6
	23	Misc. manufacturing	-131'287	-194'455	-325'742	-10.67	15.3	87.2
Non-tradeable industries	24	Construction	-24'704	-31'136	-55'840	-0.25	9.9	94.3
	25	Electricity and gas	-14'879	-19'175	-34'054	-3.79	4.5	58.1
	26	Water supply	-1'094	-1'474	-2'568	-1.38	4.6	83.4
	27	Railway transport services	-14'464	-17'863	-32'327	-3.41	3.4	60.9
	28	Other transport services	-131'595	-167'620	-299'215	-2.33	1.3	88.1
	29	Storage and warehousing	-939	-1'195	-2'134	-2.58	0.0	75.6
	30	Communication	-17'679	-21'887	-39'566	-2.45	12.4	52.5
	31	Trade	-359'582	-457'811	-817'393	-2.61	11.5	78.9
	32	Hotels and restaurants	-43'037	-53'775	-96'812	-1.96	17.9	90.1
	33	Banking	-27'840	-35'573	-63'414	-3.21	13.5	29.8
	34	Insurance	-5'884	-7'462	-13'346	-2.59	14.1	16.2
	35	Education and research	-56'048	-69'759	-125'807	-1.28	39.2	23.1
	36	Medical and health	-24'996	-31'111	-56'107	-1.82	36.9	43.6
	37	Other services	-122'671	-160'961	-283'632	-2.08	31.5	82.1
	38	All industries	-4'587'030	-5'477'108	-10'064'137	-2.81	27.5	87.9

Table 3: Industry-Level Employment Effects from Trade for India: Scenario A (Type II multiplier)

		Number of jobs (FTE)			No. jobs as % of 2003/4 empl.	% of 2003/4 empl.		
		EU	US	EU & US	EU & US	Female	Less Educ.	
Tradeable goods industries	1	Agriculture	-9'10'021	-1'290'224	-2'200'245	-1.07	35.0	95.6
	2	Forestry and logging	-5'797	-8'066	-13'864	-1.40	37.5	95.8
	3	Fishing	9'540	8'281	17'821	1.39	12.6	97.3
	4	Coal and lignite, crude petroleum and natural gas	2'539	-11'420	-8'881	-1.15	5.3	72.0
	5	Iron ore and other minerals	-2'1201	-14'865	-36'065	-2.38	21.3	96.5
	6	Manufacture of food products	-32'047	-27'014	-59'061	-1.47	23.1	85.7
	7	Beverages and tobacco products	-9'434	-18'245	-27'679	-0.74	70.6	97.5
	8	Cotton textiles	-18'712	-42'312	-61'024	-2.43	31.1	90.3
	9	Wool synthetic and silk fiber textiles	-15'392	-23'242	-38'634	-2.01	27.7	94.2
	10	Jute, hemp and mesta textiles	-2'629	-5'113	-7'742	-4.30	21.2	92.4
	11	Textile products	45'891	-197'926	-152'035	-2.75	33.1	91.2
	12	Furniture and wood products	-71'170	-98'209	-169'379	-3.16	20.3	95.5
	13	Paper, paper products, printing and publishing	-2'607	-8'786	-11'392	-0.90	10.7	64.6
	14	Leather products	-1'044	-18'962	-20'006	-1.35	15.6	86.8
	15	Rubber and plastic products, petroleum products and coal tar products	4'888	-11'276	-6'388	-0.81	10.5	70.9
	16	Chemicals	-8'298	-600	-8'897	-0.52	37.3	68.6
	17	Other non-metallic mineral products and cement	-18'837	-23'463	-42'300	-1.11	24.1	93.9
	18	Iron, steel and non-ferrous metals	-18'329	-45'459	-63'788	-3.91	2.6	76.4
	19	Metal products	-17'620	-29'763	-47'383	-3.06	5.2	83.7
	20	Non-electrical machinery	-21'575	-14'483	-36'058	-3.18	4.2	60.2
	21	Electrical machinery	-15'131	-16'980	-32'111	-1.70	3.7	67.6
	22	Rail equipment and other transport equipment	53'046	-41'247	11'799	0.36	1.5	80.6
	23	Misc. manufacturing	-89'864	-148'894	-238'758	-7.82	15.3	87.2
Non-tradeable industries	24	Construction	-5'907	-14'341	-20'248	-0.09	9.9	94.3
	25	Electricity and gas	-3'361	-8'781	-12'142	-1.35	4.5	58.1
	26	Water supply	-177	-622	-799	-0.43	4.6	83.4
	27	Railway transport services	-3'400	-8'587	-11'986	-1.26	3.4	60.9
	28	Other transport services	-30'754	-76'045	-106'799	-0.83	1.3	88.1
	29	Storage and warehousing	-221	-552	-773	-0.93	0.0	75.6
	30	Communication	-4'430	-9'545	-13'975	-0.86	12.4	52.5
	31	Trade	-84'773	-211'284	-296'058	-0.94	11.5	78.9
	32	Hotels and restaurants	-10'160	-24'824	-34'984	-0.71	17.9	90.1
	33	Banking	-6'310	-16'319	-22'629	-1.15	13.5	29.8
	34	Insurance	-1'290	-3'364	-4'654	-0.90	14.1	16.2
	35	Education and research	-13'321	-32'292	-45'613	-0.46	39.2	23.1
	36	Medical and health	-5'913	-14'379	-20'292	-0.66	36.9	43.6
	37	Other services	-25'310	-75'800	-101'109	-0.74	31.5	82.1
	38	All industries	-1'359'131	-2'585'000	-3'944'131	-1.10	27.5	87.9

Figure 1: Total Trade as a Percentage of GDP, 1960 – 2007 (X+M/GDP%)

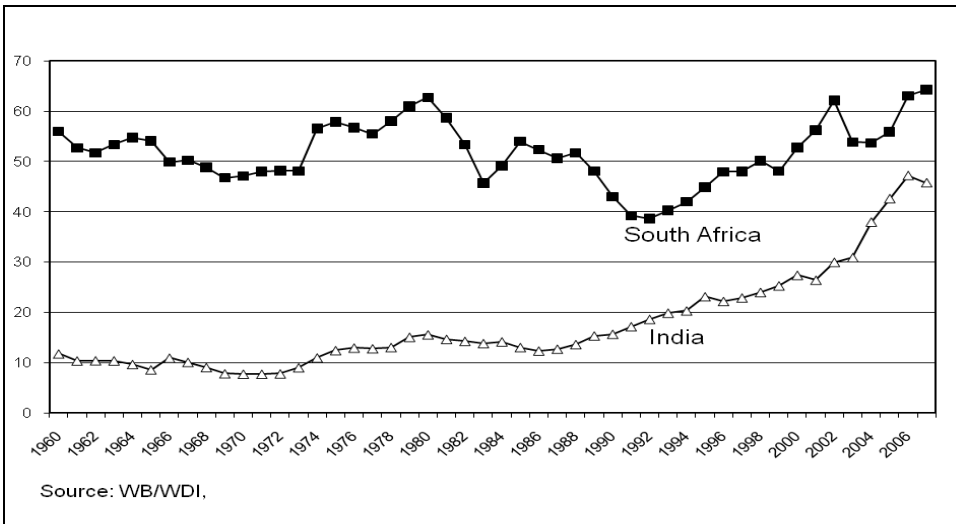


Figure 2: Net Exports of Goods and Services, 1960 -2007 (X-M, current US\$, '000)

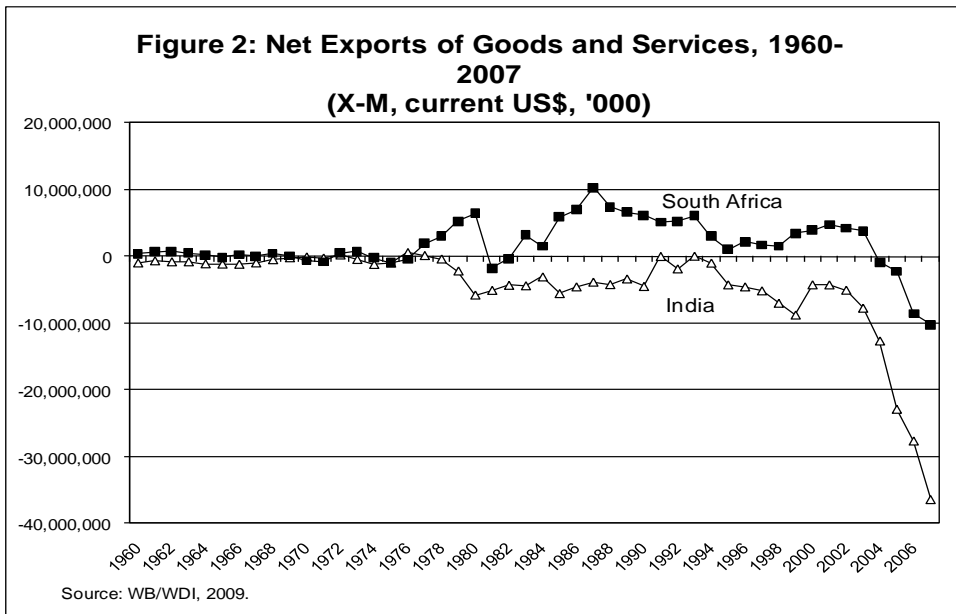


Figure 3: Indian exports to the EU and US in 2003

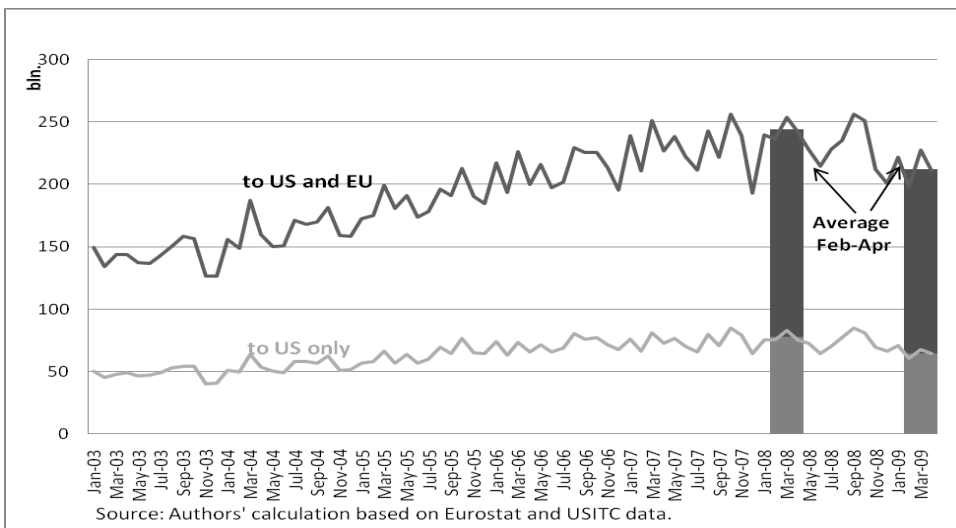


Figure 4: South African exports to the EU and US in 2000 Rand

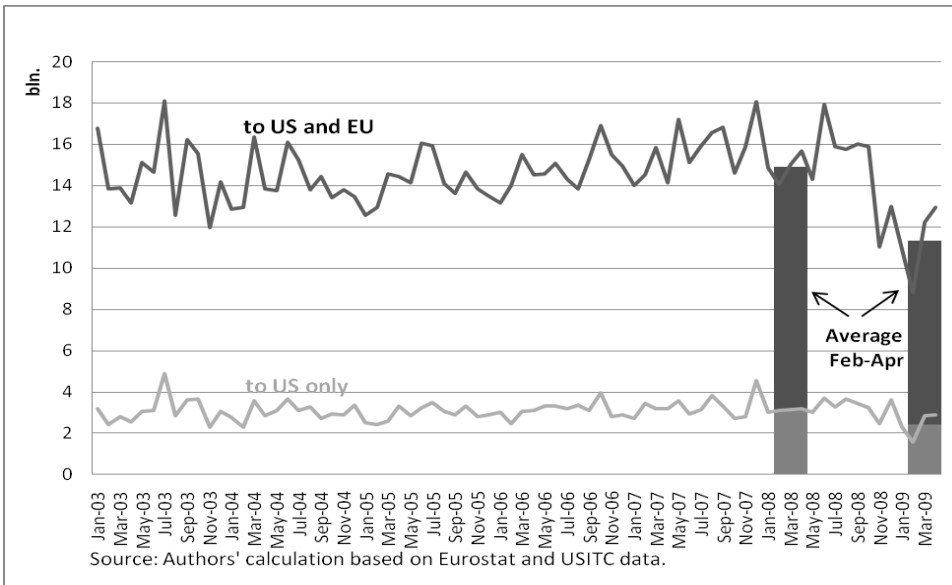


Figure 5: Gender Bias from Trade Contraction, All Industries, Scenario A

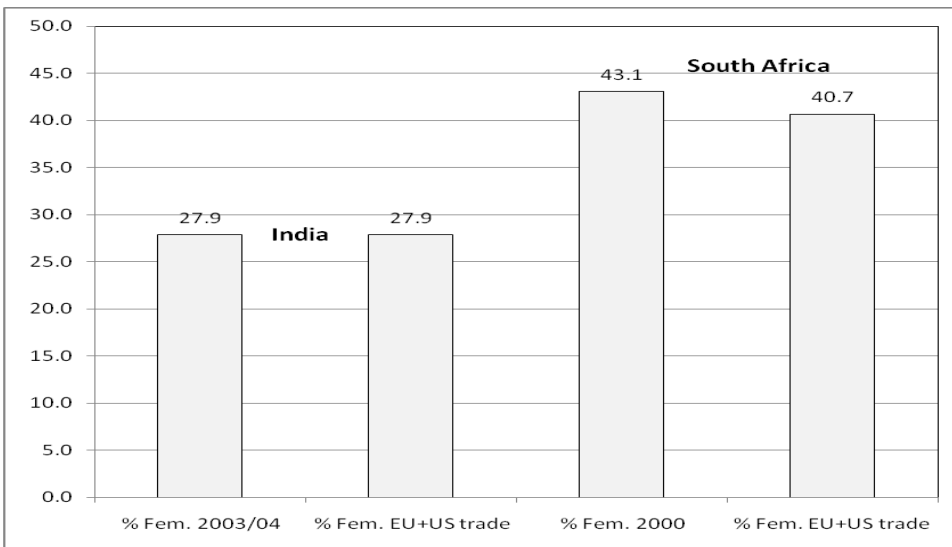


Figure 6: Skills Bias from Trade Contraction, All Industries, Scenario A

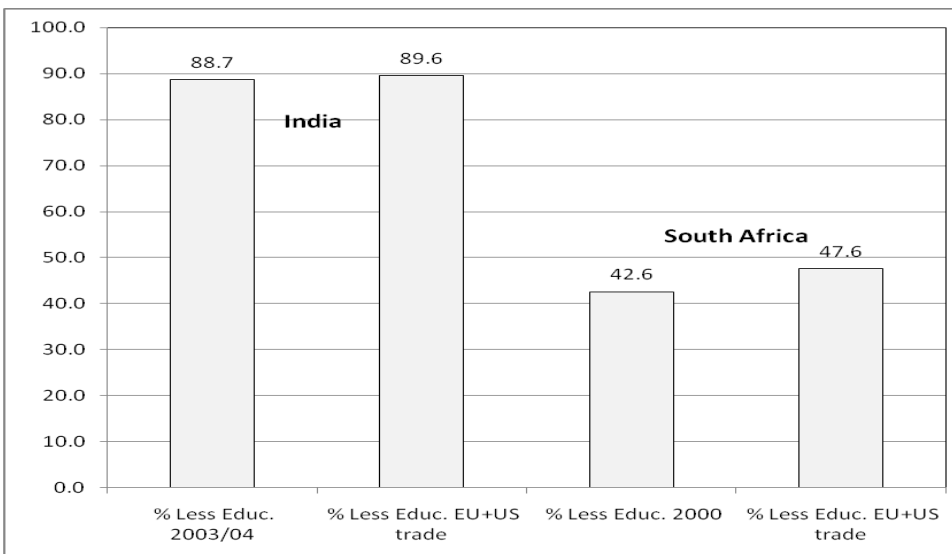


Figure 7: Impact of Trade on incomes by Urban and Rural Household Income Quintiles, India, and Scenario

A (% 2003/04 income)

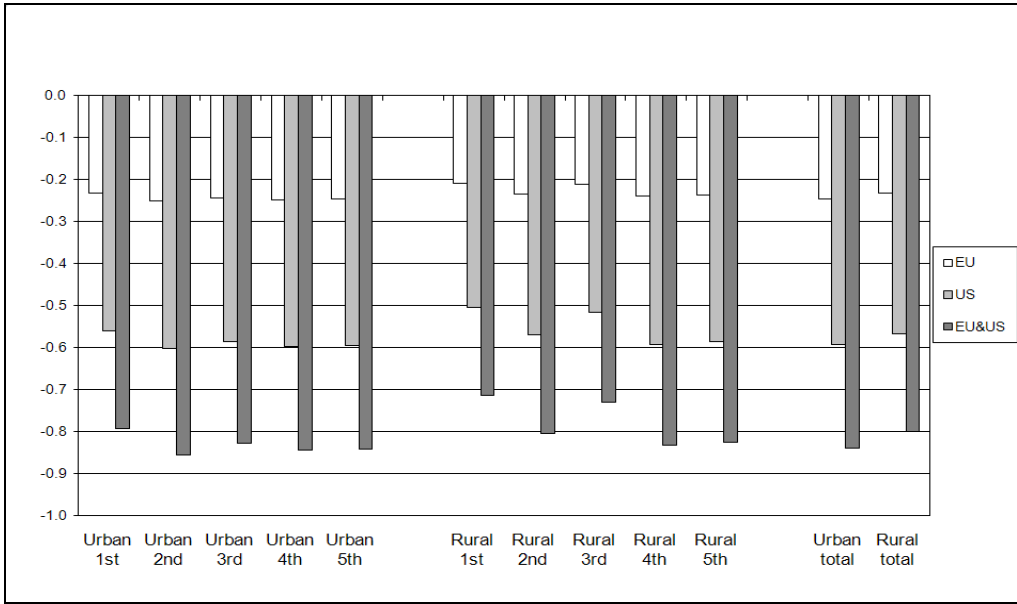
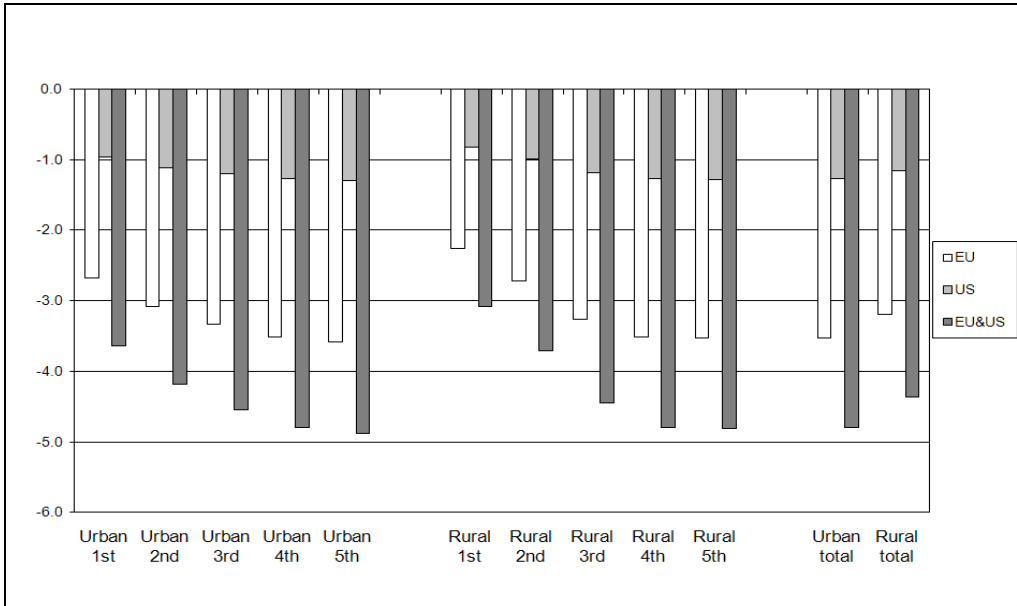
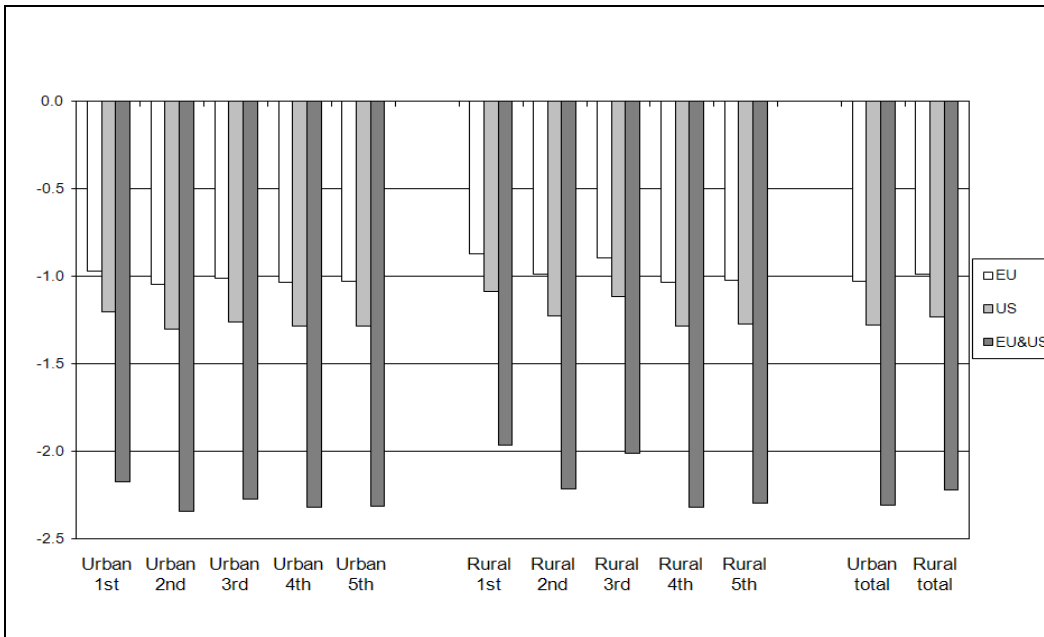


Figure 8: Impact of Trade on Incomes by Urban and Rural Household Income Quintiles, South Africa, Scenario

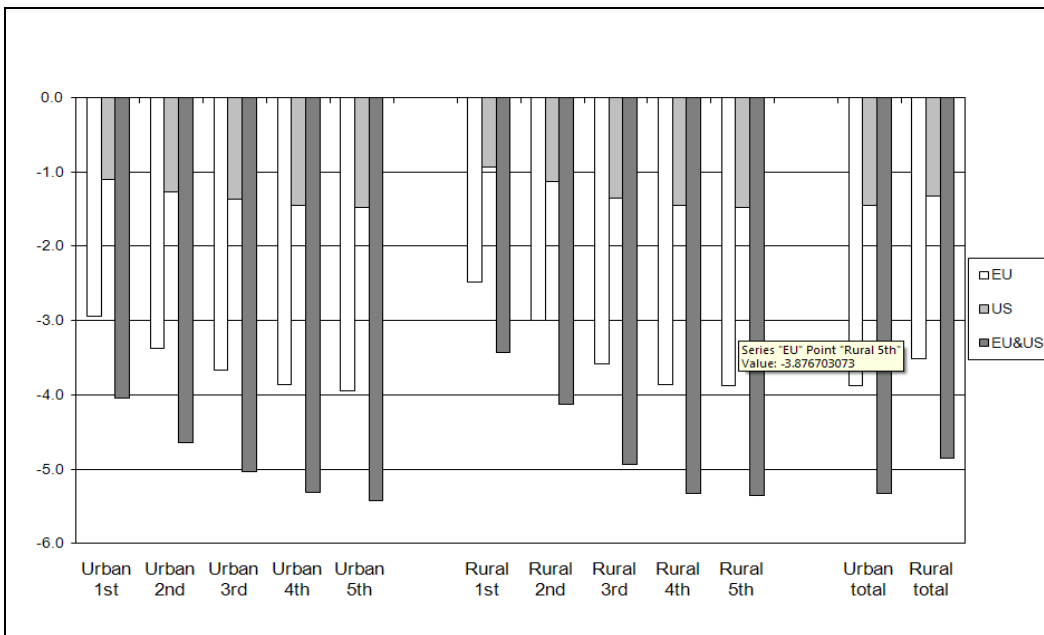
A (% 2000 income)



Appendix Figure 1: Impact of Trade on Incomes by Urban and Rural Household Income Quintiles, India, scenario B (% 2003/04 income)



Appendix Figure 2: Impact of Trade on Incomes by Urban and Rural Household income Quintiles, South Africa, Scenario B(% 2000 income)



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