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Trade Contraction and Employment in India and South Africa during the Global Crisis

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Summary. — The paper estimates the effects of the 2008–09 trade contraction on employment 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. The most notable finding is that India and South Africa experienced substantial employment declines as a result of trade contraction with the European Union and the United States. A large share of these declines occurred in the non-tradable sector and resulted from income-induced effects, illustrating how a shock originating in the tradable goods sector had strong ripple effects throughout these economies.

Key words — India, South Africa, trade, employment, economic crisis

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

1. INTRODUCTION

The global crisis 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). That global trade would have fallen alongside global output is unremarkable. Yet real global output is estimated to have declined by 2.2% in 2009 and real global trade by 12.2% (World Bank, 2010; World Trade Organization (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 "postponable" 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 Gross Domestic Product (GDP), a given change in the demand for them would have a much larger effect on trade than on GDP. 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.

World trade began to recover in late-2009, and the WTO projects it will grow by 9.5% in 2010 (WTO, 2010). It might be thought, in this regard, that studying the effects of trade contraction in the crisis is of only passing concern, since employment losses may be temporary and quickly recouped. At the same time, 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. 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 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 European Union and United States. To be explicit, the paper does not endeavor to estimate changes in employment during the crisis, which would be of limited value in the face of actual

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employment data. Rather the paper may usefully inform policy discussions in three ways.

First, this modeling approach provides a *ceterus paribus* result, for which the effects of trade contraction are to a large extent isolated from other simultaneous events, both potentially negative (e.g., a decline in 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. Second, the multiplier analysis enables the distinction among direct, indirect, and income-induced effects, providing an explanation of the strong spillover effects from tradable to non-tradable sectors resulting from trade contraction. Third, different industries and types of workers may have been differently affected by trade contraction, and such distinctions can usefully inform governments' crisis responses. As such, this paper evaluates employment impacts at aggregate and industry levels, with breakdowns by gender and skills.

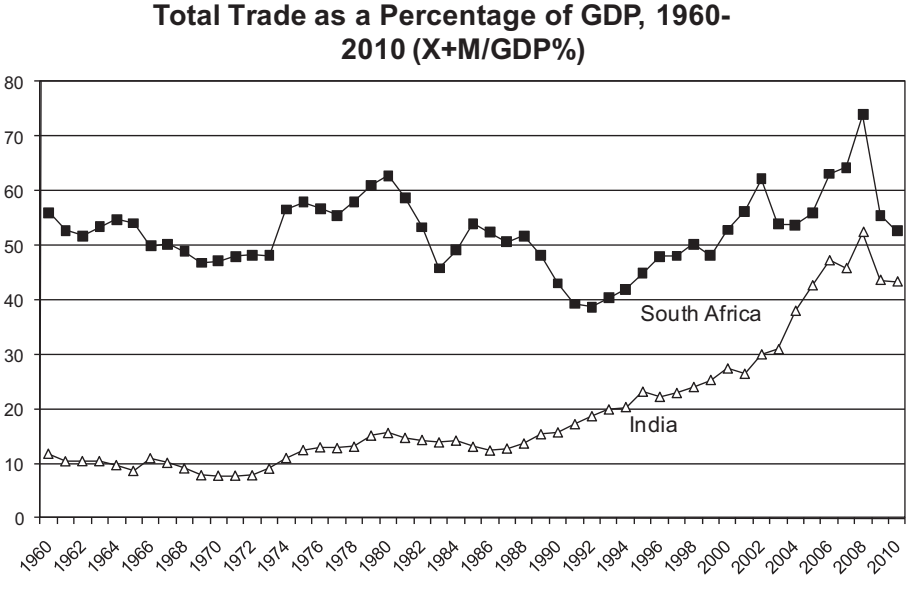
In our view, a SAMs-based Leontief multiplier model is a valuable means to estimate the employment effects of a short-term trade shock. Because of its relative simplicity combined with detailed results, the method can help design timely policy responses in an environment of great uncertainty, as created by the global crisis. Due to this simplicity and the transparency of underlying assumptions, results are well suited for informing non-specialist audiences and policymakers. Despite its limitations, the model may be as appropriate for analyzing short-term shocks as more complex Computable General Equilibrium (CGE) models that are typically designed to simulate dynamic adjustment processes to longer-run changes in the structure of trade.

Our main findings are that India and South Africa experienced substantial employment declines as a result of "The Great Trade Collapse." A large share of these declines occurred in the non-tradable sector and resulted from income-induced effects, illustrating how a shock originating in the tradable goods sector had wide-ranging effects. 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. These findings are discussed in the context of actual changes in employment in the two countries during the crisis along with aspects of Government crisis responses.

2. TRADE PATTERNS BEFORE AND DURING THE CRISIS

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. [1] 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 has 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 20–45% in India and 40–65% in South Africa up until 2008. 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 increase in their engagement with the world economy. During 2008–09, this measure declined by 9 and 18 percentage points in India and South Africa, respectively, with no rebound for either country in 2010.

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 European Union and United States. 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. [2] Shown in Figures 2 and 3 are exports (in constant prices) from India and South Africa to the European Union and United States from January 2003 to April 2009. For India, there was a substantial decline in exports from early 2008 on, driven more by trade with the United States; for South Africa, the decline was even sharper, driven more by trade with the European Union. These differences in export patterns with respect to the European Union and United States are reflected, we will see, in our employment results.



Source: WB/WDI, 2011.

Figure 1. *Total trade as a percentage of GDP, 1960–2010 ([X + M]/GDP,%).*

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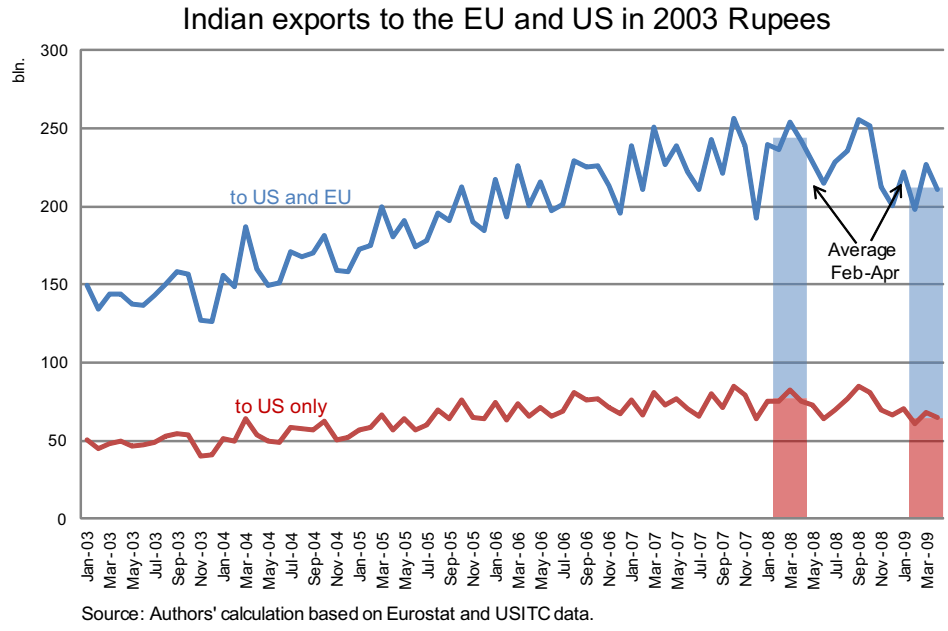

Figure 2. *Indian exports to the European Union and United States in 2003 Rupees.*

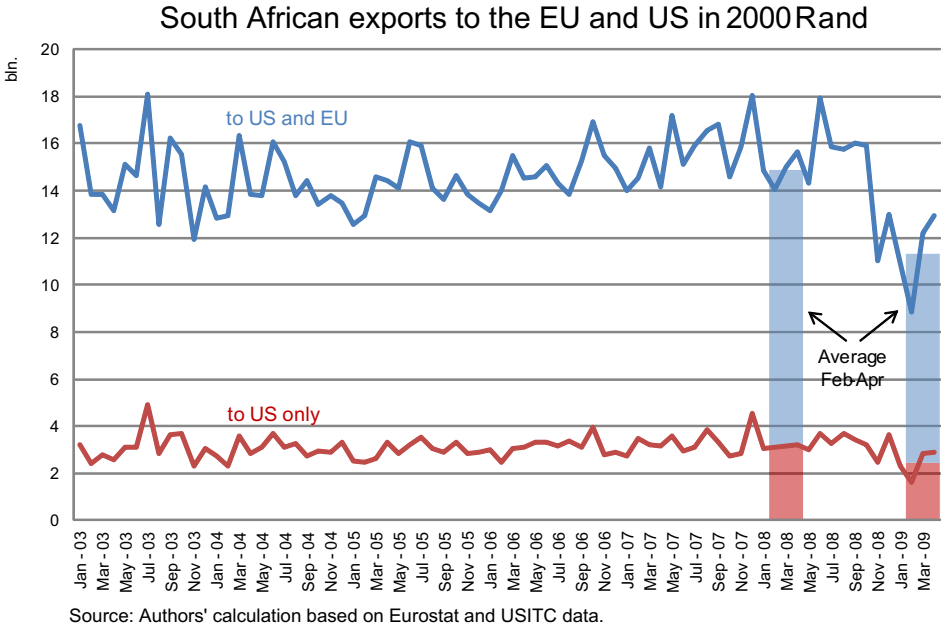

Figure 3. *South African exports to the European Union and United States in 2000 Rand.*

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 2003–04 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 employment as well as indirect effects through forward and backward 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 labor 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.

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Because the SAMs for India and South Africa provide separate commodity accounts (including imports) and production accounts (excluding imports), **T** enters the model through the commodity account and impacts the domestic economy through the production account.

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 to April of these years, shown by the shaded bars in Figures 2 and 3. 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 2004–06 and exclude the years 2007–08 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' favorable 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. [3]

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**).

Studies using similar methods to estimate the effects of trade on employment 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., Kucera & Milberg, 2003; Sachs & Shatz, 1994). 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 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, and where export growth is consistent with job loss resulting from trade expansion (Kucera & Roncolato, 2011). 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.

In addition to the breakdowns between scenarios A and B and between exports to the European Union and the United States, employment results are further broken down between male and female workers and between more and less educated workers. 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 dynamic effects through economic growth or trade-induced labor-displacing technical change. 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. In both India and South Africa during the crisis, there were concerns about exchange rate volatility and appreciation, which in normal circumstances would be expected to result in a substitution of domestic for imported inputs (Kumar & Alex, 2009; Marais, 2009). As noted in our discussion of scenarios A and B above, though, we would not expect this to hold in a predictable manner given the exceptional nature of the crisis, during which producers faced great uncertainty and imports declined as a result of plummeting demand rather than a substitution of domestic inputs. 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 toward labor-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 labor force surveys used cover both formal and informal establishments and workers, and in this sense are comprehensive. But our trade data for the European Union (from Eurostat) and the United States (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%–15% in India and 5–10% in South Africa (WB, 2009). While global 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 & Mattoo, 2009; Kumar & 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 tradable goods industries as those for which we have trade data and define all other industries as non-tradable, including service industries. These are delineated below in industry-level results. Further notes on data sources are provided in an appendix. [4]

4. RESULTS

(a) *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% in urban areas and 95% in rural areas (Sakthivel & Joddar, 2006). In this sense, what we refer to as employment declines represented in terms of full-time equivalent (FTE) jobs may in many cases translate into movements from formal into

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Table 1. *Country-level employment effects from trade (Type II multiplier).*

	India			South Africa		
	EU	US	EU & US	EU	US	EU & US
Scenario A						
	Number of jobs (FTE)					
Tradable goods industries	−1,163,804	−2,088,266	−3,252,070	−354,302	−166,124	−520,426
Non-tradable 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					
Tradable goods industries	−0.46	−0.82	−1.28	−8.30	−3.89	−12.19
Non-tradable 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)					
Tradable goods industries	−3,741,618	−4,400,303	−8,141,920	−369,835	−183,822	−553,657
Non-tradable 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					
Tradable goods industries	−1.47	−1.73	−3.20	−8.66	−4.31	−12.97
Non-tradable 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

informal employment or increases in underemployment. In any case, our results provide a measure of the negative impact for workers on average through some combination of job loss and income loss.

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 the SAMs base year employment, broken down between trade with the European Union and United States and between what we define as tradable goods and non-tradable industries.

For India, taking trade with the European Union and United States 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% 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 United States than the European Union. Estimated employment declines for non-tradable industries are substantial, even though these do not include direct trade effects for these industries. These are equivalent to 17.6% and 19.1% of estimated employment losses for all industries based on scenarios A and B, respectively.

For South Africa taking trade with the European Union and United States 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 "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% of base year employment based on scenarios A and B, respectively. In contrast with India, employment declines are driven more by trade with the European Union than the United States. Estimated employment declines for non-tradable industries are also relatively higher for South Africa, equivalent to 41.3% and 42.5% 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? For India, taking European Union and United States trade together, the share of total employment effects resulting from income-induced effects is about one-half for tradable goods industries, two-thirds for non-tradable industries, and one-half for all industries; for South Africa, the comparable shares are about one-third for tradable goods industries, two-thirds for non-tradable industries (essentially the same as for India), and just over 40% for all industries. [5]

In sum, we estimate that India and South Africa experienced sizeable employment declines as a result of trade contraction with the European Union and United States during the 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-tradable industries through indirect and income-induced effects originating from tradable goods industries. Income-induced effects also accounted for sizeable shares of estimated employment losses in tradable goods industries.

(b) *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. 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 "postponable" consumer durable and investment goods.

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Table 2. *Industry-level employment effects from trade for India: Scenario A (Type II multiplier).*

		Number of jobs (FTE)			No. jobs as % of 2003–04 empl.	% of 2003–04 empl.		Labor coefficient (2003–04, rel. to avg.)
		EU	US	EU & US	EU & US	Female	Less educ.	
Tradable goods industries	1 Agriculture	−910,021	−1,290,224	−2,200,245	−1.07	35.0	95.6	5.60
	2 Forestry and logging	−5,797	−8,066	−13,864	−1.40	37.5	95.8	0.61
	3 Fishing	9,540	8,281	17,821	1.39	12.6	97.3	0.75
	4 Coal and lignite, crude petroleum and natural gas	2,539	−11,420	−8,881	−1.15	5.3	72.0	0.22
	5 Iron ore and other minerals	−21,201	−14,865	−36,065	−2.38	21.3	96.5	1.90
	6 Manufacture of food products	−32,047	−27,014	−59,061	−1.47	23.1	85.7	0.35
	7 Beverages and tobacco products	−9434	−18,245	−27,679	−0.74	70.6	97.5	1.12
	8 Cotton textiles	−18,712	−42,312	−61,024	−2.43	31.1	90.3	0.67
	9 Wool synthetic and silk fiber textiles	−15,392	−23,242	−38,634	−2.01	27.7	94.2	0.95
	10 Jute, hemp and mesta textiles	−2,629	−5,113	−7,742	−4.30	21.2	92.4	0.66
	11 Textile products	45,891	−197,926	−152,035	−2.75	33.1	91.2	1.63
	12 Furniture and wood products	−71,170	−98,209	−169,379	−3.16	20.3	95.5	6.10
	13 Paper, paper products, printing and publishing	−2,607	−8,786	−11,392	−0.90	10.7	64.6	0.50
	14 Leather products	−1,044	−18,962	−20,006	−1.35	15.6	86.8	1.63
	15 Rubber and plastic products, petroleum products and coal tar products	4,888	−11,276	−6,388	−0.81	10.5	70.9	0.06
	16 Chemicals	−8,298	−600	−8,897	−0.52	37.3	68.6	0.14
	17 Other non-metallic mineral products and cement	−18,837	−23,463	−42,300	−1.11	24.1	93.9	1.19
	18 Iron, steel and non-ferrous metals	−18,329	−45,459	−63,788	−3.91	2.6	76.4	0.16
	19 Metal products	−17,620	−29,763	−47,383	−3.06	5.2	83.7	0.70
	20 Non-electrical machinery	−21,575	−14,483	−36,058	−3.18	4.2	60.2	0.25
	21 Electrical machinery	−15,131	−16,980	−32,111	−1.70	3.7	67.6	0.39
	22 Rail equipment and other transport equipment	53,046	−41,247	11,799	0.36	1.5	80.6	0.59
	23 Misc. manufacturing	−89,864	−148,894	−238,758	−7.82	15.3	87.2	0.68
Non-tradable industries	24 Construction	−5,907	−14,341	−20,248	−0.09	9.9	94.3	1.07
	25 Electricity and gas	−3,361	−8,781	−12,142	−1.35	4.5	58.1	0.12
	26 Water supply	−177	−622	−799	−0.43	4.6	83.4	0.36
	27 Railway transport services	−3,400	−8,587	−11,986	−1.26	3.4	60.9	0.41
	28 Other transport services	−30,754	−76,045	−106,799	−0.83	1.3	88.1	0.70
	29 Storage and warehousing	−221	−552	−773	−0.93	0.0	75.6	0.60
	30 Communication	4,430	−9,545	−13,975	−0.86	12.4	52.5	0.51
	31 Trade	−84,773	−211,284	−296,058	−0.94	11.5	78.9	1.35
	32 Hotels and restaurants	−10,160	−24,824	−34,984	−0.71	17.9	90.1	1.14
	33 Banking	−6,310	−16,319	−22,629	−1.15	13.5	29.8	0.20
	34 Insurance	−1,290	−3,364	−4,654	−0.90	14.1	16.2	0.25
	35 Education and research	−13,321	−32,292	−45,613	−0.46	39.2	23.1	1.29
	36 Medical and health	−5,913	−14,379	−20,292	−0.66	36.9	43.6	0.57
	37 Other services	−25,310	−75,800	−101,109	−0.74	31.5	82.1	1.59
	38 All industries	−1,359,131	−2,585,000	−3,944,131	−1.10	27.5	87.9	

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 European Union and United States (taken together) can be classified as "postponable" consumer durable and investment goods. 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 jewelery and precision instruments). [6] 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 round-

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Table 3. *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.		Labor coefficient (2000, rel. to avg.)
		EU	US	EU & US	EU & US	Female	Less educ.	
Tradable goods industries	1 Agriculture, hunting, forestry and fishing	−155,049	−85,990	−241,038	−11.62	44.7	74.9	5.06
	2 Coal mining	−2,230	−775	−3,004	−4.03	2.1	60.0	0.48
	3 Gold mining and other mining	−6,214	−1,678	−7,893	−1.49	3.0	52.1	0.84
	4 Food processing	−10,215	−3,873	−14,088	−6.38	32.1	38.1	0.42
	5 Beverages and tobacco products	−3,397	−1,367	−4,764	−6.50	36.8	43.0	0.34
	6 Textiles	−1,635	−2,182	−3817	−4.22	64.5	36.6	0.94
	7 Clothing	−7,969	−2,477	−10,447	−4.60	82.9	45.0	3.37
	8 Leather products	−80	−194	−273	−1.80	37.7	25.0	0.82
	9 Footwear	−1,552	−541	−2,093	−6.29	52.1	46.1	1.55
	10 Wood products	−72,933	−55,986	−128,919	−141.45	16.2	49.8	1.14
	11 Paper products	−3,254	−848	−4,102	−13.07	30.6	31.0	0.16
	12 Printing and publishing	−21,087	−2,039	−23,126	−35.46	30.0	17.3	0.64
	13 Petroleum products	−926	−324	−1,249	−5.19	12.3	10.1	0.09
	14 Chemicals	−2,445	−922	−3,367	−5.79	28.1	15.8	0.12
	15 Rubber and plastic products	−2,260	−922	−3,181	−5.31	33.3	24.2	0.48
	16 Glass products	−16,333	5,992	−10,342	−60.93	22.1	40.7	0.88
	17 Non-metal minerals	−648	−849	−1,497	−1.90	23.6	58.9	0.82
	18 Iron, steel and non-ferrous metals	−6,211	−1,419	−7,630	−8.05	11.0	35.9	0.21
	19 Metal products	−33,584	−7,819	−41,403	−29.59	8.9	37.3	0.68
	20 Non-electrical machinery	−1,417	−410	−1,827	−3.12	18.9	29.5	0.33
	21 Electrical machinery	−710	−261	−971	−2.15	21.7	13.8	0.41
	22 Communications equipment	−106	−33	−140	−1.60	51.5	15.3	0.22
	23 Scientific equipment	−125	−46	−171	−2.94	45.6	19.4	0.44
	24 Vehicles	−1,964	−378	−2,342	−3.13	19.0	24.1	0.17
	25 Transport equipment	−52	−16	−68	−1.51	4.8	43.5	0.15
	26 Furniture	−936	−390	−1,326	−3.85	21.3	36.6	0.65
	27 Misc. manufacturing	−970	−377	−1,348	−3.51	39.3	44.5	0.76
Non-tradable industries	28 Electricity, gas and water	−2,430	−1,527	−3,958	−4.21	15.6	34.3	0.30
	29 Construction	5,387	−1,267	4,121	0.60	7.3	58.5	1.19
	30 Trade services, hotels and catering	−129,280	−47,090	−176,370	−7.42	47.8	34.6	1.65
	31 Transport and communication services	−17,994	−4,340	−22,334	−3.82	14.9	34.0	0.53
	32 Financial and business services	−28,124	−11,607	−39,730	−4.02	39.9	10.9	0.52
	33 Human health, veterinary and social work	−18,417	−7,320	−25,738	−4.49	75.9	25.7	2.39
	34 Education, other services and other activities n.e.c.	−75,743	−25,689	−101,433	−4.65	69.2	44.7	5.85
	35 Government services	−391	−227	−618	−0.11	30.5	18.4	0.39
	36 All industries	−621,294	−265,192	−886,486	−7.21	43.1	42.6	

about, mediated as it is by indirect and income-induced effects as well as by differences in the labor-intensity of production across industries.

Industry-level results based on Type II multipliers are shown for India and South Africa in Tables 2 and 3, respectively, expressed in absolute terms for trade with the European Union and United States separately and together and in relative terms for the European Union and United States together. Also shown are percentages of female and less-educated workers and labor coefficients (relative to aggregate labor coefficients) for SAMs base years. The upper panel of these tables shows tradable goods industries, with manufacturing industries shaded, and the lower panel shows non-tradable industries. For the sake of brevity, we focus on scenario A results.[7]

For India looking at trade with the European Union and United States together, only two of 37 industries (23 of these tradable 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 income loss. Because the agricultural sector in India is so large, how-

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ever, estimated employment declines from trade contraction relative to 2003–04 employment are actually somewhat smaller than for the economy as a whole (1.07% *versus* 1.10%).

In relative terms, the industries with the largest estimated employment declines in India are misc. manufacturing, which includes gems and jewelery (7.8% of 2003–04 employment), jute, hemp, and mesta textiles (4.3%, though with small absolute declines), iron, steel and non-ferrous metals (3.9%), non-electrical machinery (3.2%), furniture and wood products (3.2%), and metal products (3.1%). 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 are labor-intensive and reliant on less educated workers, non-electrical machinery is capital-intensive and skills-intensive (Table 2). [8]

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% of 2000 employment. In contrast with India, however, there was an increase in agriculture exports to the European Union and United States, taken together. There was also an increase in exports from the food processing and beverages and tobacco product industries to the European Union and United States, taken together, which relied heavily on inputs from agriculture. 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. [9]

In relative terms, the industries with the largest estimated employment declines are wood products (an impossibly high 141.5% of 2000 employment [10]), glass products (60.9%), printing and publishing (35.5%) and metal products (29.6%). As with India, these industries vary widely in terms of their labor-intensity and skills-intensity. For example, wood products are labor-intensive and reliant on less educated workers whereas metal products are capital-intensive and skills-intensive (Table 3).

(c) *Gender and skills bias results*

There are large literatures on skills and gender biases of trade liberalization (e.g., Van Staveren, Elson, Grown, & Cagatay, 2007; WTO, 2008). Much of the skills bias literature is motivated by the Heckscher–Ohlin theorem regarding relative factor endowments as determinants of comparative advantage. According to this theorem, developing countries are posited to generally have a comparative advantage in unskilled labor-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 over-represented among less educated workers as well as in such export-oriented labor-intensive industries as clothing and footwear. [11]

In India and South Africa, women and less educated workers are indeed disproportionately concentrated in labor intensive industries. More specifically, there are positive correlations between labor coefficients and the percentages of female and less-educated workers, though with generally weaker relationships for India than South Africa. [12] 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 "postponable" 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 2 and 3).

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. [13] 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., Leung, Stampini, & Vencatachellum, 2009; Rubery, 1988). 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 4 regarding gender bias and Figure 5 regarding skills bias. We present results based on scenario A for all industries and for European Union and United States trade together. Regarding gender bias for India, an identical percentage of women workers, 27.9%, is estimated to have lost jobs as the actual percentage of women workers in 2003–04. That is, the 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%. For the economy as a whole, then, there is a gender bias in favor 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 European Union and United States. Though the difference of 2.4 percentage points is not large, it is consistent with the results of two prior studies assessing the overall effect of the crisis on employment in South Africa using labor 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 to 04, 89.6 to 88.7%. 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%. 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 favor of women workers and a stronger bias against less educated workers. The result on gender bias in favor of women workers during the crisis is usefully set against a prior

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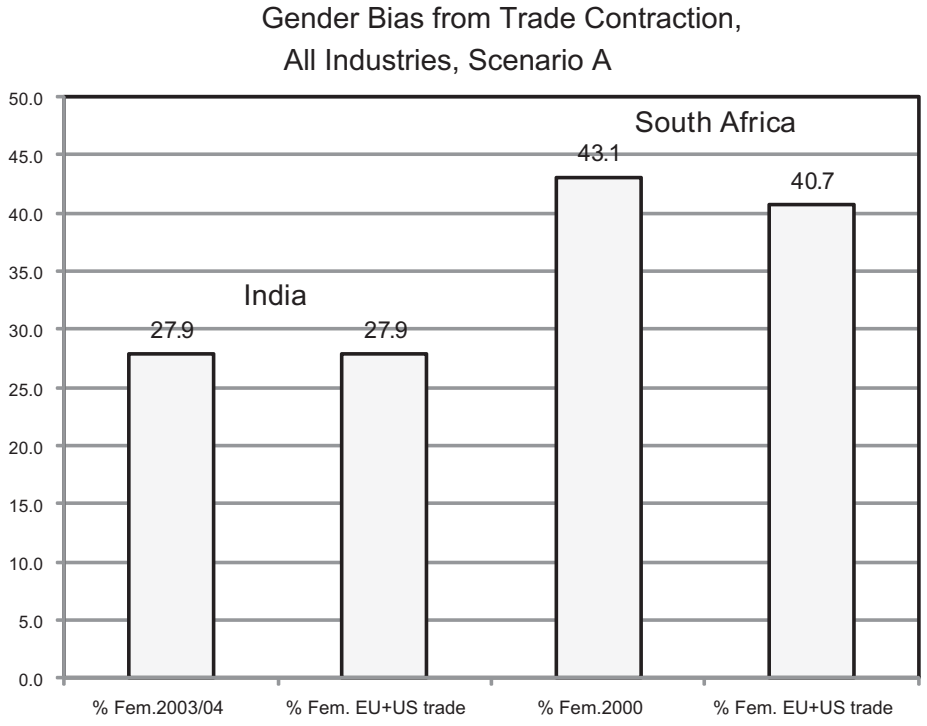

Figure 4. *Gender bias from trade contraction, all industries, Scenario A.*

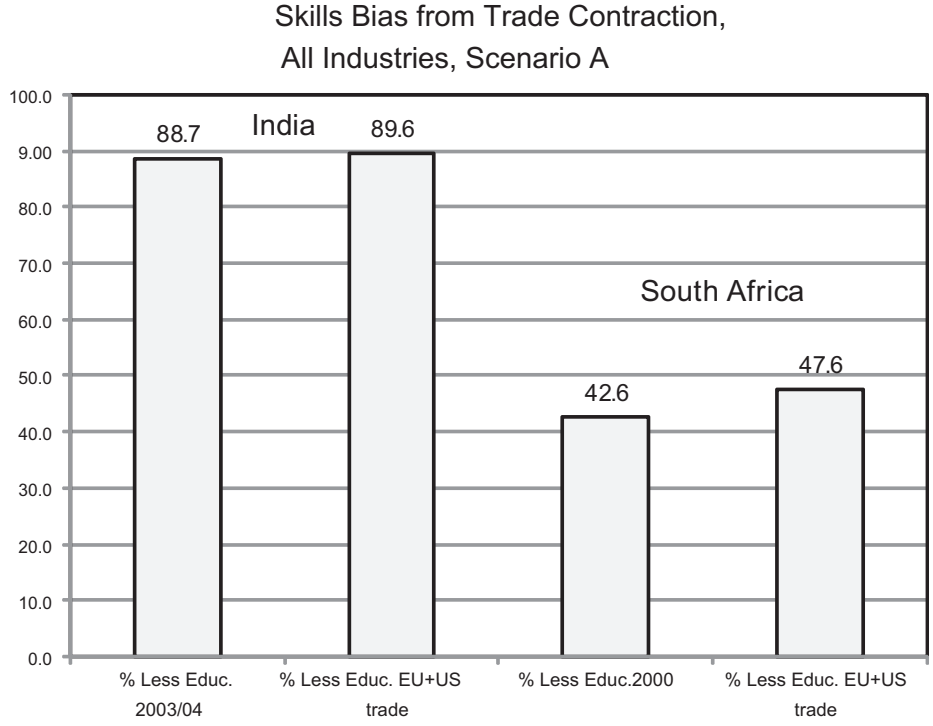

Figure 5. *Skills bias from trade contraction, all industries, Scenario A.*

study's findings of gender bias against women workers during the period of trade liberalization from 1993 to 2006 (Kucera & Roncolato, 2011). 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.

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Table 4. *Comparing actual employment changes with estimated employment changes resulting from trade contraction for India.*

Sectors in survey	Actual employment changes as cumulative quarterly % changes (Base = 2008 Q4)					Estimated employment changes from trade contraction as % changes from SAM year (Base = 2003/04)	
	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	Sectors in SAM	
Textiles and apparel*	1.0	0.3	1.6	1.7	0.9	Cotton textiles	−2.4
						Wool synthetic and silk fit	−2.0
						Jute, hemp and mesta tex	−4.3
						Textile products	−2.7
						Total textile products	−2.6
Leather*	−2.8	−2.2	−2.8	−1.9	−1.9	Leather products	−1.3
Metals	−0.6	−0.6	0.6	1.1	1.1	Metal products	−3.1
Automobiles*	0.1	1.3	2.6	2.9	4.3	Rail and other transport	0.4
Gems and jewelry*	3.1	1.4	6.5	7.3	10.2	Misc. manufacturing	−7.8
Transport	−0.4	−0.4	−0.4	−0.6	−0.8	Railway transport services	−1.3
						Other transport services	−0.8
						Total transport services	−0.9
IT/BPO*	0.8	0.5	0.7	4.9	6.1	Other services	−0.7
Handloom/powerloom*	0.3	2.6	3.3	4.0	3.6	Total textile products	−2.6
Total for surveyed industries	0.6	0.3	1.3	3.1	3.2		

Sources: Government of India, Report on effect of economic slowdown on employment in India (October–December 2008 to January–March 2010); Author's estimates as shown in Table 2.
Notes: Asterisk indicate industries receiving Government crisis support, as described in text; Shaded areas indicate period overlapping with the trade shock.

5. COMPARISON WITH ACTUAL CHANGES IN EMPLOYMENT AND GOVERNMENT CRISIS RESPONSES

"The Great Trade Collapse" may have been the most important transmission channel through which India and South Africa were affected by the crisis, but it was not the only channel, and the negative effects of all transmission channels were offset to an extent by Government crisis responses. Our employment estimates are based on the effects of trade contraction only, further limited to trade with the European Union and the United States. We have also noted that our estimates of employment declines represented as FTE jobs may actually mean income declines or increases in underemployment, such as informal or part-time employment, which would not be reflected in data on actual changes in employment.

For all these reasons, comparing our estimated changes in employment with actual changes in employment is necessarily an incomplete exercise. It can be useful, nonetheless, in providing context for our results. 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 impact of the crisis on employment (Leung *et al.*, 2009; Verick, 2010).

The Indian Government carried out establishment surveys in eight industries that reportedly account for 60% of India's GDP, though these were "quick" small sample surveys addressing mainly formal employment (Government of India, 2010). Notably, the surveys did not include agriculture, which accounted for 57 percent of employment in India as of 2005 (NSSO, 2006). (Employment data (including by gender, 2006)). Based on these surveys, there were employment declines of 131,000 workers in the second quarter of 2009 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.

Industry-level survey results for India are shown in Table 4 as cumulative percentage changes since the last quarter of 2008 alongside estimated percentage changes in employment from trade contraction, taken from Table 2. The two sources were matched by industry to the extent possible, though this remains highly imperfect because of different definitions used, and there is also a difference in base periods. The two shaded columns indicate the first two quarters of 2009, which overlap with the period of the trade shock as captured by our export demand vectors. Industries marked by an asterisk are those having received Government crisis support, as described below.

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 jewelery 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 initiated three fiscal stimulus packages between December 2008 and February 2009, but these were relatively small, totaling less than 1% of the country's GDP (ILO, 2010a). 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, jewelery, and seafood products (ILO, 2009; ILO, 2010a). These industries overlapped to a large extent with those in the Government's "quick" establishment survey. An important complement to

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Table 5. *Comparing actual employment changes with estimated employment changes resulting from trade contraction for South Africa.*

Sectors in Survey	Actual employment changes as cumulative quarterly % changes (Base = 2008 Q4)					Estimated employment changes from trade contraction as % changes from SAM year (base = 2000)	
	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	Sectors in SAM	
Agriculture	−3.4	−7.1	−14.5	−19.5	−14.9	Agriculture, hunting, forestry and fishing	−11.6
Mining*	3.7	−0.7	−6.9	−7.8	−7.8	Coal mining	−4.0
						Gold mining and other mining	−1.5
						Total mining	−1.8
Manufacturing*	−3.2	−3.7	−11.4	−10.4	−12.1	Total manufacturing	−16.9
Utilities	16.3	8.2	−5.8	14.0	−18.6	Electricity, gas and water	−4.2
Construction*	−5.5	−6.3	−11.3	−9.0	−14.4	Construction	0.6
Trade	−4.5	−6.4	−9.9	−9.2	−10.8	Trade services, hotels and	−7.4
Transport*	−2.2	−6.1	−4.8	−4.5	−0.9	Transport and communication services	−3.8
Finance*	5.4	4.5	2.8	7.5	−0.2	Financial and business services	−4.0
Community and social services	−0.4	0.1	−1.3	−1.3	−0.2	Government services	−0.1
Total for surveyed industries	−1.5	−3.5	−6.9	−6.3	−7.5		

Sources: Statistics South Africa, *Quarterly Labour Force Survey* (quarter 1, 2009 to quarter 1, 2010); Author's estimates as shown in Table 3.
Notes: Asterisk indicate industries receiving Government crisis support, as described in text; Shaded areas indicate period overlapping with the trade shock.

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.

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 (Table 2).

The South Africa Government undertakes quarterly labor force surveys, which show economy-wide year-on-year employment declines of 770,000, 833,000 and 870,000 for the periods ending with the third and fourth quarters of 2009 and first quarter of 2010 show, 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 in the beginning of this section, 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 for South Africa are shown in Table 5 following the same conventions as Table 4 for India, with cumulative percentage changes since the last quarter of 2008 alongside estimated percentage changes in employment from trade contraction, taken from Table 3. As for India, only a rough match is possible between the two sources. In particular, most of our industry breakdowns are within manufacturing, which is treated as one industry in the published labor force survey.

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. For finance, the story is ambiguous. We estimate employment declines, while the survey shows essentially no cumulative change up to the first quarter of 2010 following four quarters of employment gains.

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% for gold mining and other mining and −3.1% for vehicles, compared to −7.2% for all industries, as shown in (Table 3) (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%) and Australia (15%), 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 European Union and United States 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 (ILO, 2010b; Kumar & P. Vashisht, 2009, p. 4). 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; NEDLAC, 2009b). The *Framework* addresses transport and electrical power infrastructure, macroeconomic, trade and industrial policies, job training and policies to avoid job cuts, social policies, and global coordination.

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*. Though agriculture is absent from the *Framework* is agriculture, a "Comprehensive Rural Development Programme" was approved by the Government in August 2009 Stats SA (2010). In addition, the Government extended social transfer

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programs and implemented an emergency food relief program (Hirsch, 2010). Given the importance of income-induced employment effects, such programs not only address the social impacts of the crisis but can mitigate job losses by stabilizing household incomes.

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 India grew by 5.7% in 2009, down from 9.4% in 2007 and 7.3% in 2008, but still respectable nonetheless. In contrast, real GDP shrank in South Africa by −1.8% in 2009, compared to growth rates of 5.5% in 2007 and 3.7% in 2008 (IMF, 2010).

The two countries faced more similar challenges, though, when it came to employment, 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% in the fourth quarter of 2009 but only 0.2% in the first quarter of 2010, for the eight industries surveyed (Government of India, 2010). For South Africa, the quarter-to-quarter growth rate of employment was 0.7% in the fourth quarter of 2009 after three quarters of negative growth, but was −1.3% in the first quarter of 2010 (Stats SA). With respect to employment, the Governments of both India and South Africa faced pressing challenges well after the initial impact of the crisis.

6. CONCLUDING REMARKS

This study finds that declining exports to the European Union and United States during "The Great Trade Collapse" had a substantial negative effect on employment in India and South Africa. We estimate that the decline in exports to the European Union and United States between early-2008 and early-2009 (the more conservative of our two scenarios) resulted in the loss of nearly four million jobs in India and about 900,000 jobs in South Africa, equivalent to about 1% of base year employment in India and 7% in South Africa.

The effects of trade contraction swept widely across these countries. The vast majority of industries are estimated to have experienced employment declines as a result of trade contraction, in both tradable and non-tradable sectors. Even though the shock originated in the tradable goods sector, sizeable shares of total estimated employment declines result from ripple effects in non-tradable industries (about 18% and 40% in India and South Africa, respectively). Moreover, large shares of estimated employment declines are income-induced (about 50% and 40% in India and South Africa, respectively), which has an important policy implication: stabilizing household incomes, in addition to its social benefits, can be an effective means to reduce job loss.

Regarding the differential impact of trade contraction on male and female and skilled and unskilled workers, we find no evidence for India of gender or skill bias. For South Africa, however, we find that industries with higher shares of unskilled and male workers are disproportionately affected by employment declines, consistent with two prior studies (Leung *et al.*, 2009; Verick, 2010).

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 reveals how greater trade openness can be a source of vulnerability in a volatile global economy. This presents a significant challenge to policy-makers and emphasizes the importance of governments' ability to deliver timely and effective responses to external shocks in open economies.

NOTES

1. 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.

2. 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).

3. 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.

4. Notes on data cleaning procedures for the construction of **T1** and **T2** are available from the authors on request.

5. Detailed results available from authors on request.

6. Export demand vectors are available from the authors on request.

7. Scenario B results are available from the authors on request.

8. With respect to the labor intensity of production, one way of addressing this is by looking at the correlation between export demand vectors and labor coefficients, that is, between **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 European Union and United States together. For South Africa, there is also effectively no correlation, with a comparable Pearson correlation coefficient of 0.16.

9. Further details available from authors upon request.

10. Such a result can arise from the heterogeneous nature of the wood products industry and a subsequent mismatch between the labor intensity of production for export to the European Union and United States compared with the average labor 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.

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

12. Results available from authors on request.

13. 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.

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REFERENCES

Baldwin, R. (2009a). The great trade collapse: What caused it and what does it mean?. In R. Baldwin (Ed.), *The great trade collapse: Causes, consequences and prospects*. London: Center for Economic Policy Research, pp. 1–14.

Baldwin, R. (2009b). *The great trade collapse: Causes consequences and prospects*. London: Center for Economic Policy Research.

Borchert, I., & Mattoo, A. (2009). Services trade – the collapse that wasn't. In R. Baldwin (Ed.), *The great trade collapse: Causes, consequences and prospects*. London: Center for Economic Policy Research, pp. 151–158.

ECDC (2005). An overview of the Eastern Cape automotive industry and its opportunities in the South African context. London: Eastern Cape Development Corporation.

Gabru, F. (2009). Financial crisis batters SA's automotive industry. Creamer Media's Engineering News Online.

Government of India (2010). October–December 2008 to January–March 2010. Report on effect of economic slowdown on employment in India. Chandigarh: Ministry of Labour and Employment, Labour Bureau.

Hirsch, A. (2010). South Africa's response to the global economic crisis – some reflections. Presentation given at Development Policy Research Unit, Employment Promotion Programme and Trade & Industrial Policy Strategies Conference, Indaba Hotel and Conference Centre, Johannesburg, 27–29 October.

ILO (2009). Review of sector-specific stimulus packages and policy responses to the global economic crisis. Geneva: International Labour Organization, Sectoral Activities Programme.

ILO (2010a). India's response to the crisis. Geneva: International Labour Organization.

ILO (2010b). South Africa's response to the crisis. Geneva: International Labour Organization.

IMF (2010). World economic outlook, April 2010: Rebalancing growth. Washington, DC: International Monetary Fund.

Krueger, A. (2008). The role of international economic policy in Indian economic performance. *Asian Economic Policy Review, 3*(2), 266–285.

Kucera, D., & Milberg, W. (2003). Deindustrialization and changes in manufacturing trade: Factor content calculations for 1978–1995. *Review of World Economics, 139*(3), 601–624.

Kucera, D., & Roncolato, L. (2011). Trade liberalization, employment and inequality in India and South Africa. *International Labour Review, 150*(1-2), 1–41.

Kumar, R., & Alex, D. (2009). The great recession and India's trade collapse. In R. Baldwin (Ed.), *The great trade collapse: Causes, consequences and prospects*. London: Center for Economic Policy Research, pp. 221–230.

Kumar, R. & Vashisht. P. (2009). The global economic crisis: Impact on India and policy responses. ADBI Working Paper 164. Tokyo: Asian Development Bank Institute.

Leung, R., Stampini, M., & Vencatachellum, D. (2009). Does human capital protect workers against exogenous shocks? South Africa in the 2008–2009 crisis?, IZA Discussion Paper 4608. Bonn: The Institute for the Study of Labor.

Marais, H. (2009). The impact of the global recession on South Africa", ARI Paper 114. Madrid: Real Instituto Elcano.

NEDLAC (2009a). Framework for South Africa's response to the international economic crisis. Johannesburg: South Africa National Economic Development and Labour Council.

NEDLAC (2009b). Progress report to the President of the Republic of South Africa on the implementation of the framework for South Africa's response to the international economic crisis. Johannesburg: South Africa National Economic Development and Labour Council.

NSSO (2006). National sample survey: Employment-unemployment NSS 61st Round, July 2004-June 2005. New Delhi: Government of India National Sample Survey Organisation.

Rodrik, D. (2008). Understanding South Africa's economic puzzles. *Economics of Transition, 16*(4), 769–797.

Rodrik, D. & Subramanian, A. (2005). From 'Hindu Growth' to productivity surge: The mystery of the Indian growth transition. *IMF Staff Papers, 52*(2), 193–228.

Rubery, J. (1988). *Women and recession*. London and New York: Routledge.

Sachs, J., & Shatz, H. (1994). Trade and jobs in US manufacturing. *Brookings Papers in Economic Activity, 1*, 1–84.

Sakthivel, S., & Joddar, P. (2006). Unorganized sector workforce in India: Trends, patterns and social security coverage. *Economic and Political Weekly, 41*(21), 2107–2114.

SA (2010). Department of rural development & land reform strategic plan, 2010–2013. Pretoria: Government of South Africa.

SARW (2009). Impact of the global financial crisis on mining in Southern Africa. Southern Africa Resource Watch.

Stats SA (2010). Quarter 1, 2009 to Quarter 1, 2010. Quarterly labour force survey. Pretoria: Statistics South Africa.

UNCTAD (2009). Impact of global slowdown on India's exports and employment. Draft for comments. New Delhi: United Nations Conference on Trade and Development India Team.

Van Staveren, I., Elson, D., Grown, C., & Cagatay, N. (2007). *The feminist economics of trade*. London: Routledge.

Verick, S. (2010). Unravelling the impact of the global financial crisis on the South African labour market. ILO Employment Sector Working Paper 48. Geneva: International Labour Organization.

WB (2009). World Development Indicators. Washington, DC: World Bank.

World Bank (2010). Global economic prospects 2010: Crisis, finance, and growth. Washington, DC: World Bank.

WTO (2008). World trade report 2008: Trade in a globalizing world. Geneva: World Trade Organization.

WTO (2010). Trade to expand by 9.5 percent in 2010 after a dismal 2009, WTO reports. WTO press release, PRESS/598. Geneva: World Trade Organization.

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.

Trade/GDP data: World Development Indicators, (Washington DC: World Bank).

Social accounting matrices. India: Saluja, M. R.; Yadav, B. 2006. Social Accounting Matrix for India 2003–04, (Haryan, India Development Foundation); South Africa: Thurlow, J. 2005. South African Social Accounting Matrices for 1993 and 2000, (Washington, DC, 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).

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