

International Labour Organization

The Impact of Crisis-related Changes in Trade Flows on Employment, Incomes, Regional and Sectoral Development in Brazil

Scott McDonald, Marion Jansen, Erik von Uexkull

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Ralf Peters
ILO Trade and Employment Programme
Comments to jansen@ilo.org



Summary and Overview

- Financial crisis spread quickly to other countries
- Trade was a major channel: Trade dropped by 40 per cent
- The study examines the impact of the trade shock on labour and household incomes in a developing country: Brazil
- Use a CGE model where exports are exogenous and reduce exports
- Modest GDP reduction by 2.1 per cent
- Labour lose out of the crisis, with low and medium skilled labour losing more than high skilled labour



A single country CGE: STAGE_LAB

- STAGE is a general purpose single country CGE model calibrated using data from a Social Accounting Matrix (SAM determines agents and provides database)
- STAGE_LAB is a variant of STAGE with greater richness in the modelling of factor use
- Developed by Scott McDonald and Karen Thierfelder
- Conceptually follows: Derivis, de Melo, Robinson (1982), Robinson, Kilkenny, Hanson (1990), Kilkenny (1991).
- Well documented model
- Codes for the STAGE models are provided free of charge for academic use: <http://www.cgemod.org.uk/>



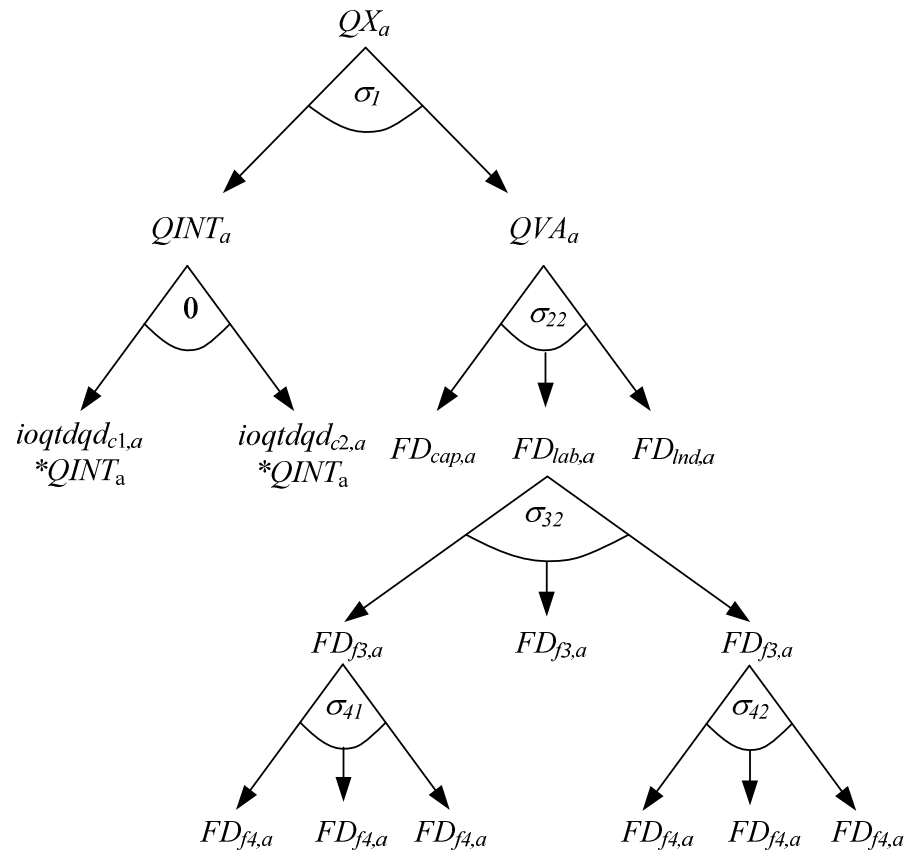
Features of STAGE_LAB

- General treatment of trade: goods to be traded or non-traded
- Allows relaxation of the small country assumption for exports
- Price taker for all imports
- Imperfect transformation between domestic demand and export demand: Constant Elasticity of Transformation
- Household consumption expenditure is modelled using Stone-Geary utility functions
- Armington assumption: domestic and imported goods consumed depending on relative price
- All tax rates can adjust endogenously to satisfy fiscal policy constraints



Production Relationships for Stage_LAB Model: Quantities

- Value added production technologies specified as general system of nested CES functions



Production in STAGE_LAB

- Activity output is a CES aggregate of the quantities of aggregate intermediate inputs ($QINT$) and value added (QVA)
 - Aggregate intermediate inputs are a Leontief aggregate of the (individual) intermediate inputs
 - Aggregate value added is a CES aggregate of the quantities of 'primary' inputs demanded by each activity (FD), where the primary inputs can be natural factors – types of labour, capital and land that exist – and aggregate factors that are aggregates of natural factors and/or other aggregate factors
- No assumption necessary that all natural factors are equally substitutable
- Factor markets are segmented, e.g. unskilled labour in different regions



Unemployment in the Model

- Allows endogenous unemployment for all factors and ability for factors to migrate between regions and/or factor classification
 - Unemployment:
 - supply = current total demand + stock of factor currently unemployed
 - Real wage is fixed until all the stock absorbed by the labour market and after that the real wage is flexible
 - Migration:
 - constant elasticity of supply of subsets of factors to 'pools'
 - allows factors to migrate between regions



Data and Closure

- Data: SAM constructed by Bento de Souza Ferreira Filho
- Base year is 2004

- 27 regions aggregated to 7 regions
- 42 commodities
- 7 region specific types of land
- 7 region specific types of capital
- 35 types of labour (5 different skill levels in each region)
- 7 region specific households

- A short-term perspective: Capital and land are fixed
- Skilled labour is assumed to adjust via wages, while the model allows for unemployment of unskilled labour (reflecting the realities of the Brazilian labour market)



Exogenous trade shock

- Export quantities are made exogenous, world prices of exports flexible
 - Mirror data to calculate decline of exports to US and EU
 - Percentage change of Feb. - April of 2009 to same period in 2008
 - Trade with rest of the world assumed unchanged
 - Import quantity is endogenous and world prices of imports are fixed
 - Imports decline as well
-
- 2nd scenario: fixed import quantity (based on calculated changes) and flexible prices for imports



... is predicted
to lead ...

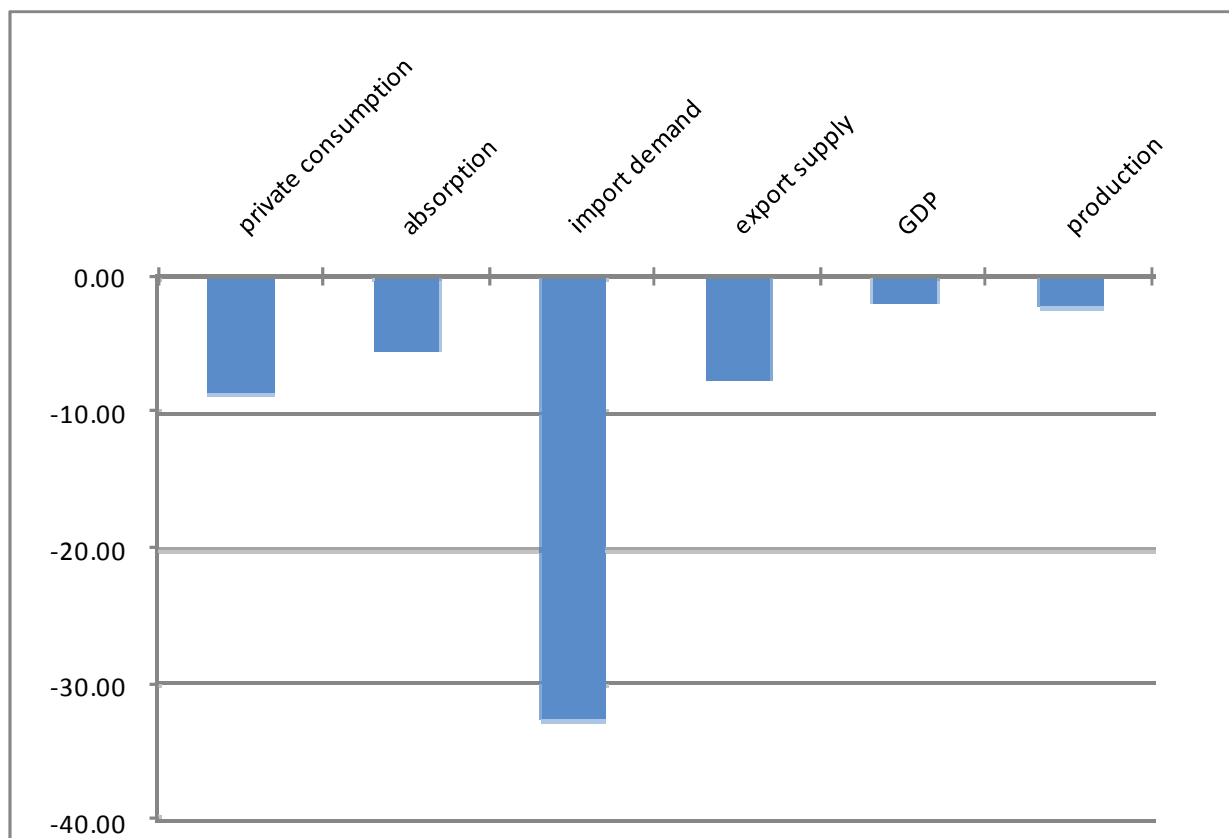
Brazil: Export shock as
used for the modelling
exercise

Sugar Cane	0.0%
Soybean	12.8%
Other agriculture	-14.2%
Livestock	-4.3%
Mineral Extraction	-18.3%
Petrol and Gas Extraction	21.9%
Non metallic minerals	-19.1%
Iron	-30.5%
Non ferrous metals	-26.9%
Other metal products	-13.1%
Machinery	-16.5%
Electric materials	-6.9%
Electronic Equipment	-6.9%
Automobiles	-2.5%
Other vehicles and spare parts	-17.8%
Wood and furniture	-20.6%
Paper and graphic	5.9%
Rubber products	-8.6%
Chemical elements	-5.0%
Refined petrol products	-2.4%
Other chemical products	1.1%
Pharmaceuticals	15.7%
Plastics	-2.0%
Textiles	-12.0%
Apparel	-17.2%
Leather products	-13.1%
Processed coffee products	-21.0%
Livestock products	-2.4%
Sugar	-1.3%
Other food products	-1.1%
Other manufacturing	-6.7%
TOTAL	-9.4%



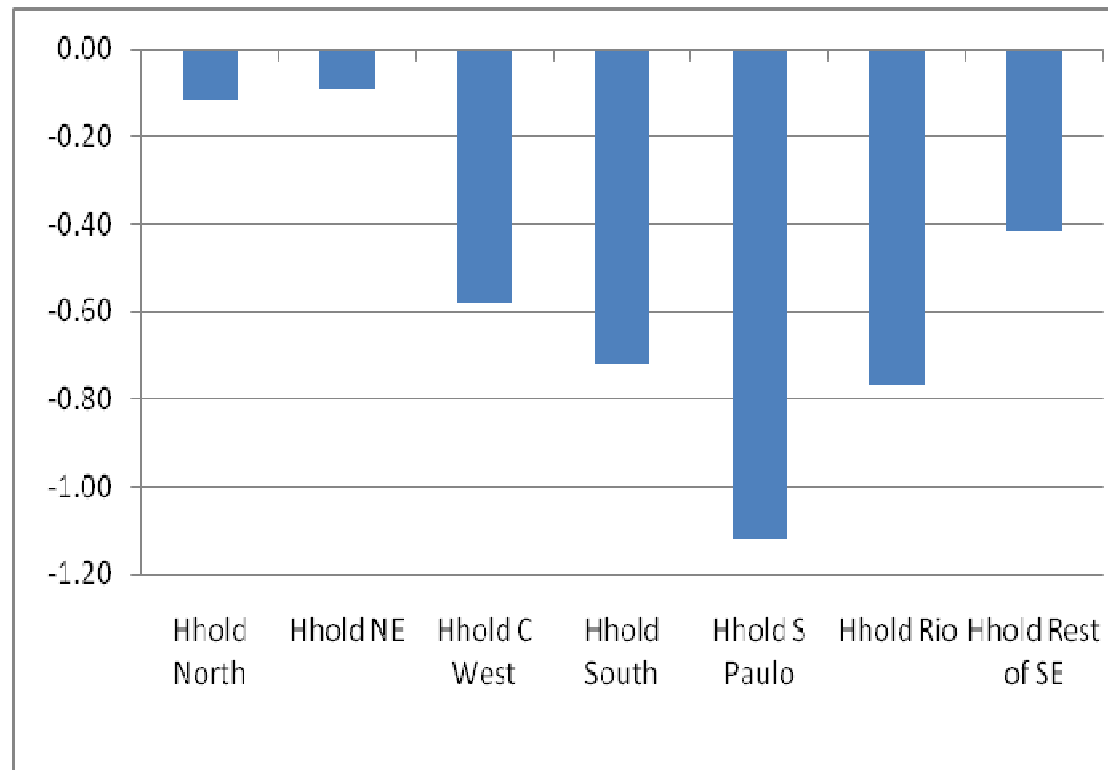
... to substantial macroeconomic fluctuations...

Brazil: Predicted Changes in Macroeconomic Aggregates



... and welfare reductions, especially in the more industrialized regions.

Brazil: Predicted Welfare Changes



All factors are predicted to lose, but very low wage earners are hit the hardest.

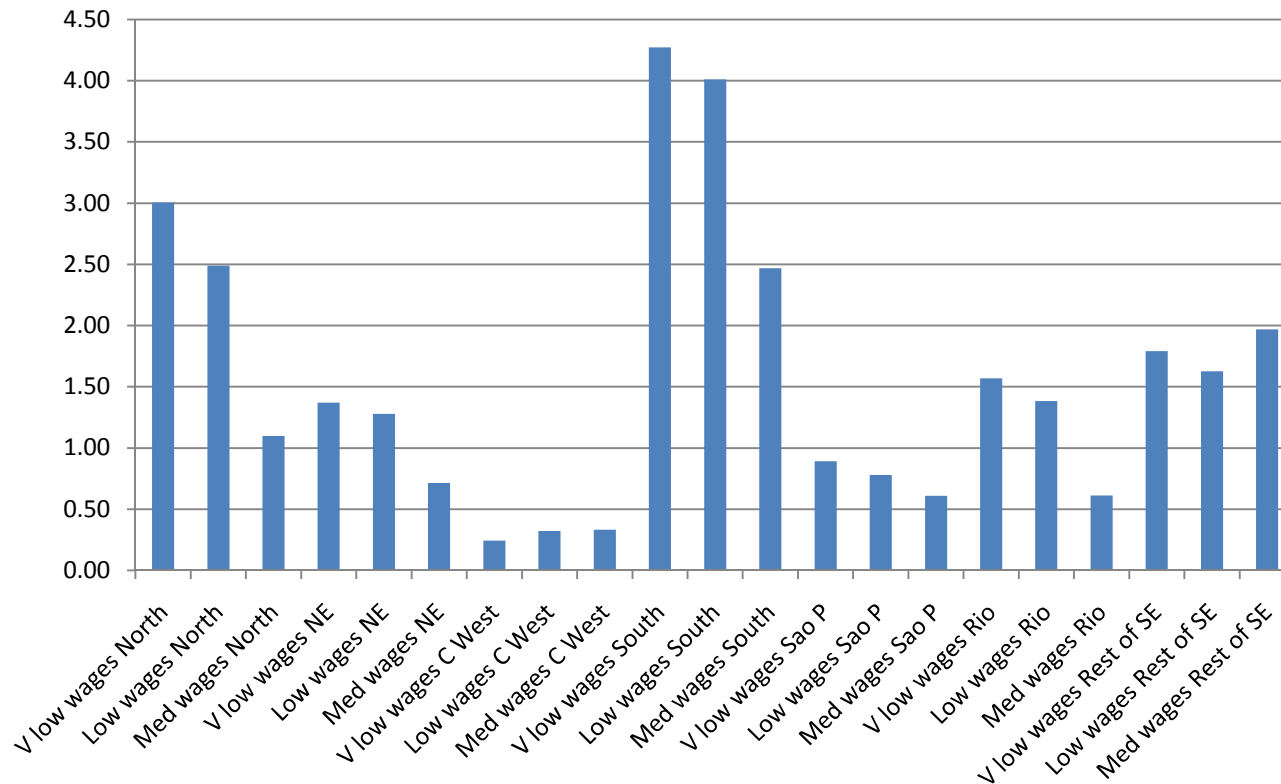
Brazil: Predicted Changes in Factor Incomes

	North	NE	C West	South	Sao P Rio	SE
V low wages	-11.15	-7.27	-1.60	-6.00	-7.43	-8.80
Low wages	-9.24	-6.78	-2.13	-5.64	-6.48	-7.99
Med wages	-7.37	-6.09	-2.06	-5.94	-5.68	-6.71
High wages	-2.85	-2.48	-0.95	-2.44	-2.56	-2.86
V high wages	-2.83	-2.19	-1.08	-2.36	-2.77	-2.94
Capital	-4.64	-3.73	-5.26	-4.75	-5.10	-2.39
Land	-9.51	-5.48	6.37	-1.01	-3.37	-8.69



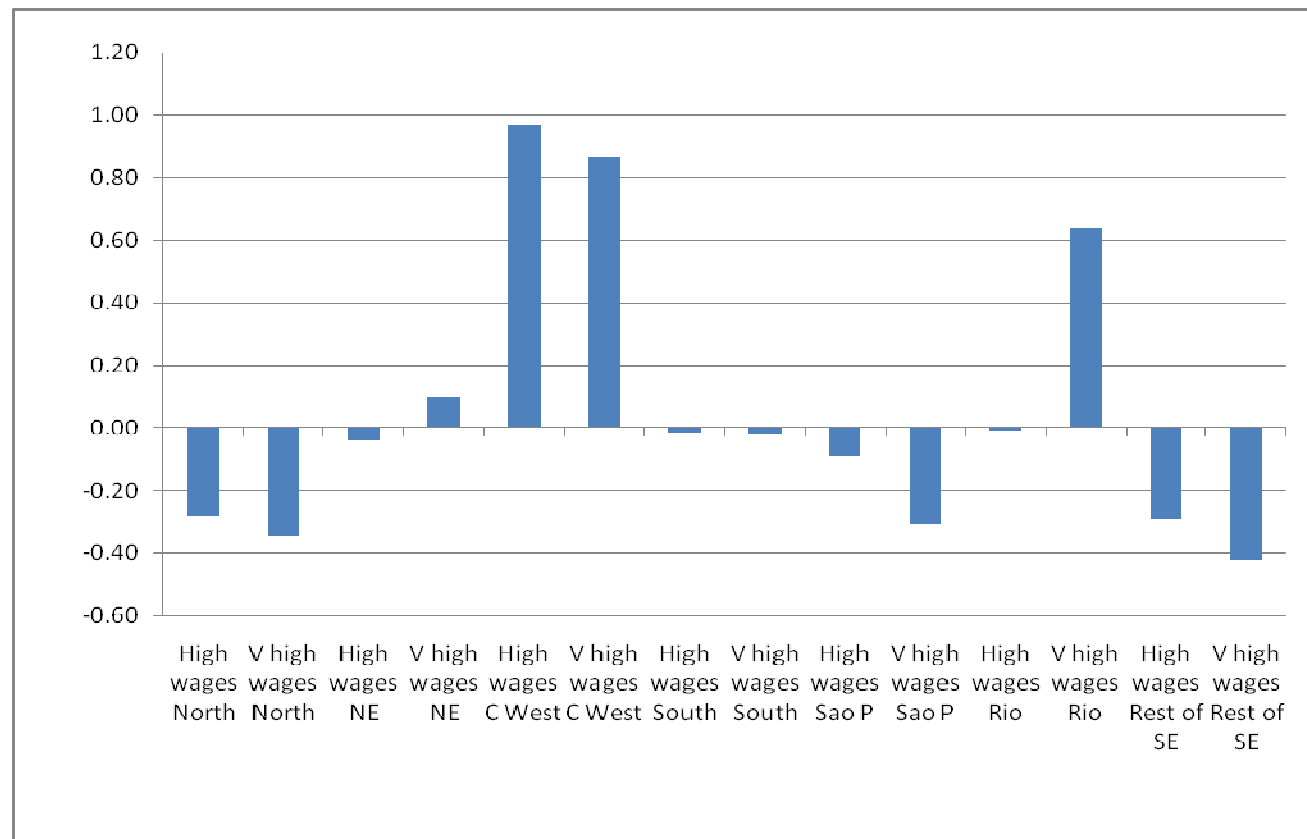
Unemployment increases, especially for very low wage earners in the South...

Brazil: Predicted Changes in Unemployment



... and there are migration incentives for skilled labour to Rio and the Central West.

Brazil: % Changes in Employment due to Labour Migration



Conclusions / Lessons from Brazil

- Exports and imports decline which worsens allocative efficiency: Welfare declines
- Strong differences in the impact of the crisis among households, regions, production factors
- Results demonstrate the seriousness of the trade shock for the Brazilian economy despite it being relatively close
- Policy intervention seems to have been effective in mitigating some of the impact to materialize. Focus on social spending (*Bolsa Familia* extension) seems justified given the strong effect on low wage earners.
- Limitation: Effects may be inflated because in reality actors may believe that exports normalize

