



The Role of Brazilian Regions in the Global Value Chain

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“Outsourcing, offshoring, international fragmentation, vertical specialization, slicing up the value chain, global supply chain”

Production processes are sliced up into smaller parts
outsourced to specialized subcontractors in foreign countries

Global unbundling:

location of production of intermediates \neq
location of production of final goods

Upsurge of trade in intermediate products



Today's products and services no longer produced within a single country, but made in global value chains

Consequence:

do imports/exports adequately reflect what is going on?

WTO & OECD:

"made in the world" initiative

next to standard trade figures
also *trade in value added*

How much Chinese value added ends up
in US "consumption" bundle?

(consumption, investments, government expenditures)



How much Chinese value added ends up
in US “consumption” bundle?
(consumption, investments, government expenditures)

Calculations with world input-output tables

World input-output tables

		France	Germany	USA	France	Germ	USA	Tot
		M ... S ... C	M ... S ... C	M ... S ... C	H | I | G	H | I | G	H | I | G	
France	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
Germany	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
USA	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•
Value added		• • • • •	• • • • •	• • • • •				
Total		• • • • •	• • • • •	• • • • •				

World input-output tables

		France			Germany			USA			France	Germ	USA	Tot
		M ...	S ...	C	M ...	S ...	C	M ...	S ...	C					H	I	G
France	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
Germany	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
USA	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
Value added		•	•	•	•	•	•	•	•	•	•	•	•	•
Total		•	•	•	•	•	•	•	•	•	•	•	•	•

**From: French car manufacturing
To: German household consumption**

**From: US mining
To: German steel manufacturing**

World input-output tables

		France			Germany			USA			France	Germ	USA	Tot
		M ...	S ...	C	M ...	S ...	C	M ...	S ...	C				
France	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
Germany	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
USA	Mining	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	•
Value added		•	•	•	•	•	•	•	•	•	•	•	•	•
Total		•	•	•	•	•	•	•	•	•	•	•	•	•

From: French car manufacturing
To: German household consumption

From: US mining
To: German steel manufacturing

Production "recipe" of
French steel manufacturing

World input-output tables

		France			Germany			USA			Tot
		M ... S ... C	C ... S ... C	M ... S ... C	H | I | G	H | I | G	H | I | G				
France	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
Germany	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
USA	Mining	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Steel manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
	Car manuf	• • • • •	• • • • •	• • • • •	• • •	• • •	• • •	•			
Value added		• • • • •	• • • • •	• • • • •							
Total		• • • • •	• • • • •	• • • • •							
Employment		• • • • •	• • • • •	• • • • •							
CO2 emissions		• • • • •	• • • • •	• • • • •							

World input-output tables
and satellite accounts



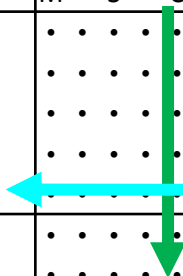
Overly simplified example

Question:

How *much* labour and *what* labour is involved in the French exports of cars to US households?

Calculations

		France			Germany			USA			France	Germ	USA	Tot
		M ...	S ...	C	M ...	S ...	C	M ...	S ...	C				
France	Mining	.	.	.	.	.	.	.	.	.	.	.	.
	
	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.
	
	Car manuf	.	.	.	.	.	.	.	.	.	.	.	.
Germany	Mining	.	.	.	.	.	.	.	.	.	.	.	.
	
	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.
	
	Car manuf	.	.	.	.	.	.	.	.	.	.	.	.
USA	Mining	.	.	.	.	.	.	.	.	.	.	.	.
	
	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.
	
	Car manuf	.	.	.	.	.	.	.	.	.	.	.	.
Value added		.	.	.	.	.	.	.	.	.	.	.	.
Total		.	.	.	.	.	.	.	.	.	.	.	.
Employment		.	.	.	.	.	.	.	.	.	.	.	.
CO2 emissions		.	.	.	.	.	.	.	.	.	.	.	.

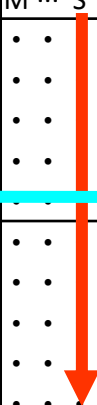
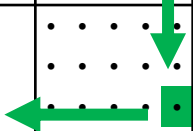
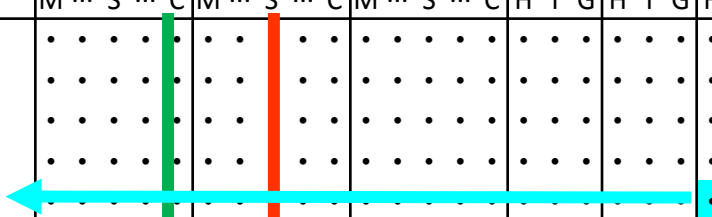


French car manufacturing requires: inputs from German steel manufacturing

and French labour

Calculations

		France			Germany			USA			France	Germ	USA	Tot
		M ...	S ...	C	M ...	S ...	C	M ...	S ...	C				
France	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
Germany	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
USA	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
Value added		•	•	•	•	•	•	•	•	•	•	•	•	
Total		•	•	•	•	•	•	•	•	•	•	•	•	
Employment		•	•	•	•	•	•	•	•	•	•	•	•	
CO2 emissions		•	•	•	•	•	•	•	•	•	•	•	•	



German steel manufacturing requires: inputs from US mining

and German labour

Calculations

		France			Germany			USA			France	Germ	USA	Tot
		M ...	S ...	C	M ...	S ...	C	M ...	S ...	C	H | I | G	H | I | G	H | I | G	
France	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
Germany	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
USA	Mining	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Steel manuf	•	•	•	•	•	•	•	•	•	•	•	•	
	•	•	•	•	•	•	•	•	•	•	•	•	
	Car manuf	•	•	•	•	•	•	•	•	•	•	•	•	
Value added		•	•	•	•	•	•	•	•	•	•	•	•	
Total		•	•	•	•	•	•	•	•	•	•	•	•	
Employment		•	•	•	•	•	•	•	•	•	•	•	•	
CO2 emissions		•	•	•	•	•	•	•	•	•	•	•	•	

US mining requires:
US labour



This paper:

trade in value added for regions

Same story applies (perhaps even to a larger extent)

Region with seaport or airport exports

and gets all the credits

whereas v.a. generation takes place in inland regions



This paper:
 trade in value added for regions

Question:

How much value added generated in a certain Brazilian state (Amazonas) ends up in a foreign “consumption” bundle?
 = exports of value added by Amazonas

How much foreign value added ends up in the “consumption” bundle of a certain Brazilian state (Bahia)?
 = imports of value added by Bahia



Combine:

WIOD's world input-output table

Brazilian inter-state input-output table



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Grant Agreement no: 225 281

WIOD

WORLD INPUT-OUTPUT DATABASE: Construction and Applications

Publicly available, *free of charge*
<http://www.wiod.org>





List of Countries

- **EU-27**
- **plus 13 non-EU:**

Canada	Russia	South Korea
United States	China	Taiwan
Brazil	India	Indonesia
Mexico	Japan	Australia
Turkey		

- Countries selected on basis of quality of public data availability and economic importance





Combine:

WIOD's world input-output table
Brazilian inter-state input-output table

- 2008
- Aggregated to 28 industries
- 39 countries + Brazil + RoW
27 states (26 states + Federal District)



	Intermediate use				Final use				Gross Output
	in R	in S	in e	in w	in R	in S	in e	in w	
Product flows from									
country R	\mathbf{z}^{RR}	\mathbf{z}^{RS}	\mathbf{z}^{Re}	\mathbf{z}^{Rw}	\mathbf{c}^{RR}	\mathbf{c}^{RS}	\mathbf{c}^{Re}	\mathbf{c}^{Rw}	\mathbf{x}^R
country S	\mathbf{z}^{SR}	\mathbf{z}^{SS}	\mathbf{z}^{Se}	\mathbf{z}^{Sw}	\mathbf{c}^{SR}	\mathbf{c}^{SS}	\mathbf{c}^{Se}	\mathbf{c}^{Sw}	\mathbf{x}^S
Brazil region e	\mathbf{z}^{eR}	\mathbf{z}^{eS}	\mathbf{z}^{ee}	\mathbf{z}^{ew}	\mathbf{c}^{eR}	\mathbf{c}^{eS}	\mathbf{c}^{ee}	\mathbf{c}^{ew}	\mathbf{x}^e
Brazil region w	\mathbf{z}^{wR}	\mathbf{z}^{wS}	\mathbf{z}^{we}	\mathbf{z}^{ww}	\mathbf{c}^{wR}	\mathbf{c}^{wS}	\mathbf{c}^{we}	\mathbf{c}^{ww}	\mathbf{x}^w
Value added	$(\mathbf{v}^R)'$	$(\mathbf{v}^S)'$	$(\mathbf{v}^e)'$	$(\mathbf{v}^w)'$					
Total inputs	$(\mathbf{x}^R)'$	$(\mathbf{x}^S)'$	$(\mathbf{x}^e)'$	$(\mathbf{x}^w)'$					



Results





	export		import		surplus	
Amazonas	1607	7,8%	6205	30,0%	-4599	-22,3%
Pará	7964	27,2%	2934	10,0%	5029	17,2%
Bahia	6736	11,8%	7737	13,6%	-1002	-1,8%
Maranhão	2322	12,2%	2802	14,7%	-480	-2,5%
Mato Grosso	5471	21,7%	1568	6,2%	3903	15,5%
Mato Grosso do Sul	1702	11,3%	1839	12,2%	-136	-0,9%
Espírito Santo	6391	22,0%	5229	18,0%	1161	4,0%
Minas Gerais	19149	14,6%	13805	10,5%	5343	4,1%
Rio de Janeiro	19835	12,6%	17352	11,0%	2482	1,6%
São Paulo	57476	12,7%	57765	12,7%	-289	-0,1%
Paraná	10952	13,1%	11324	13,5%	-372	-0,4%
Santa Catarina	6699	11,6%	7672	13,2%	-973	-1,7%
Rio Grande do Sul	13304	14,2%	12293	13,1%	1011	1,1%
Total	171056		170859		197	
Average weighted		12,2%		12,2%		0,0%
Average unweighted		9,9%		11,4%		-1,5%



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Mar						5%
Mat						5%
Mat						9%
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At national level:
exports of value added \approx imports of value added



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	export		import		surplus	
Amazonas	1607	7,8%	6205	30,0%	-4599	-22,3%
Pará						2%
Bahia						8%
Maranhão						5%
Mat Grosso						5%
Mat Grosso do Sul						9%
Espírito Santo						0%
Minas Gerais						1%
Rio de Janeiro	15855	12,6%	17552	11,6%	2482	1,6%
São Paulo	57476	12,7%	57765	12,7%	-289	-0,1%
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Average unweighted		9,9%		11,4%		-1,5%

Weights: export/import of value added

weighted > unweighted:

states with much export of value added

export a larger % of their value added

than states with little export of value added



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Santa Catarina	6699	11,6%	7672	13,2%	-973	-1,7%
Rio Grande do Sul	13304	14,2%	12293	13,1%	1011	1,1%
Total	171056		170859		197	
Average weighted		12,2%		12,2%		0,0%
Average unweighted		9,9%		11,4%		-1,5%



	export		import		surplus	
Amazonas	1607	7,8%	6205	30,0%	-4599	-22,3%
Paraná						2%
Bahia						8%
Maranhão						5%
Mato Grosso do Sul	1702	11,3%	1839	12,2%	-136	-0,9%
Espírito Santo	6391	22,0%	5229	18,0%	1161	4,0%
Minas Gerais	19149	14,6%	13805	10,5%	5343	4,1%
Rio de Janeiro	19835	12,6%	17352	11,0%	2482	1,6%
São Paulo	57476	12,7%	57765	12,7%	-289	-0,1%
Paraná	10952	13,1%	11324	13,5%	-372	-0,4%
Santa Catarina	6699	11,6%	7672	13,2%	-973	-1,7%
Rio Grande do Sul	13304	14,2%	12293	13,1%	1011	1,1%
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Average weighted		12,2%		12,2%		0,0%
Average unweighted		9,9%		11,4%		-1,5%

South and Southeast:
78% of exported value added
73% of imported value added



How do the results for Brazil and its states
 relate to other countries?



	export		import		surplus	
Canada	372396	26,5%	329022	23,4%	43373	3,1%
China	1525398	34,6%	896192	20,3%	629206	14,3%
Germany	1049941	32,1%	758659	23,2%	291281	8,9%
France	449716	17,6%	501144	19,6%	-51428	-2,0%
UK	540362	22,1%	551867	22,5%	-11505	-0,5%
Indonesia	117124	24,1%	100465	20,7%	16659	3,4%
India	183084	15,4%	217587	18,3%	-34504	-2,9%
Japan	676130	14,2%	596165	12,5%	79966	1,7%
Korea	246761	29,7%	247194	29,7%	-433	-0,1%
Netherlands	290840	37,5%	222624	28,7%	68216	8,8%
USA	1302756	9,0%	1891039	13,1%	-588283	-4,1%
RoW	2172022	27,2%	2564064	32,1%	-392042	-4,9%
	11787589		11787786		-197	
Average weighted		20,9%		20,9%		0,0%
Average unweighted		28,7%		29,7%		-1,1%



	export		import		surplus	
Canada	372396	26,5%	329022	23,4%	43373	3,1%
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Indo						%
India						%
Japa						%
Kore						%
Neth						%
USA						%
RoW	2172022	27,2%	2564064	32,1%	-392042	-4,9%
	11787589		11787786		-197	
Average weighted		20,9%		20,9%		0,0%
Average unweighted		28,7%		29,7%		-1,1%

The average country is much more involved in the global value chain than Brazil is

Approximately twice as much trade in value added (as % of country's value added)

20,9%

28,7%

20,9%

29,7%



	export		import		surplus	
Canada	372396	26,5%	329022	23,4%	43373	3,1%
						14,3%
						8,9%
						-2,0%
						0,5%
						%
						%
						%
						%
						%
						%
USA						%
RoW	2172022	27,2%	2564064	32,1%	-392042	-4,9%
	11787589		11787786		-197	
Average weighted		20,9%		20,9%		0,0%
Average unweighted		28,7%		29,7%		-1,1%

Weights: export/import of value added

weighted < unweighted:
 countries with little export of value added
 (i.e. small, open countries)
 export a larger % of their value added
 than states with much export of value added
 (i.e. large, closed countries)



	export		import		surplus	
Canada	372396	26,5%	329022	23,4%	43373	3,1%
China	1525398	34,6%	896192	20,3%	629206	14,3%
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RoW	2172022	27,2%	2564064	32,1%	-392042	-4,9%
	11797599		11797796		197	

countries with little export of value added (i.e. small, open countries)
 export a larger % of their value added than
 states with much export of value added (i.e. large, closed countries)



Brazilian trade in value added is limited

Do Brazilian states trade?
And, if yes, with whom?

With each other?



	domestic	regional	regional	regional	intl
		exports	imports	surplus	surplus
Amapá	82%	13%	42%	-30%	-4%
Amazonas	41%	51%	31%	20%	-22%
Pará	57%	16%	44%	-28%	17%
Paraíba	80%	17%	47%	-30%	-8%
Piauí	81%	15%	60%	-45%	-7%
Mato Grosso	44%	34%	24%	10%	15%
Mato Grosso do Sul	61%	28%	36%	-8%	-1%
Espírito Santo	48%	30%	34%	-4%	4%
Minas Gerais	61%	24%	33%	-8%	4%
Rio de Janeiro	64%	23%	31%	-7%	2%
São Paulo	57%	30%	14%	16%	0%
Paraná	54%	32%	27%	6%	0%
Santa Catarina	57%	31%	30%	1%	-2%
Rio Grande do Sul	61%	25%	28%	-3%	1%



Results

	domestic	regional exports	regional imports	regional surplus	intl surplus
Amapá	82%	13%	42%	-30%	-4%
Amazonas	41%	51%	31%	20%	-22%
Pará	57%	16%	44%	-28%	17%
Paraíba	80%	17%	47%	-30%	-8%
Piauí	81%	15%	60%	-45%	-7%
Mato Grosso	44%				
Mato Grosso do Sul	61%	28%	36%	-8%	-1%
Espírito Santo	48%	30%	34%	-4%	4%
Minas Gerais	61%	24%	33%	-8%	4%
Rio de Janeiro	64%	23%	31%	-7%	2%
São Paulo	57%	30%	14%	16%	0%
Paraná	54%	32%	27%	6%	0%
Santa Catarina	57%	31%	30%	1%	-2%
Rio Grande do Sul	61%	25%	28%	-3%	1%

somewhat smaller than for countries



	domestic	regional exports	regional imports	regional surplus	intl surplus
Amapá	82%	13%	42%	-30%	-4%
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Minas Gerais	61%	24%	33%	-8%	4%
Rio de Janeiro	64%	23%	31%	-7%	2%
São Paulo	57%	30%	14%	16%	0%
Roraima	54%	22%	27%	6%	0%
Rio Grande do Sul	61%	25%	28%	-3%	1%

surplus of 16% for Sao Paulo "does the job"

surplus of 16% for Sao Paulo "does the job"

total surpluses/shortages = 86.667

surplus for Sao Paulo is 86% of the total surplus

almost all states are net importers from Sao Paulo !

		exports	imports	surplus	intl surplus
Amapá	82%	13%	42%	-30%	-4%
Amazonas	41%	51%	31%	20%	-22%
Pará	57%	16%	44%	-28%	17%
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Mato Grosso	44%	34%	24%	10%	15%
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São Paulo	57%	30%	14%	16%	0%
Paraná	54%	32%	27%	6%	0%
Santa Catarina	57%	31%	30%	1%	-2%
Rio Grande do Sul	61%	25%	28%	-3%	1%



- Participation of Brazilian states in the global value chain is limited
- States in South and Southeast dominate
- Trade in value added for Brazil as a whole: exports \approx imports
- Interesting Brazilian value chain
- Almost all states are net importers from Sao Paulo



university of
 groningen

Thank you for your attention