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Disaggregation of results from a detailed general equilibrium model of the US to the State level

by

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State disaggregation of CGE results

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- This paper describes the state extension of the USAGE-ITC model
- USAGE-ITC is a 500-industry dynamic CGE model of the US being constructed at Monash University in collaboration with the ITC
- USAGE-ITC uses the theory of Australia's MONASH model as a starting point
- MONASH and its static predecessor, ORANI, have been used extensively since 1977 for policy analysis and forecasting
- Add-ons

Experiment: Unilateral removal of US import restraints

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USAGE-ITC Commodity	Tariff rate equivalents	Imports (c.i.f., $m)	Implied revenue ($m)
78 Sugar	84	634	531
55 Butter	53	133	70
113 Hosierynec	33	279	92
115 Apparel	33	44563	14732
112 Womenhosiery	33	392	129
56 Cheese	25	488	123
209 Luggage	20	2547	516
…	…	…	…
…	…	…	…
373 Watches	5	2628	139
High-tariff, 31 coms. (>5%)	23.67	83269	19709
All other commodities	0.72	1043128	7465
All commodities	2.41	1126397	27174

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Effects on imports and output by commodity: selected high-tariff items

USAGE-ITC Commodity	Tariff rate equivalents	USAGE-ITC results % changes		
		imports	output	Armington
…	…	…	…	…
113 Hosierynec	33	20.80	-2.42	1.6
115 Apparel	33	14.66	-4.71	1.6
209 Luggage	20	11.43	-13.03	2.9
…	…	…	…	…
…	…	…	…	…
All commodities	2.41	1.046	0.042	

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Export shares and effects of tariff removal

USAGE-ITC Commodity	Export share	USAGE-ITC results % changes output
500 ExpEdu	100	1.86
205 BootCutStock	88	1.83
502 WaterTrans international	0	1.49
499 ExpTour	100	1.44
286 OilGsFldMach	80	1.32
79 Chocolate	19	0.98
23 Nonferrores	71	0.98
280 Turbines	63	0.86
503 AirTrans international	0	0.84
356 Aircraft	50	0.81
416 RetailTrade	0	0.80
358 AircrftEquip	44	0.75
…	…	…

Disaggregating to the states: theory

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Specification of demands:

E.g. Demand for commodity i to be used in production of j in region r

$$x1(i,j,r) = x1nat(i,j) + x0(j,r) - \sum_{g \in REG} SH(j,g) * x0(j,g)$$

In general,

$$var(r) = \mathbf{varnat} + relevant(r) - \sum_{g \in REG} VARSH(g) * relevant(g)$$

Theory continued

$$dem(i,r) = F(\text{national variables}; x0(j,g) \text{ for } j \in COM,\ g \in REG)$$

$$x0(i,g) = H(SOURCE(i,g,r); dem(i,r) \text{ for } r \in REG)$$

500*x*50*x*2 equations to determine 500*x*50*x*2 variables: dem(i,r) and x0(i,g)

Aggregate?

Estimate of SOURCE: US fruit

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Demand / Supply	California	Florida	Georgia	New York	Utah	Wash-ton	Dist. of Columbia	Other	Total supply
California	0.70	0.34	0.47	0.35	0.75	0.35	0.44	0.51	0.54
Florida	0.05	0.53	0.25	0.13	0.03	0.01	0.19	0.13	0.13
Wash'ton	0.17	0.05	0.07	0.06	0.10	0.55	0.07	0.09	0.13
Other	0.09	0.09	0.22	0.46	0.12	0.08	0.30	0.27	0.20
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

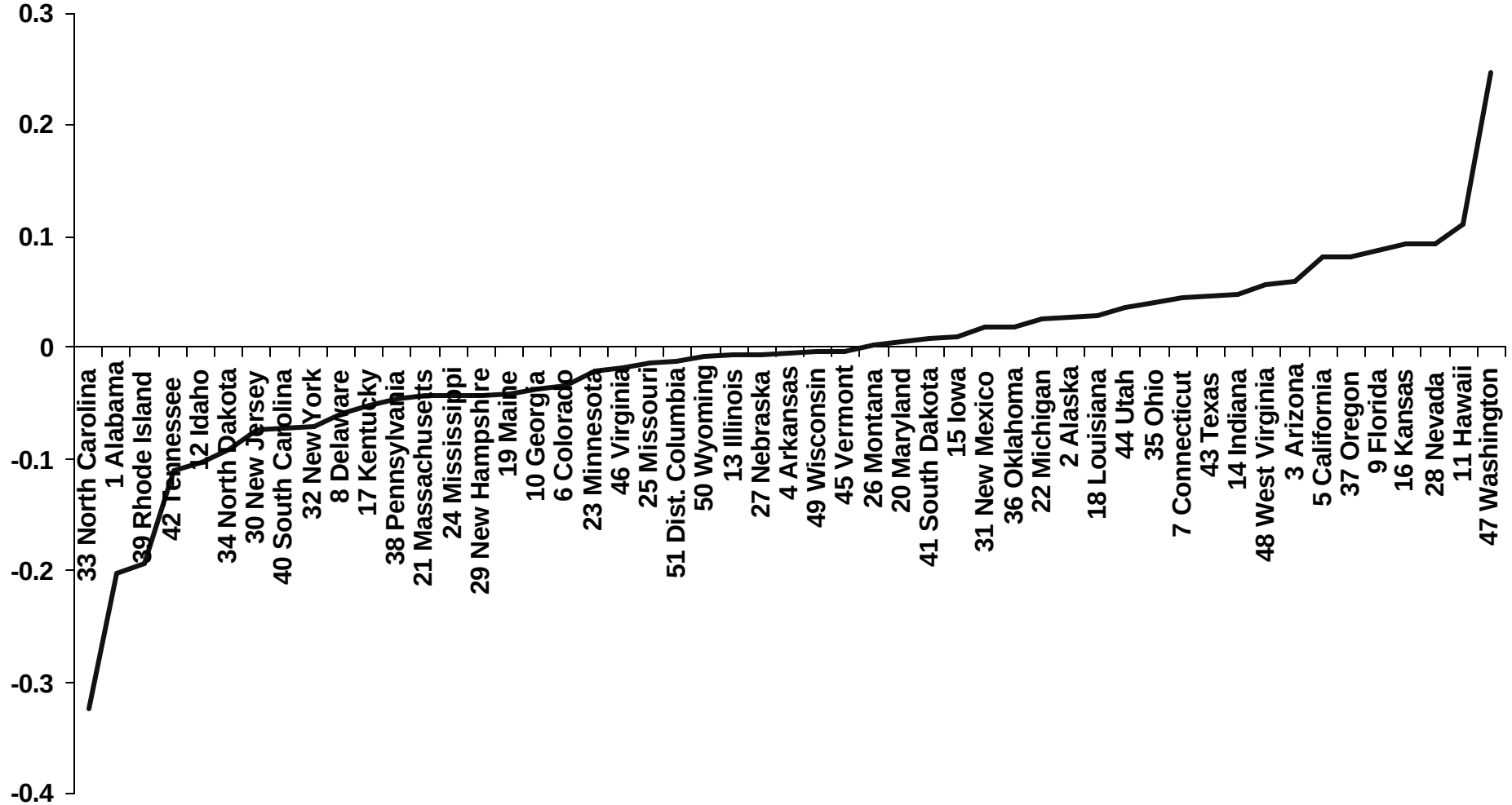
Horridge formula:

- takes account of tradability of commodity
- assigns large diagonals for major producers
- off diagonal reflects distance between supplying & demanding region and share of supplying region in national output

Estimate of SOURCE: US Retail trade

Demand / Supply	Alabama	Alaska	Arizona	Arkansas	Other	Total
Alabama	0.99	0.00	0.00	0.00	0.00	0.02
Alaska	0.00	0.98	0.00	0.00	0.00	0.00
Arizona	0.00	0.00	0.99	0.00	0.00	0.02
Arkansas	0.00	0.00	0.00	0.99	0.00	0.01
other	0.01	0.02	0.01	0.01	1.00	0.96
Total	1.00	1.00	1.00	1.00	1.00	1.00

States employment effects of removing import restraints (per cent)



State characteristics and effects of removal of import restraints

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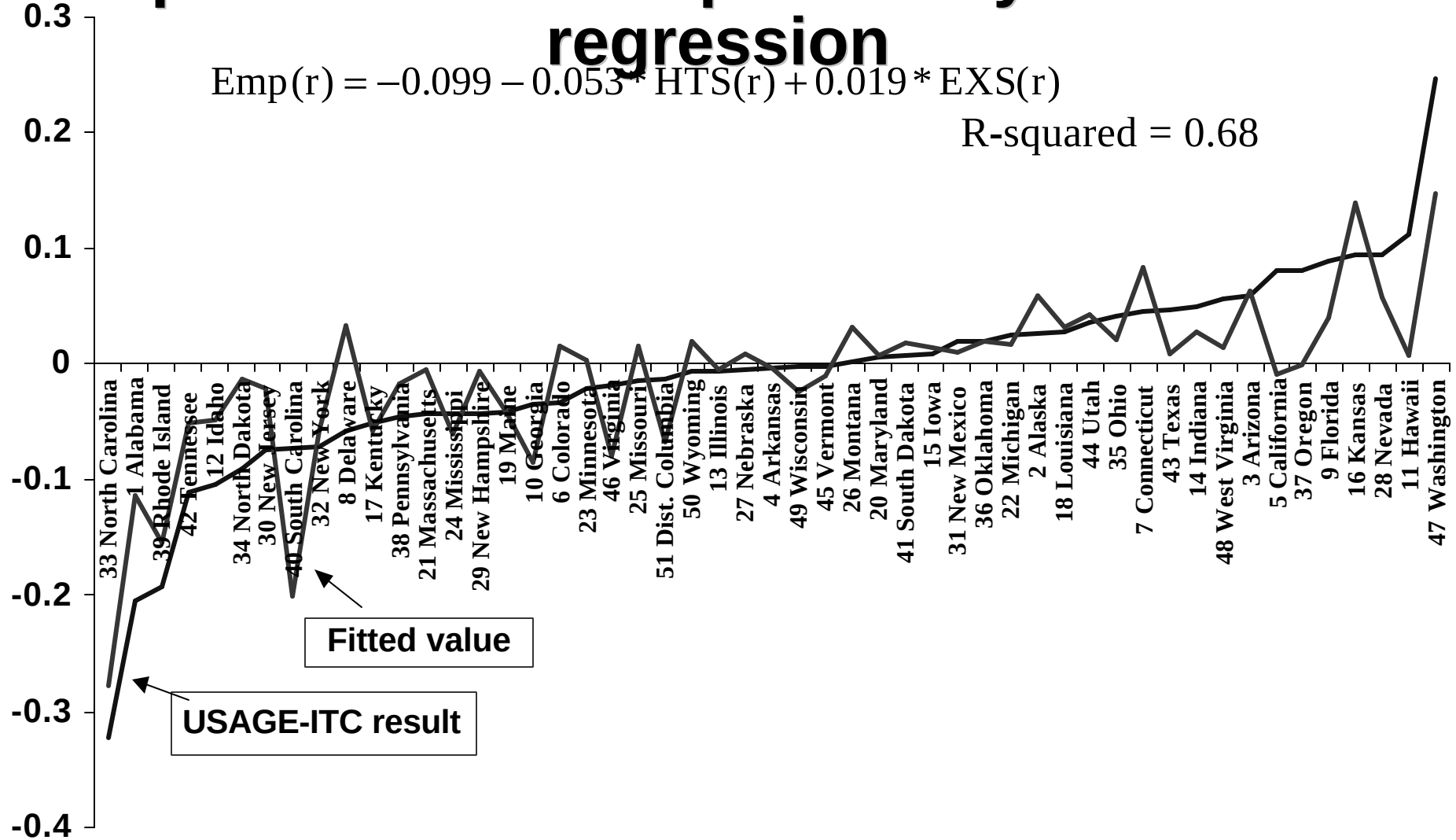
State	Employment shares		Port index	Proximity variable	USAGE-ITC results *Percentage change*
	High-tariff activities	Export activities			Employment
North Carolina	5.78	6.46	0.12	0.05	-0.323
Alabama	2.99	7.33	0.00	0.05	-0.203
Rhode Island	3.50	6.56	0.00	0.04	-0.193
…	…	…	…	…	…
Nevada	0.26	8.74	0.00	0.07	0.094
Hawaii	0.59	7.05	0.36	0.06	0.111
Washington	0.60	14.29	4.14	0.08	0.247
All states	1.20	7.62	1.00	0.04	0.000

States employment effects of removing import restraints explained by 2-variable regression

$$Emp(r) = -0.099 - 0.053 * HTS(r) + 0.019 * EXS(r)$$

R-squared = 0.68



States employment effects of removing import restraints explained by 3-variable regression

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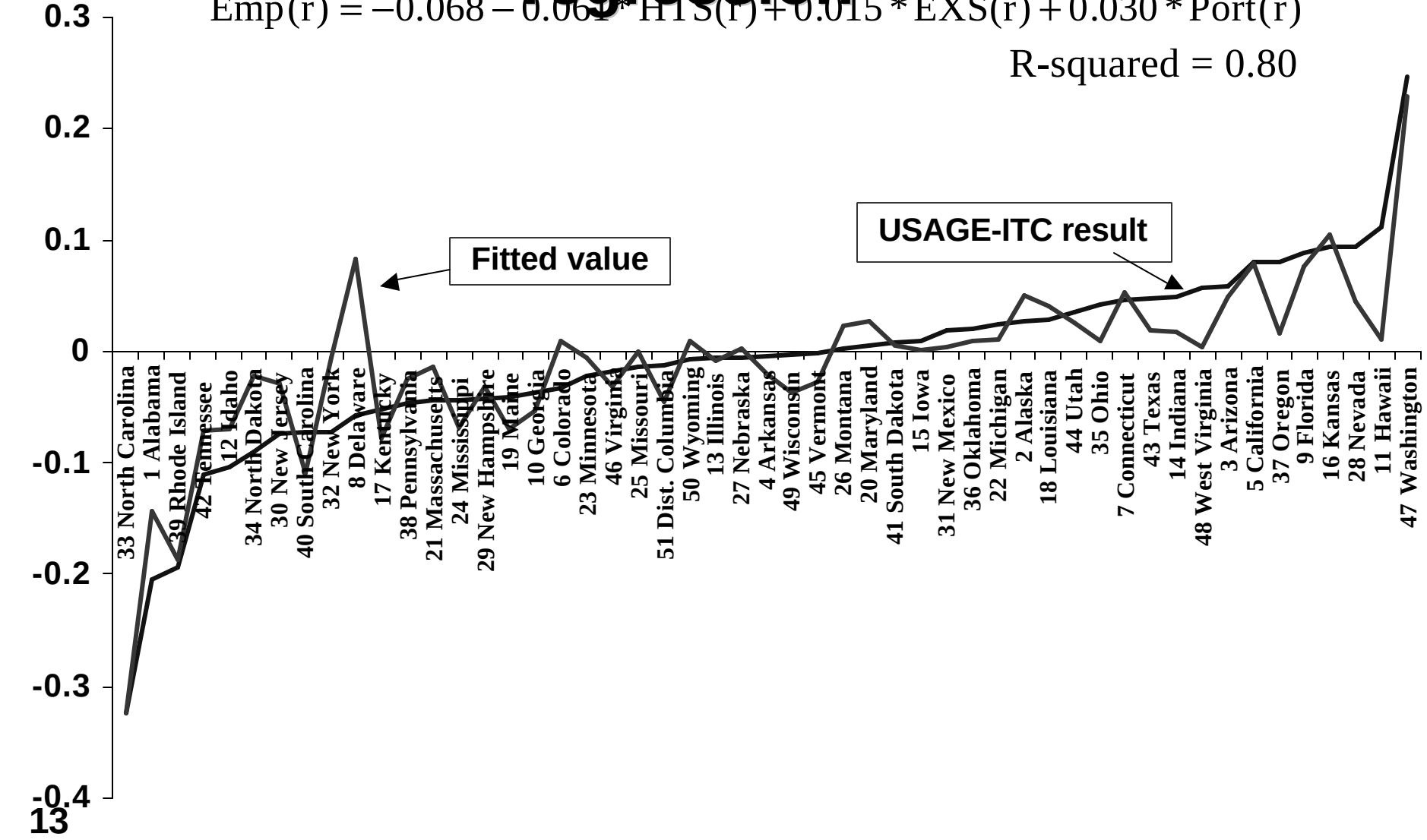
$$Emp(r) = -0.068 - 0.061 * H1S(r) + 0.015 * EXS(r) + 0.030 * Port(r)$$

R-squared = 0.80



Employment effects of tariff removal by Region