Macro, Industry and Regional Effects of Buy America(n) Programs: USAGE Simulations

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Summary

(1) U.S. state and federal governments (including government enterprises) purchase mining, construction and manufacturing goods worth about $800 billion per year. Most of these purchases are subject to Buy America and Buy American provisions which we refer to collectively as Buy America(n).

(2) Buy American operates on direct purchases by government agencies while Buy America operates on indirect purchases. Direct refers to purchases made by government agencies while indirect refers to input purchases made by firms in creating goods sold to government agencies.

(3) Buy America(n) provisions are intended to guide government agencies towards domestic suppliers (Buy American) and to guide these suppliers towards domestically produced inputs (Buy America). The aim is to protect U.S. industries, particularly manufacturing industries such as steel, against import competition.

(4) Much of the direct purchases by the U.S. government is construction projects. Construction faces almost no import competition. For non-construction purchases, the U.S. government is inhibited by international obligations from discriminating against imports. Consequently Buy American does not appear to have much effect. In our analysis we assume that, in practice, Buy America(n) operates via the indirect route, that is, through Buy America.

(5) Detailed anecdotal data compiled by Trade Partnership Worldwide and others suggests that Buy America(n) strongly affects input decisions by suppliers to U.S. governments, especially suppliers of construction. Not only are suppliers forced to bias their input purchases in favor of U.S. products, but they also experience considerable expense and inconvenience in establishing that their inputs comply with Buy America(n) provisions. These considerations suggest that U.S. governments pay more for goods because of Buy America(n) than they would in the absence of these provisions.

(6) We use the USAGE model to simulate the effects on the U.S. economy of scrapping Buy America(n), that is giving domestic suppliers to the U.S. government complete freedom in their choice of suppliers of inputs.

(7) USAGE is a detailed model of the U.S. economy. It separately identifies 389 industries. USAGE produces macro and industry results at the national level. Implications for states and congressional districts are then calculated by top-down modules.

(8) Scrapping Buy America(n) would induce shifts towards imported inputs by industries in supplying the U.S. government. We represent these shifts in USAGE as an array of 259 by 389 "technology" shocks. These show how this policy would influence quantities of domestic and imported inputs of 259 mining, manufacturing and construction goods per unit of output in 389 industries.

(9) In developing the technology shocks, we assumed that scrapping Buy America(n) would move input choices by industries for producing goods for government close to those that they make in producing goods for the private sector. We also introduced efficiency gains leading to reductions in the costs of goods supplied to government.

(10) Simulation with USAGE shows that scrapping Buy America(n) would have favorable macroeconomic effects. It would increase total jobs in the U.S. by 0.161 per cent (about 306 thousand), and GDP by 0.124 per cent (about $22 billion). Under the assumptions adopted in our simulation, the GDP increase is also the overall annual welfare gain measured by the ability to sustain extra private consumption. The policy would be pro-trade, with percentage increases in imports and exports about 10 times greater than that in GDP.

(11) These favorable macro effects are largely attributable to the reduction in the cost of goods to government. We assume that the government maintains its pre-scrapping level of demand for goods. There is no change in the public-sector deficit because we assume that the government returns cost savings to the private sector by a tax reduction, introduced as a cut in indirect taxes on consumer goods. This allows the private sector to employ more people at the going real wage which strengthens the revenue side of the public sector budget and allows more tax cuts.

(12) Like nearly all movements towards freer trade, scrapping Buy America(n) would create winners and losers with the negative effects on the losers being more pronounced than the positive effects on the winners. Even though the overall effects of the policy would be positive, USAGE projects for 23 of its 389 industries output contractions of more than 2 per cent. On the other hand, there are 229 industries with positive output results but none with output gains of more than 1.144 per cent (the result for Export tourism).

(13) Almost all the losing industries are suppliers of components used principally in construction projects and other projects requiring the supply of capital goods. These goods have two characteristics. First, they face significant competition from imports when they are used as inputs to production of goods destined for the private sector. Second, a significant fraction of their sales is to industries that have major sales to government. Examples of goods that have these characteristics and are therefore shown by USAGE as losers from scrapping Buy America(n) include: Plumbing material, Cut Stone, Clay refractories, Aircraft engines, Communication equipment, and Computer storage equipment.

(14) Iron and steel manufacture is not among the industries identified by USAGE as being a major loser from scrapping Buy America(n). This is perhaps surprising because support of this industry is often mentioned as a rationale for Buy America(n). USAGE shows that Iron and steel has a relatively weak dependence on indirect sales to government.

(15) Scrapping Buy America(n) stimulates imports and thereby stimulates exports. As explained in the paper, the mechanism is via the exchange rate which adjusts so that the U.S. pays for its extra imports with extra exports. The boost to exports means that export-oriented industries are among the prominent winners from scrapping Buy America(n). Examples include Export tourism, Export education, International shipping, Radiation instruments and Dental equipment.

(16) Scrapping Buy America(n) would reduce employment in manufacturing by 0.439 per cent, or 57 thousand jobs. However this policy would create 363 thousand jobs outside of manufacturing. Even within manufacturing there would be many export-oriented industries in which there would be employment gains. These include high-tech and machinery industries.

(17) Buy America(n) fails as a policy to promote aggregate employment and economic growth. What about Buy America(n) as a policy for safeguarding national security by boosting key manufacturing industries? By protecting 57 thousand manufacturing jobs, Buy America(n) leaves the rest of the economy with 363 thousand less jobs than it would otherwise have had. If U.S. policy makers have legitimate security concerns centered on the viability of U.S. manufacturing, then these should be addressed in a more cost efficient manner.

(18) Scrapping Buy America(n) would provide a boost for many industries, nearly every industry outside manufacturing and 40 per cent of the industries within manufacturing. Reflecting this wide spread of positive results across industries, USAGE shows wide spread positive results across regions. Fifty out of 51 states and 430 out of 436 congressional districts would gain jobs.

(19) In presenting the USAGE results we have tried to make them understandable to people with little background in economic modeling. We have done this by the use of back-of-the-envelope models. Our aim is to make it clear how we have interpreted Buy America(n) and what we have included and what we have left out in analyzing the effects of its removal. In this way, we hope to elicit constructive discussion with the possibility of improvements in our analysis.

Contents

Abstract

The U.S. government attempts to stimulate employment, especially in the manufacturing sector, by favoring U.S. contractors for public sector projects (Buy American regulations) and by insisting that these contractors themselves favor domestic suppliers of inputs such as steel (Buy America regulations). We refer to these policies collectively as Buy America(n). Using a detailed computable general equilibrium model, we demonstrate that Buy America(n) policies are counter-productive. The main reason is that they increase costs to the U.S. government. Scrapping these policies would reduce employment in manufacturing but boost employment in the rest of the economy with a net gain of about 306 thousand jobs. Even in the manufacturing sector, there would be many winning industries including those producing machinery and other high-tech products. Employment would increase in 50 out of 51 states and 430 out of 436 congressional districts.

JEL: C68, F13, F16

Key words: Buy America(n), local-content schemes, computable general equilibrium, regional modeling, U.S. manufacturing

1. Introduction

Since the Buy American Act of 1933, and earlier[1], the U.S. federal government has endeavored to channel its expenditures on goods and construction projects towards U.S. suppliers. This includes its own direct purchases and purchases by its instrumentalities such as Amtrak, together with purchases by state governments using federal funds. Through what has become known as Buy America schemes, the U.S. government has tried to reach beyond the nationality of its direct suppliers through to the national origin of the inputs that they use. U.S. contractors supplying construction projects to the public sector financed under the American Recovery and Reinvestment Act (ARRA, the Obama stimulus package of 2009) were, for instance, obliged to use U.S.-produced steel and other manufactured inputs. In determining whether an input qualifies as "U.S.-produced" the government attempts to reach even further back to the inputs to the manufactured item. For example, as described in Koehl and Masini (2017), when the federal government purchases of an oven for a military mess, they inquire into the national origin of the component parts, such as the oven door handle.

In this paper, we will refer generally to government provisions favoring local content in public-sector purchases as Buy America(n).

Implementation of Buy America(n) is governed by highly detailed regulations. For example, the Secretary of Defense is required "to encourage increased domestic breeding while ensuring that military working dogs are procured as efficiently as possible and at best value to the government" (see Manuel *et al.*, 2016). Regulations at this level of detail are subject to expensive legal interpretations and litigation (see Koehl and Masini, 2017). To us, they seem a fruitful area for legislators interested in finding scrapable regulations when trying to comply with the spirit of President Trump's demands for scrapping two regulations whenever a new one is introduced (see Mufson, 2017).

Drawing on the Government Accountability Office (GAO), Hufbauer *et al.* (2013) summarizes the general aims of Buy America(n) as:

- boosting domestic employment and economic growth through infrastructure spending;
- protecting against unfair competition from foreign firms that receive subsidies from their governments; and

[1] See Hufbauer *et al.* (2010), section 2.

- strengthening national security by promoting the iron and steel industries.

In this paper, we abstract from the minutia of Buy America(n). We use an economic model to throw light on the issue of whether such schemes could ever be expected to deliver on their objectives. Hufbauer *et al.* (2013) list various obvious problems with Buy America(n) including higher costs to government, reduced bidding competition, project delays while compliance is being worked out, and potential international retaliation.[2] But we assume that Buy America(n) works in a comprehensive transparent way and is tolerated by foreigners. We show that even under these favorable conditions such schemes are likely to be counter-productive.

The paper is organized as follows. Section 2 is a brief introduction to USAGE, the economic model that we use to simulate the effects of a comprehensive Buy America(n) program. Section 3 explains our methodology, including how we represent Buy America(n) in the USAGE model. Sections 4, 5 and 6 give macro, industry and regional results. Concluding remarks are in section 7.

2. Why a model and why the USAGE model?

We start by looking at the U.S. economy under the assumption that comprehensive Buy America(n) policies are in place. Then we work out the effects of the policies by calculating how the economy would be affected if they were removed.

The only feasible way of doing this is to apply a general equilibrium model, that is, a model that links all the various parts of the economy. We need such a model so that we can trace out how a switch towards imports in government financed projects affects:

- the balance of payment and the exchange rate;
- output and employment in industries, such as iron and steel, that supply inputs to government projects and would be faced with greater import competition;
- output and employment in other industries (induced multiplier effects) in regions specializing in supplying government projects;
- output and employment in industries, such as export tourism, that would benefit from a lower exchange rate brought about by increased use of imports in government projects; and
- the cost of any given volume of government projects, the public sector's budgetary position and taxes and government expenditures.

The model we chose to use is USAGE. This is a 389-industry computable general equilibrium (CGE) model of the U.S. economy.[3] It has been created over the last 15 years at the Centre of Policy Studies (CoPS), Victoria University, in collaboration with the U.S. International Trade Commission.[4] The model has been used by and on behalf of the U.S. International Trade Commission, the Canadian Embassy in Washington DC, the U.S. Departments of Commerce, Agriculture, Energy, Transportation and Homeland Security as well as private sector organizations such as the Cato Institute and the Mitre Corporation. Issues analyzed using the model include the effects of: trade policies; environmental regulations; carbon taxes; energy security; illegal immigration; road infrastructure; Next-Gen aviation infrastructure expenditures; the Obama stimulus package; the National Export

[2] Hufbauer and Schott (2009) and Baughman and Francois (2009) discuss how copycat adoption by foreign governments of local content schemes could lead to negative results from Buy America(n) for the industries such as iron and steel that they are intended to assist.

[3] The theory underlying USAGE is based on Dixon and Rimmer (2002).

[4] Applications of USAGE by the U.S. International Trade Commission can be found in USITC (2004, 2007, 2009, 2011 and 2013).

Initiative; an H1N1 epidemic; security-related port closures; and a large number of terrorism scenarios.[5]

In applications, USAGE initially produces results at the national level for the macro economy and industries. USAGE then derives results at the state and congressional district levels using regional modules in a top-down fashion.

The theory of the state-level regional module is set out in Dixon *et al.* (2007). In distributing results from the national level to the states, the regional module takes account of three factors. The most important is the industrial composition of activity in each state. If employment in a state is heavily concentrated in industries that are relatively harmed by the national shock under consideration [in this case the scrapping of Buy America(n)] then the regional module will generate relatively large negative results for that state. The second factor is interstate trade. If a state relies heavily on exports to states that are negatively impacted by the shock under consideration, then on this account the regional module will generate negative effects for that state. Finally, the regional module encompasses local multiplier effects. If traded-goods industries in a state are relatively badly affected by the first two factors, then in the regional module, nontraded-goods industries (e.g. Retail trade) will also be relatively badly affected.

In disaggregating from the state level to the congressional district level, we use the simplest possible top-down approach. We assume that the percentage change in jobs for residents in *district* r who work in industry j is the same as the percentage change in jobs for residents in the *state* to which r belongs who work in industry j. Thus, variations in percentage changes in total employment across congressional districts within a state reflect differences in the industrial composition of activity across the state's districts.

3. Representing Buy America(n) in the USAGE model

Buy America(n) provisions operate on direct purchases by government agencies and indirect purchases. Direct refers to purchases made by government agencies while indirect refers to purchases made by firms in creating goods sold to government agencies. For example, the government directly buys a mile of paved road and indirectly buys asphalt used by the contractors who supply the paved road.

In practice, Buy America provisions, concerned with inputs to government suppliers, appear to have more important effects on the economy that Buy American provisions, concerned with direct government purchases. To a large extent, the type of goods purchased directly by government face little competition from imports, even when purchased by the private sector. As shown in Table 3.1, 43 per cent of direct government purchases of goods are construction projects ($341,980m out of $799,700m). According to U.S. input-output data, construction imports are zero.[6] For most of the remaining 57 per cent, data from the Bureau of Economic Analysis shows that U.S. government purchases are barely less import intensive than purchases by the U.S. private sector. For the government, the import share of non-construction purchases of goods is 27.6 per cent, only slightly less than the corresponding

Table 3.1. Sales of goods to the government and private sectors together with import shares: estimates for 2015

USAGE	Commodity	Sales to	Import	Sales to	Import

[5] Published USAGE papers include: Dixon and Rimmer (2010 and 2013); Dixon *et al.* (2007 and 2011); Fox *et al.* (2008); Gehlhar *et al.* (2010); and Zahniser *et al.* (2012).

[6] See U.S. Input-output data for 2015 at www.bea.gov/iTable/itable.cfm?reqid=52&step=1#reqid=52&step=102&isuri=1&5206=4&5205=sec .

identifier		government $million	share government	private sector $ million	share private
11 to 22	Construction	341980	0.000	1070158	0.000
241	Petroleum refining	84821	0.239	404470	0.125
164	Aircraft	30049	0.171	40894	0.362
124	Search & navigation equip.	25564	0.197	24773	0.217
117	Broadcast equip.	14350	0.982	60201	0.981
170	Ships	11998	0.024	8409	0.028
239	Printing	11484	0.102	47296	0.097
23	Natural gas distribution	10446	0.000	107496	0.000
208	Animal product processing	10441	0.067	145905	0.070
263	Other chemicals	9859	0.265	48147	0.233
167	Missiles	7934	0.055	5996	0.003
152	Heavy trucks	7429	0.277	24561	0.292
184	Surgical supplies	6479	0.401	35969	0.322
255	Pharmaceuticals	6345	0.443	237059	0.444
249	Other organic chemicals	6213	0.292	87319	0.278
	All other goods	16434	0.313	5450166	0.297
	Total	*799700*	*0.158*	*7798818*	*0.247*
	Total less Construction	*457720*	*0.276*	*6728661*	*0.286*

Source: USAGE model database derived from Benchmark input-output tables for 2007 published by the Bureau of Economic Analysis (BEA) and imports matrix supplied by the BEA, updated to 2015 by USAGE simulation.

percentage for the private sector of 28.6 per cent (Table 3.1). Direct purchases by governments (Buy American) are subject to U.S. free trade agreements and other undertakings to the WTO which limit the ability of the U.S. government to use Buy American to discriminate against imports in its direct purchases.

By contrast, detailed anecdotal data compiled by Trade Partnership Worldwide (TPW, 2016) and Hufbauer *et al*, (2010) suggest that Buy America(n) strongly affects input decisions by suppliers to U.S. governments, especially suppliers of construction.

Not only are suppliers forced to bias their input purchases in favor of U.S. products, but they also experience considerable expense and inconvenience in establishing that their inputs comply with Buy America provisions. These considerations suggest that U.S. governments pay more for goods because of Buy America than they would in the absence of these provisions. For example, Hufbauer *et al*, (2013) estimate that over the three year period 2009-11, contractors to the U.S. government (and thus the U.S. government itself) paid $5.7 billion more for domestic steel embedded in ARRA infrastructure projects than they would have paid if they had been free to use comparable imported steel which was about 40 per cent cheaper.

No quantitative evidence is available on the extent to which input decisions by goods suppliers to the U.S. government are biased against imports. In this paper, we make what we consider to be plausible assumptions concerning this bias and then trace out the implications by using simulations conducted with the USAGE model.

We assume that Buy America(n) operates through Buy America rather than Buy American, that is through *indirect* purchases, rather than *direct* purchases. We assume that Buy America(n) induces U.S. industries in supplying the U.S. government to use domestically produced inputs of goods (mining, construction and manufacturing) in preference to imported goods.

In quantifying this assumption, we start by looking at flows of goods inputs to each industry. For example, Table 3.2 shows sales of Plumbing materials (USAGE commodity 78) to current production in Power and communications structures (industry 29). The total value of these sales in the 2015 USAGE database is $63.9 million. The database shows that of this, $44.4 million was domestically supplied while $19.5 million was imported. The USAGE database shows that 13 per cent of the sales of industry 29 was to government.[7] On this basis, we assume that $8.9 million of commodity 78 was sold to industry 29 to facilitate the industry's production of goods for government (8.9 = 0.13*63.9). This gives us the border for Table 3.2. But where do we find information about the four numbers in the body of the table? There are no direct data on this.

We assume that because of Buy America(n), imported inputs to production of goods destined for government are as small as possible. In the case of C78-to-I29 we put zero in the import row and government column in Table 3.2. Then the other three entries are determined.

It is not always possible to put zero in the import row and Government column. In a few cases a zero in this position would lead to a negative in the (domestic, private) position. This would happen with the border data in Table 3.3 for Broadcasting equipment (C117) into Educational & vocational structures (I30). If we placed a zero in the (import, government) position then we would end up with -$117.9 m in the (domestic, private) position. As shown in Table 3.3, the smallest number that can be placed in the (import, government) position is $117.9 m, leading to zero in the (domestic, private) position.

Applying the principle that imported inputs of goods to production of goods for government are as low as possible, we split all of the intermediate input flows of commodities to industries into four parts. Table 3.4 is an aggregate representation. It shows domestic and imported goods sold to U.S. goods-producing industries and the split of these sales between inputs of goods to production for government and to production for private.[8] The table implies an import share of 4.2 per cent for goods inputs to U.S. goods-producing industries for production of goods for government. The import share for all other goods inputs to U.S. goods-producing industries is 24.3 per cent.

To simulate the effects of removing Buy America(n) we introduce shocks to the USAGE model which move the import-domestic structure of goods inputs used for government sales closer to that used for private sales. For example, we replace the 8.9 and 0 appearing in the government column of Table 3.2 with numbers that more closely align with the proportions exhibited in the private column. More specifically, we assume that dropping Buy America(n) would move the import share of industry j's purchases of good c for government production towards that for private production according to:

$$S^{n}_{mg}(c, j) = \frac{T_g(j)}{T_g(j) + T_p(j)} * S^{o}_{mg}(c, j) + \frac{T_p(j)}{T_g(j) + T_p(j)} * S^{o}_{mp}(c, j) \qquad (3.1)$$

[7] By government we mean the 9 government industries identified in the BEA input-output tables: Federal general government (defense), Federal general government (nondefense), Postal service, Federal government gas and electric utilities, Other federal government enterprises, State and local general government, State and local government operated transit systems, State and local government gas and electric utilities, Other state and local government enterprises.

[8] Production for private means production of goods and services for sale to non-U.S.-government purchasers.

Table 3.2. Sales of Plumbing materials (C78) into Power & communication structures (I29), $million and percentages

	government	private	Total
domestic	8.9	35.5	44.4
	(100)	*(64.6)*	*(69.5)*
import	0	19.5	19.5
	(0)	*(35.4)*	*(30.5)*
Total	8.9	55.0	63.9
	(100)	*(100)*	*(100)*

Table 3.3. Sales of Broadcasting equipment (C117) into Educational & vocational structures (I30), $ million and percentages

	government	private	Total
domestic	5.6	0	5.6
	(4.5)	*(0)*	*(3.7)*
import	117.9	25.5	143.4
	(95.5)	*(100)*	*(96.3)*
Total	123.5	25.5	149.0
	(100)	*(100)*	*(100)*

Table 3.4. Sales of goods to U.S. goods-producing industries, $ million and percentages

	government	private	Total
domestic	162,837.1	2,794,707.0	2,957,544.1
	(95.8)	*(75.7)*	*(76.6)*
import	7,054.4	898,075.4	905,129.8
	(4.2)	*(24.3)*	*(23.4)*
Total	169,891.5	3,692,782.4	3,862,673.9
	(100)	*(100)*	*(100)*

In this equation $S^n_{mg}(c, j)$ is the new import share for commodity c purchased by industry j for production for government, and $S^o_{mg}(c, j)$ and $S^o_{mp}(c, j)$ are the original import shares for commodity c purchased by industry j for government and private. If c is Plumbing materials (C78) and j is Power and communications structures (I29), then from Table 3.2 we see that the original shares are 0 and 0.354. $T_g(j)$ and $T_p(j)$ are the values of j's output for government and private. The government share for j equals I29 is 0.139 (= 8.9/63.9) and the private share is 0.861 (= 55.0/63.9). Application of (3.1) for the C78-to-I29 case gives the new value for the import share in I29's purchase of C78 for use in production for government of 0.305[9]:

$$S^n_{mg}(C78, I29) = 0.139 * 0 + 0.861 * 0.354 = 0.305 \qquad (3.2)$$

[9] Using (3.1) is equivalent to assuming that the new import share in industry j's use of good c to produce output for government is the same as the initial share across industry j's use of c for all production.

Notice in (3.1) that we move $S_{mg}(c,j)$ close to $S^{o}_{mp}(c, j)$ if private output accounts for a large share of j's production. When most of j's production is for the private sector, we consider that the domestic-import mix for inputs used by j to produce output for the private sector is strongly representative of the mix that j could use to produce output for the government in the absence of Buy America(n). On the other hand, if most of j's production is for government, then we have little evidence of what would be possible in the absence of Buy America(n). For these cases we cautiously assume that dropping Buy America(n) would make little difference to j's choice of domestic-import mix of inputs used in production destined for government.

Apart from changing the $S_{mg}(c,j)$s, we assume that dropping Buy America(n) would produce efficiency gains. This is because Buy America(n) prevents businesses from adopting an efficient choice between domestic and imported inputs in their production destined for government. We assume that dropping Buy America(n) would generate an efficiency gain associated with j's choice of source for inputs of c in producing for government that is proportional to the change in import share:

$$\text{EffGain}(c, j) = \alpha * \left[S^{n}_{mg}(c, j) - S^{o}_{mg}(c, j) \right] \qquad (3.3)$$

where α is the factor of proportionality assumed to be the same for all c and j. The efficiency gain is assumed to operate as a reduction in the amount of c required by industry j to produce any given level of output for government. Apart from Hufbauer *et al.* (2013)'s commentary on the use of steel inputs during the ARRA, we know of no quantitative evidence on the extent of these gains. We quantified the gains in our illustrative simulation by setting α in equation (3.3) at 0.25. With this value, the efficiency gain for C78-to-I29 is given by:

$$\text{EffGain}(C78, I29) = 0.25 * \left[0.305 - 0 \right] = 0.076 , \qquad (3.4)$$

which means that dropping Buy America(n) saves 7.6 per cent of I29's post Buy America(n) inputs of C78 used to produce output for government.

For each c and j we applied (3.1) and (3.3) to obtain post Buy America(n) four-quadrant flow matrices. For example, starting from Table 3.2, we computed the new C78-to-I29 table as Table 3.5. The arithmetic underling Table 3.5 starts by using $S^{n}_{mg}(C78, I29)$ and $\text{EffGain}(C78, I29)$ to estimate the (import, government) component as 2.5 [=0.305*8.9*(1-0.076)]. The (domestic, government) component is estimated as 5.7 [=(1-0.305)*8.9*(1-0.076)].

By comparing the new four-quadrant (c,j) tables with the original tables we can deduce the impact effects on input flows of dropping Buy America(n). These impact effects are computed under the assumption of no change in outputs. Of course the major idea of conducting simulations is to work out how dropping Buy America(n) would affect industry outputs. But for representing the import-domestic substitution and efficiency effects of dropping Buy America(n) we need to look at how input flows are affected at the initial level of industry outputs.

By comparing the total column of the new (c,j) table with that of the original (c,j) table we can calculate domestic-c-input-saving and import-c-input-using technical change associated with dropping Buy America(n). For (C78, I29) these technical changes are:

$$\text{TC(C78, dom, I29)} = 100*(41.2/44.4 - 1) = -7.2 , \qquad (3.5)$$

and

Table 3.5. Sales of Plumbing materials (C78) into Power & communication structures (I29) freed from Buy America(n), $million and percentages

	government	private	Total
domestic	5.7	35.5	41.2
	(69.5)	*(64.6)*	*(65.2)*
import	2.5	19.5	22.0
	(30.5)	*(35.4)*	*(34.8)*
Total	8.2	55.0	63.2
	(100)	*(100)*	*(100)*

$$TC(C78, imp, I29) = 100*(22.0/19.5 - 1) = 12.8 \ . \qquad (3.6)$$

We interpret (3.5) and (3.6) as meaning that scrapping Buy America(n) would allow I29 to achieve any given level of output by using 7.2 per cent less inputs of domestic C78 combined with 12.8 per cent more inputs of imported C78 while holding all other inputs constant.

Following this method, we worked out technical changes for inputs of all goods c, domestic and imported, to all non-government industries j. These technical changes became the shocks in our USAGE simulation of the effects of scrapping Buy America(n).

4. Simulating the scraping of Buy America(n) in the USAGE model: macro assumptions and results

As explained in the previous section, we view the impact of scrapping of Buy America(n) as an array of technical changes. These favor the substitution of imported inputs for domestic inputs and introduce efficiency gains associated with freeing industry choices between domestic and imported inputs.

Before we can use USAGE to simulate the effects of any set of shocks (in this case technology shocks) we must set the closure. This refers to the macroeconomic assumptions. The main closure choices we made for the simulation reported in this paper are as follows:

(a) Wages, employment, aggregate capital and investment. We assume that the policy [in this case scrapping Buy America(n)] does not affect real wages (wages deflated by the CPI). But it can affect aggregate employment. We also hold aggregate capital (quantity of buildings and machines in the U.S.) constant. Thus, our simulation is designed to answer the question: with the scrapping of Buy America(n), how many more jobs would the U.S. economy be able to support at current real wages with its current level of capital?[10] With capital held constant, we also hold aggregate investment constant (the rate of change of capital).

(b) Public consumption, taxes and the public sector deficit. Scrapping Buy America(n) would reduce the cost of construction projects and other goods to state and federal governments.[11] We assume that governments do not change the quantity of their

[10] Buy America(n) may influence foreigners to locate production facilities in the U.S. This is not inconsistent with our assumption of fixed aggregate capital. In our simulation, scrapping Buy America(n) reduces the share of capital stock in the U.S. that is devoted to supplying inputs to public sector projects, and it may reduce foreign investment in this type of capital. However, as argued in point (c), we should not suppose that this affects aggregate foreign investment in the U.S.

[11] As explained in section 3, we represent the scrapping of Buy America(n) as an array of shocks that affect *industry* technologies. Through the use of artificial tax variables we ensure that the cost savings arising from the technology shocks directly affect purchasers' prices for government, not other purchasers' prices. In this way, we ensure that the cost savings flow entirely to government.

purchases. Instead they return the cost savings to households through cuts in indirect taxes applying to consumption. Thus, we hold real public consumption and the public sector deficit constant, and cut taxes.

(c) *The balance of trade*. Scrapping Buy America(n) will stimulate imports. We assume that the exchange rate will adjust to generate an offsetting stimulation in exports, leaving the balance of trade unchanged. For understanding this assumption, it is helpful to think about savings and investment. The balance of trade is not only the difference between exports and imports, but it is also the difference between savings and investment. As already mentioned, we hold investment constant. We also hold government savings constant (no change in the public-sector deficit). There is no reason to suppose that scrapping Buy America(n) will have an identifiable effect on private savings. We can conclude that for our simulation it is reasonable to assume no change in the savings-investment gap. That is, it is reasonable to assume no change in the balance of trade.

(d) *The terms of trade*. As explained in the previous point, a policy of scrapping of Buy America(n) would stimulate exports. If the policy were unilateral, then it would not affect the positions of foreign demand curves for U.S. products. In these circumstances extra U.S. exports would mean lower prices. That is, the U.S. would suffer a terms-of-trade loss (a reduction in the prices of its exports relative to its imports). But unilateral scrapping of Buy America(n) seems unlikely. In recent decades, the U.S. has almost always made movements towards freer trade only as part of bilateral or multilateral trade agreements, not unilaterally. Consequently in our simulation we assume that Buy America(n) is relaxed in the context of trade agreements that improve U.S. access to foreign markets sufficiently to avoid terms-of-trade deterioration.

(e) *Private consumption and welfare*. In our simulation, public consumption (G), investment (I) and the trade balance (X – M) are held constant. GDP, the amount of goods and services that the economy produces, is determined by technology (A), and inputs of capital (K) and labor (L). Technology is treated exogenously and shocked, K is held constant and L is tied down by our assumption of constant real wages. This leaves private consumption (C) determined as a residual in the GDP identity:

$$GDP = C + I + G + X - M \quad .$$

Under the assumptions of fixed G, I, X – M and K, the movement in C is a legitimate indicator of the welfare effect of a policy. If scrapping Buy America(n) allows an increase in private consumption with no reduction in investment, public consumption and the trade balance and no requirement for extra capital, then we can conclude that the policy is welfare-enhancing.

Table 4.1 sets out macro results from the simulation of scrapping Buy America(n). Reflecting our assumptions, the table includes zero results for G, I, K, the trade balance, the terms of trade and the real wage rate. At first glance it might seem surprising that the results for real exports and real imports are not equal (1.139 compared with 0.953). But these results are *percentage* effects. In the USAGE database for 2015, exports are less than imports. The slightly larger percentage movement in X compared with that in M is consistent with our assumption of no change in X-M.

Scrapping Buy America(n) is a strongly pro-trade policy. In Table 4.1 the percentage increases in imports and exports are an order of magnitude larger than that in GDP.

Table 4.1. Macro effects on scrapping Buy America(n), (%)

Real private consumption (C)	0.191
Real public consumption (G)	0
Real investment (I)	0
Real exports (X)	1.139
Real imports (M)	0.953
Real GDP	0.124
Technology contribution (A)	0.053
Labor input (L)	0.117
Jobs	0.161
Capital stock (K)	0
Terms of trade	0
Trade balance	0
Real wage (CPI deflated)	0

The policy is also pro-employment. We show two employment results in Table 4.1: labor input which increases by 0.117 per cent and jobs which increases by 0.161 per cent. Labor input takes into account not only changes in number of jobs but also the wage rates for different jobs. If one job has a wage rate twice that of another, then an extra job of the first kind contributes twice as much to labor input as an extra job of the second. For a count of jobs they make equal contributions. The percentage impact for jobs is greater than that for labor input because scrapping Buy America(n) stimulates employment in industries with high-paid jobs less than in industries with low-paid jobs. We return to this topic in section 5 in the discussion of industry results. For explaining macro results, the labor input measure is the more relevant.

GDP increases by 0.124 per cent. There are two contributing factors: the increase in labor input and the improvement in technology.

These factors combine to determine the percentage increase in GDP via the equation:

$$\text{gdp} = a + S_L * \ell + S_K * k, \tag{4.1}$$

In this equation, gdp, *a*, ℓ and k are percentage changes in GDP, A, L and K. S_L and S_K are the shares of labor and capital in GDP. In the USAGE database these are about 0.6 and 0.4. In Table 4.1, *a* equals 0.053, ℓ equals 0.117 and k equals 0. With these numbers, (4.1) closely reproduces the USAGE result for gdp.

The improvement in technology is imposed in the simulation through the array of import-using and domestic-saving technical changes that, as explained in section 3, represent the impact effect of scrapping Buy America(n). That these technical changes should amount in aggregate terms to a GDP contribution of approximately 0.05 per cent can be understood by back-of-the-envelope arithmetic performed on Table 3.4. Broadly, we are assuming a 20 percentage point increase in the import share of goods inputs used by U.S. industries to produce goods for sale to government [that is, a change from 4.2 per cent to approximately 24 per cent, see the shares in the "import" row in Table 3.4 and equation (3.1)]. Applying equation (3.3) we get an efficiency gain of 5 per cent [recall that we have set the factor of proportionality α in equation (3.3) at 0.25]. This operates on \$169,891.5m worth of inputs, giving a GDP boost of \$8494m (= 0.05*169,891.5m). U.S. GDP is \$18 trillion. This

suggests that the efficiency gain contributes 0.047 per cent (=100*8.494/18,000) to GDP, close to the simulated contribution of 0.053 per cent.

What about the increase in labor input? In qualitative terms, we can understand why there is an increase in labor input in two steps. First, the improvement in technology raises the marginal product of labor. With real wages fixed, the marginal product of labor is now higher than the real wage rate. This sets up an incentive to use more labor. The second step is an increase in labor input which, with the given amount of capital, reduces the marginal product of labor. Labor input increases until the capital/labor ratio has fallen sufficiently to return the marginal product of labor to the fixed real wage rate.

We can gain quantitative insight as to why Table 4.1 shows a labor input gain of 0.117 per cent by using two useful back-of-the-envelope equations. The first defines σ, the elasticity of substitution between capital and labor as:

$$\sigma = \frac{\ell - k}{q - w} \quad , \tag{4.2}$$

where

w and q are the percentage changes in the wage rate and the rental rate on capital; and

ℓ and k are, as before, percentage changes in L and K.

In most CGE models, including USAGE, σ is treated as a parameter for each industry. It controls the sensitivity of the labor/capital ratio to movements in the factor price ratio.

The second useful back-of-the-envelope equation is

$$p_{GDP} = S_L * w + S_K * q - a, \tag{4.3}$$

In this equation, the only new notation is p_{GDP} which denotes the percentage change in the price deflator for GDP. Equation (4.3) is an aggregate version of the zero-pure-profit condition which relates the producer prices of goods and services to input costs per unit of output. In our back-of-the-envelope model, unit costs are increased by positive movements in the costs of using capital and labor and decreased by technology improvements that increase output per unit of input.

With k fixed on zero, (4.2) and (4.3) imply that the percentage change in labor input should be given, approximately, by:

$$\ell = \frac{\sigma}{S_K} * \left(-(w - p_{GDP}) + a\right), \tag{4.4}$$

With real wages fixed we might expect $w - p_{GDP}$ to be zero. As mentioned earlier, S_K is 0.4. In USAGE, σ is set at 0.5 for all industries. Substituting these values into (4.4) and using the result from Table 4.1 that *a* equals 0.053, we obtain:

$$\ell = \frac{0.5}{0.4} * \left(0 + 0.053\right) = 0.066 \tag{4.5}$$

This is low as an estimate of the USAGE labor input result (of 0.117). What is it that is happening in the model that is not accounted for in (4.5)? Recall from point (a) in the macro assumptions listed earlier in this section that it is the wage rate deflated by the CPI, not the GDP price deflator, which is held constant. With this in mind, we rewrite (4.4) as

$$\ell = \frac{\sigma}{S_K} * \left(-(w - p_C) + \left(p_{GDP} - p_C\right) + a\right), \tag{4.6}$$

Referring to USAGE results not shown in Table 4.1 we find in our simulation that consumer prices fall relative to producer prices. This result can be traced to macro assumption (b) that the government returns the cost saving from scrapping Buy America(n) to households by reducing taxes on consumer goods. Specifically, USAGE gives

$$p_{GDP} - p_C = 0.023 \tag{4.7}$$

where p_C is the percentage change in the CPI. Using (4.7) in (4.6) and fixing the wage deflated by the CPI at zero, we obtain

$$\ell = \frac{0.5}{0.4} * (0 + 0.023 + 0.053) = 0.095 \quad . \tag{4.8}$$

This is still a little low. As can be seen in the next section (Table 5.1), scrapping Buy America(n) favors export activity such as Export tourism and Export education (C388-9). These are labor intensive activities. Scrapping Buy America(n) causes changes in the industrial composition of output that provide a boost to employment in addition to what can be explained in a simple one-sector back-of-the-envelope model.

The final macro result that we will explain is the increase in private consumption. This is an important result because, as mentioned in point (e) of the macro assumptions, the increase in private consumption is a measure of the welfare benefit of scrapping Buy America(n). With G, I and X-M fixed, all of the increase in GDP accrues to private consumption. Because private consumption is about two thirds of GDP, the increase in GDP of 0.124 per cent, that we have already explained, translates into an increase in private consumption of about 0.19 per cent, approximately the result shown in Table 4.1.

5. Effects of scrapping Buy America(n) on U.S. industries

Tables 5.1 and 5.2 show effects of scrapping Buy America(n) on U.S. outputs of 389 commodities and employment in 387 industries. The reason for separate tables for commodity output and industry employment is that USAGE commodity and industry classifications are not quite the same. In line with BEA input-output data, USAGE includes commodities that are produced by more than one industry and industries that produce more than one commodity.

A priori we expected a large negative effect for U.S. output of any good c for which the TC(c,dom,j)s calculated in section 3 are large negative numbers for industries j that are important customers for domestically produced commodity c. More formally we expected output effects across all commodities c to be correlated with TCave(c) defined by:

$$\text{TCave}(c) = \sum_{j \in \text{Ind}} R(c, j) * TC(c, \text{dom}, j) \quad . \tag{5.1}$$

where

R(c,j) is the share of the total sales of domestically produced c that is absorbed by industry j as an intermediate input.

The TCave(c) values are given in Table 5.1. These values are large negatives for commodities such as Plumbing materials (C78) that face considerable import competition and rely for a major part of their sales on industries such as Power and communications structures (I29) for which the U.S. government is a major customer. Scrapping Buy America(n) would damage the output of these commodities because it would significantly free up their customers to substitute towards imports. In Table 5.1, commodities for which the absolute value of TCave is 2 or more are shaded. Like Plumbing materials, most of these commodities are importable construction materials.

Table 5.1. Commodity output effects (%) of Buy America cessation: USAGE & fitted results, and explanatory variables*

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
1 OilSeedFarm	0.159	0.393	0.000	0.342	35 MFamResStruc	0.028	0.068	0.000	0.000
2 GrainFarm	0.352	0.318	0.000	0.263	36 OthResStruc	0.036	0.068	0.000	0.000
3 VegMelonFarm	0.091	0.151	0.000	0.088	37 Sawmills	-2.450	-1.746	-2.015	0.118
4 FruitNutFarm	0.111	0.386	0.000	0.335	38 VeneersPlywd	-3.105	-2.763	-3.020	0.058
5 GreenNursPrd	0.091	0.086	0.000	0.019	39 Millwork	-1.312	-1.179	-1.337	0.032
6 OthCropFarm	0.188	0.325	0.000	0.271	40 OthWoodProd	-0.291	-0.154	-0.272	0.039
7 CattRancFarm	0.113	0.071	0.000	0.003	41 ClayRefrac	-4.208	-4.044	-4.511	0.210
8 DairCattProd	0.136	0.069	0.000	0.001	42 Glass	-0.650	-0.586	-0.851	0.168
9 OtherAnimal	0.086	0.097	0.000	0.030	43 Cement	-1.292	-1.133	-1.272	0.016
10 PoultryEgg	0.183	0.078	0.000	0.011	44 ReadyMix	0.038	0.070	0.000	0.002
11 ForestLog	-1.424	0.173	0.000	0.111	45 ConcPipeBric	-0.127	-0.071	-0.155	0.009
12 FishHuntTrap	0.539	0.631	0.000	0.592	46 OthConcPrd	-0.913	-0.851	-0.988	0.027
13 AggForSupp	0.073	0.069	0.000	0.001	47 LimeGypsum	-0.272	-0.106	-0.218	0.036
14 OIlGas	-0.040	0.158	0.000	0.095	48 Abrasives	-1.993	-1.927	-2.391	0.305
15 Coal	-0.289	0.108	-0.149	0.193	49 CutStonePrd	-4.485	-4.785	-5.097	0.019
16 GoldOthMetl	-0.312	0.110	-0.408	0.455	50 GrdMinEarth	-0.822	-0.056	-0.189	0.059
17 CopNickMine	-0.253	0.235	-0.013	0.189	51 MinWool	-0.453	-0.196	-0.397	0.121
18 Stone	-1.049	-0.905	-1.029	0.010	52 MscNonMetMi	-0.599	-0.471	-0.706	0.143
19 OtherNonMetl	-0.979	-0.775	-1.005	0.124	53 IronStlManuf	-1.388	-0.790	-0.998	0.100
20 OilGasDrill	-0.148	0.068	0.000	0.000	54 PurchStlProd	-2.266	-1.543	-1.757	0.072
21 OthMineSupp	-0.085	0.111	-0.008	0.054	55 AlRefManuf	-1.155	-0.645	-0.807	0.062
22 PowerGener	0.091	0.072	-0.007	0.012	56 PurchAlProd	-0.624	-0.244	-0.515	0.190
23 NatGasDist	-0.009	0.074	0.000	0.007	57 CopperSmelt	-1.475	-0.557	-0.806	0.153
24 WaterSewage	0.121	0.076	0.000	0.009	58 NonferrMetl	-0.695	-0.543	-1.122	0.485
25 NResMainRepa	0.071	0.069	0.000	0.001	59 CopperProd	-1.309	-0.156	-0.486	0.252
26 ResMaintRepa	0.006	0.068	0.000	0.000	60 NonferMetlPr	-0.300	0.004	-0.506	0.441
27 HeaCareStruc	0.024	0.068	0.000	0.000	61 FerrFoundry	-0.894	-0.216	-0.336	0.039
28 ManufStruc	0.032	0.068	0.000	0.000	62 NonFerrFound	-0.683	0.046	-0.027	0.005
29 PowComStruc	0.025	0.068	0.000	0.000	63 OthForgStmp	-0.769	0.068	0.000	0.000
30 EducVocStruc	-0.026	0.068	0.000	0.000	64 RollForming	-0.302	0.069	0.000	0.001
31 HwayStreets	-0.037	0.068	0.000	0.000	65 CrwnMtlStamp	-0.418	0.002	-0.111	0.043
32 ComFarmStruc	0.029	0.068	0.000	0.000	66 CutHandTool	-0.466	-0.468	-0.764	0.204
33 OthNResStruc	-0.006	0.068	0.000	0.000	67 PlateWork	-1.755	-1.457	-1.631	0.035
34 SFamResStruc	0.035	0.068	0.000	0.000	68 OrnArchMetal	-0.857	-0.697	-0.824	0.024

Table 5.1 continues …

Table 5.1 continued

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
69 Boiler	-1.708	-1.629	-2.000	0.226	103 MechPowTran	-3.435	-3.032	-3.540	0.299
70 MetalTank	-0.642	-0.552	-0.783	0.135	104 OthEngEquip	-1.652	-1.708	-2.224	0.368
71 MetalCntnr	-0.290	-0.159	-0.296	0.059	105 Pumps	-0.598	-0.623	-0.938	0.216
72 Hardware	-2.878	-2.656	-3.096	0.247	106 AirGasCmprs	0.010	-0.005	-0.371	0.296
73 SprnWirePrd	-1.033	-0.722	-0.991	0.165	107 MatlHandl	-0.519	-0.494	-0.754	0.167
74 MachShops	-0.410	0.072	0.000	0.004	108 PdrivnHandTl	0.149	0.060	-0.365	0.359
75 ScrewNut	-1.473	-0.987	-1.210	0.107	109 Scales	-0.052	-0.132	-0.792	0.586
76 CoatEngrave	-0.310	0.069	0.000	0.001	110 PackngMach	-0.196	-0.225	-0.550	0.245
77 Valves	-2.123	-2.064	-2.572	0.343	111 IndFurnace	0.532	0.470	-0.162	0.585
78 PlumbingMat	-5.927	-5.583	-5.975	0.062	112 FluidPower	-2.570	-2.447	-2.886	0.257
79 BallBearng	-1.355	-1.016	-1.424	0.291	113 Computers	0.106	0.073	-0.086	0.091
80 Ammunition	0.402	0.295	0.000	0.240	114 CmptrStorage	-2.936	-2.955	-3.293	0.130
81 FabPipeFtng	-0.474	0.068	0.000	0.000	115 CompTermin	-1.845	-2.252	-2.841	0.416
82 OthFabMetl	-1.510	-1.501	-2.008	0.369	116 Telephone	0.533	0.509	-0.063	0.527
83 FarmMach	0.287	0.268	-0.029	0.239	117 BroadcastEq	-0.247	-0.456	-1.426	0.882
84 LawnEquip	0.048	0.077	0.000	0.010	118 CommunEqui	-2.405	-2.850	-3.328	0.277
85 ConstMach	-0.048	-0.105	-0.540	0.360	119 AudVidEquip	0.223	0.077	-0.173	0.183
86 MinOilMach	0.251	0.213	-0.248	0.401	120 OtElectrnic	-2.874	-3.021	-3.507	0.276
87 OthInduMach	-0.339	-0.396	-0.848	0.364	121 Semicondctr	-2.408	-2.744	-3.358	0.418
88 PlstRbrMach	0.017	-0.064	-0.518	0.382	122 PrintCircuit	-0.085	0.191	0.000	0.130
89 SemicondMach	0.817	0.647	0.000	0.610	123 ElectroMedic	0.246	0.245	-0.004	0.190
90 VendingMach	0.083	0.134	-0.003	0.073	124 SearchNavig	-0.071	0.020	-0.160	0.111
91 OfficeMach	0.451	0.389	-0.104	0.443	125 EnviroContrl	-4.603	-4.881	-5.330	0.153
92 OptInstLens	0.332	0.191	-0.536	0.669	126 ProcVblInsts	-0.687	-0.868	-1.623	0.647
93 PhotoEquip	0.359	0.291	-0.093	0.328	127 FluidMeters	-0.487	-0.539	-0.695	0.061
94 AirPurVentil	-0.993	-0.894	-1.138	0.133	128 ElecTestInst	-1.448	-1.669	-2.454	0.641
95 HeatingEq	-1.656	-1.571	-1.787	0.073	129 LabInsts	0.273	0.230	-0.326	0.498
96 ACRefrig	-1.206	-1.095	-1.343	0.126	130 RadiationIns	0.625	0.528	-0.001	0.484
97 MoldMfg	-0.012	0.117	-0.053	0.106	131 WatchClock	-0.203	-0.326	-0.825	0.415
98 RollMillMach	-0.080	-0.128	-0.559	0.356	132 MagOptiMedi	0.051	-0.012	-0.351	0.269
99 ToolDieJig	-0.063	0.079	-0.036	0.048	133 Lightbulbs	-1.836	-1.924	-2.574	0.492
100 MtlWorkMac	-0.640	-0.540	-0.920	0.285	134 LightFxtr	-8.826	-8.974	-9.582	0.123
101 Turbine	0.307	0.247	-0.467	0.657	135 SmAppliaMf	-0.401	-0.564	-1.128	0.470
102 GearManuf	-3.353	-3.475	-4.098	0.393	136 HshldStove	0.334	0.236	-0.040	0.217

Table 5.1 continues …

Table 5.1 continued

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
137 HshldFridge	0.308	0.229	-0.063	0.232	171 Boats	0.408	0.166	0.000	0.103
138 HshldLaundry	0.506	0.375	0.000	0.323	172 MotrBikes	0.210	-0.006	-0.237	0.161
139 OthHshldApp	-1.319	-1.507	-1.917	0.271	173 ArmyTanks	-1.521	-1.203	-1.504	0.175
140 PwrTrnsfrmr	-0.642	-0.415	-0.603	0.097	174 OthrTransEq	0.277	0.082	-0.017	0.032
141 MotorGenratr	-2.208	-2.281	-2.904	0.448	175 WoodKitcCabt	-0.028	0.075	-0.003	0.011
142 Switchboard	-1.559	-1.532	-1.868	0.195	176 UphlHldFurn	0.130	0.072	-0.045	0.050
143 Relays	-2.468	-2.533	-3.164	0.445	177 NonUpHhlFur	-0.273	-0.381	-0.635	0.166
144 StorBattery	-0.146	-0.296	-0.610	0.231	178 OthInsHhFurn	0.109	0.050	-0.049	0.031
145 PrimBatter	0.124	-0.041	-0.354	0.242	179 InstFurn	0.344	0.319	0.000	0.264
146 ComElecWire	-4.078	-3.776	-4.425	0.405	180 OfficeFurn	0.060	0.096	0.000	0.029
147 WireDevice	-6.066	-6.461	-7.167	0.337	181 ShcaseShlv	-0.619	-0.615	-0.849	0.136
148 CarbonProds	-0.753	-0.724	-1.491	0.666	182 OthFurn	0.120	0.050	-0.034	0.015
149 MsElEquip	-0.137	-0.230	-0.941	0.632	183 SrgMedInst	0.306	0.226	-0.115	0.281
150 Automobile	0.350	0.216	0.000	0.156	184 SurgAppSupp	0.293	0.181	-0.095	0.215
151 LightTruck	0.388	0.221	0.000	0.161	185 DentalEquip	0.420	0.294	-0.004	0.241
152 HeavyTruck	0.212	0.164	-0.142	0.244	186 Ophthalmic	0.458	0.287	0.000	0.231
153 VehicleBody	0.165	0.058	-0.089	0.079	187 DentalLab	0.277	0.069	0.000	0.001
154 TruckTrailer	0.310	0.293	-0.007	0.244	188 Jewelry	0.752	0.618	-0.036	0.615
155 MotorHome	0.487	0.215	0.000	0.155	189 SportGoods	0.295	0.141	-0.038	0.115
156 TravlTrlr	0.503	0.284	-0.033	0.261	190 Toys	0.774	0.626	-0.018	0.605
157 GasEngPrts	-0.051	-0.208	-0.475	0.188	191 OfficSupply	-0.761	-0.851	-1.055	0.094
158 ElecEngPrts	-1.071	-1.116	-1.372	0.134	192 Signs	-0.066	-0.011	-0.104	0.021
159 SteerBrake	-1.407	-1.573	-1.839	0.123	193 AllOthManuf	-0.101	-0.111	-0.319	0.132
160 PwrTrainPrts	-0.180	-0.395	-0.595	0.111	194 DogCatFood	0.165	0.113	0.000	0.047
161 SeatingInter	0.098	-0.148	-0.284	0.059	195 OthAnFood	0.182	0.103	-0.001	0.038
162 AutoMtlStam	0.173	0.070	-0.041	0.043	196 FlourMalMill	0.160	0.090	-0.090	0.114
163 OthAuto	-0.685	-0.860	-1.366	0.397	197 WetCornMill	0.011	0.036	-0.172	0.139
164 Aircraft	0.649	0.574	0.000	0.532	198 SoyOilProc	-0.165	-0.096	-0.382	0.212
165 AirEngines	-2.685	-2.804	-3.647	0.645	199 FatsOils	0.066	0.061	-0.041	0.034
166 OthAirParts	-2.728	-3.324	-4.287	0.743	200 BrkCereal	0.191	0.153	0.000	0.090
167 Missiles	0.196	0.204	0.000	0.143	201 SugarConfec	-0.108	-0.127	-0.269	0.065
168 MissilPrts	-0.075	-0.040	-0.256	0.144	202 FrozFood	0.102	0.000	-0.117	0.046
169 RlrdCars	0.104	0.095	-0.210	0.240	203 FrtVegCDry	0.106	0.035	-0.123	0.089
170 Ships	0.072	0.094	-0.015	0.042	204 MilkButter	0.158	0.070	-0.011	0.013

Table 5.1 continues …

Table 5.1 continued

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
205 Cheese	0.170	0.051	-0.039	0.022	239 Printing	0.217	0.098	-0.046	0.079
206 DCEDairy	-0.008	-0.068	-0.321	0.179	240 SuppPrint	0.145	0.038	-0.058	0.027
207 IceCream	0.188	0.078	-0.003	0.014	241 PetrolRefine	-0.080	-0.083	-0.297	0.140
208 AnimalProc	0.123	0.027	-0.125	0.082	242 AsphaltPave	-0.061	-0.023	-0.118	0.022
209 PoultryProc	0.201	0.128	-0.004	0.067	243 AsphltShngl	-0.626	-0.578	-0.773	0.098
210 Seafood	0.210	0.088	-0.004	0.025	244 OthPetroCoal	-0.089	0.135	-0.026	0.097
211 BreadBakery	0.160	0.088	-0.001	0.022	245 Petrochem	-0.908	-0.362	-0.531	0.082
212 CookiePasta	0.136	0.076	-0.012	0.021	246 IndGas	-0.250	0.054	-0.050	0.036
213 SnackFood	0.216	0.167	-0.006	0.111	247 SynthDye	-1.070	-0.860	-1.311	0.342
214 CoffTea	0.206	0.123	-0.047	0.105	248 OthInorgChem	-0.904	-0.697	-1.142	0.344
215 FlavorSyrup	-0.370	-0.506	-0.637	0.037	249 OthOrgChem	-0.429	-0.262	-0.675	0.332
216 SeasDressing	0.125	0.050	-0.071	0.052	250 Plastics	-0.665	-0.319	-0.724	0.322
217 OthrFoodMf	0.233	0.159	-0.055	0.151	251 SynRubbFiber	-0.634	-0.442	-0.805	0.273
218 SoftDrinks	0.211	0.093	0.000	0.027	252 Fertilizer	-1.084	-1.071	-1.391	0.201
219 Breweries	0.164	0.096	-0.001	0.031	253 Pesticide	0.358	0.224	-0.004	0.168
220 Wineries	0.188	0.133	-0.075	0.144	254 MedicBotanic	0.222	0.020	-0.050	0.000
221 Distilleries	0.246	0.193	-0.062	0.194	255 Pharma	0.348	0.272	-0.007	0.222
222 Tobacco	0.147	0.064	-0.014	0.010	256 InVitroDiag	0.250	0.059	-0.015	0.006
223 FiberYarn	-0.095	0.092	-0.357	0.383	257 BiologicProd	0.337	0.200	-0.079	0.218
224 FabricMills	-0.925	-0.990	-1.535	0.430	258 Paint	-0.339	-0.153	-0.338	0.107
225 TextFabrCoat	-0.686	-0.509	-0.715	0.112	259 Adhesives	-0.422	-0.183	-0.435	0.174
226 Carpet	0.079	0.007	-0.127	0.064	260 Soap	0.108	0.031	-0.142	0.104
227 CurtainLinen	0.143	0.069	-0.167	0.168	261 ToiletPrep	0.278	0.154	-0.037	0.127
228 OthTextMills	-1.523	-1.496	-1.773	0.138	262 Ink	-1.489	-1.471	-1.724	0.114
229 ApparelMf	0.061	-0.020	-0.163	0.072	263 OthChemical	-0.871	-0.713	-0.958	0.141
230 LeatherMf	-0.231	-0.346	-0.817	0.386	264 PlstPacking	-0.657	-0.469	-0.681	0.120
231 PulpMills	-1.860	-2.140	-2.915	0.608	265 PlstPipe	-0.782	-0.631	-0.843	0.113
232 Paper	-0.603	-0.668	-0.960	0.191	266 LamPlstPlate	-0.198	0.069	0.000	0.001
233 Paperboard	-0.809	-0.584	-0.687	0.005	267 Polystyrene	0.168	0.068	0.000	0.000
234 PprContainer	-0.218	-0.057	-0.177	0.047	268 UrethaneFoam	0.164	0.068	0.000	0.000
235 PprBagTreat	-0.344	-0.404	-0.702	0.209	269 PlstBottle	-0.034	-0.121	-0.252	0.054
236 Stationry	0.211	0.175	-0.042	0.154	270 OthPlastic	-0.510	-0.509	-0.745	0.142
237 SanitPpr	0.230	0.117	-0.001	0.052	271 Tires	-0.813	-0.959	-1.333	0.260
238 OthPprProd	-0.515	-0.527	-0.664	0.042	272 RbrPlstHose	-0.747	-0.822	-1.339	0.411

Table 5.1 continues …

Table 5.1 continued

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
273 OthRbrProd	-0.480	-0.437	-0.666	0.138	307 Housing	0.002	0.068	0.000	0.000
274 WholesaleTr	0.078	0.069	0.000	0.001	308 OthRealEst	0.157	0.072	0.000	0.005
275 RetailTr	0.155	0.068	0.000	0.000	309 AutoRental	0.204	0.085	0.000	0.018
276 AirTrans	0.302	0.072	0.000	0.005	310 GenrlRentl	0.229	0.096	0.000	0.029
277 RailTrans	-0.039	0.104	0.000	0.037	311 MachEquRntl	0.173	0.137	0.000	0.072
278 WaterTrans	0.471	0.068	0.000	0.000	312 AssetLessors	0.402	0.428	0.000	0.379
279 TruckTrans	0.081	0.114	0.000	0.049	313 LegalSvces	0.221	0.127	0.000	0.062
280 GrdPassTrans	0.165	0.068	0.000	0.000	314 CustCptrProg	-0.003	0.080	0.000	0.013
281 Pipeline	0.084	0.093	0.000	0.026	315 cptrSysDesgn	0.119	0.107	0.000	0.041
282 ScenSuppTran	0.327	0.174	0.000	0.112	316 OthCptrSvce	0.193	0.115	0.000	0.050
283 Couriers	0.405	0.289	0.000	0.232	317 Accounting	0.170	0.078	0.000	0.010
284 Warehousing	0.157	0.119	0.000	0.054	318 ArchEngSvce	0.164	0.176	0.000	0.114
285 NewspaperPb	0.285	0.126	0.000	0.061	319 DesignSvce	0.044	0.070	0.000	0.002
286 PerdclPub	0.311	0.160	0.000	0.097	320 MgmtCnsltSv	0.292	0.219	0.000	0.159
287 BookPub	0.259	0.167	0.000	0.104	321 EnvCnsltSvc	0.161	0.071	0.000	0.003
288 DataPub	0.230	0.099	0.000	0.033	322 ResDevelSvc	0.065	0.133	0.000	0.069
289 SoftwrPub	0.395	0.332	0.000	0.278	323 Advertising	0.169	0.092	0.000	0.025
290 MoviesVideo	0.301	0.241	0.000	0.182	324 MscProfSvces	0.106	0.110	0.000	0.044
291 SoundRecord	0.203	0.138	0.000	0.074	325 PhotoSvce	0.225	0.072	0.000	0.004
292 RadTVBroad	0.054	0.068	0.000	0.000	326 VetSvces	0.257	0.068	0.000	0.000
293 Cable	0.108	0.068	0.000	0.000	327 CompanyMgm	0.001	0.069	0.000	0.001
294 WiredTelco	0.162	0.090	0.000	0.023	328 OffAdmSvces	0.158	0.068	0.000	0.000
295 WirelesTelco	0.182	0.070	0.000	0.003	329 FacilSupSvc	0.081	0.068	0.000	0.000
296 SatOthTelco	0.224	0.218	0.000	0.158	330 EmplSvce	0.149	0.070	0.000	0.002
297 DataHostServ	0.093	0.077	0.000	0.009	331 BusnsSupSvc	0.106	0.068	0.000	0.001
298 NewsInfoServ	0.241	0.119	0.000	0.053	332 TravelSvce	0.277	0.120	0.000	0.055
299 NetPubSearch	0.233	0.111	0.000	0.046	333 DetectivSvce	0.111	0.069	0.000	0.002
300 MonetDepCre	0.247	0.118	0.000	0.052	334 BldgSvce	0.112	0.068	0.000	0.000
301 NonDepCredit	0.223	0.134	0.000	0.069	335 OthSuppSvce	0.061	0.075	0.000	0.007
302 SecComBroke	0.378	0.246	0.000	0.187	336 WasteMgmt	0.118	0.069	0.000	0.001
303 OthFinance	0.397	0.219	0.000	0.158	337 EleSecSchool	0.219	0.068	0.000	0.000
304 InsCarriers	0.255	0.096	0.000	0.030	338 Colleges	0.261	0.076	0.000	0.009
305 InsBrokers	0.237	0.068	0.000	0.000	339 OtherEducSv	0.230	0.084	0.000	0.017
306 FundsTrusts	0.253	0.068	0.000	0.000	340 Physician	0.278	0.068	0.000	0.000

Table 5.1 continues …

Table 5.1 continued

Commodity	USAGE	Fitted	TCave	Xsh	Commodity	USAGE	Fitted	TCave	Xsh
341 Dentists	0.277	0.068	0.000	0.000	367 MachinerRp	0.073	0.068	0.000	0.000
342 OthHealth	0.275	0.068	0.000	0.000	368 HhGoodsRpr	0.167	0.068	0.000	0.000
343 Outpatient	0.267	0.068	0.000	0.000	369 PersCareSvce	0.238	0.068	0.000	0.000
344 MedDiagLab	0.276	0.068	0.000	0.000	370 DeathCareSv	0.252	0.068	0.000	0.000
345 HomeHlthSvc	0.272	0.068	0.000	0.000	371 CleanLaundry	0.216	0.068	0.000	0.000
346 OthAmbul	0.272	0.068	0.000	0.000	372 OthPerSvce	0.225	0.068	0.000	0.000
347 Hospitals	0.245	0.069	0.000	0.001	373 ReligiousOrg	0.242	0.068	0.000	0.000
348 NursingHome	0.241	0.068	0.000	0.000	374 GrantOrg	0.248	0.068	0.000	0.000
349 MentlHealth	0.242	0.068	0.000	0.000	375 CivSocialOr	0.224	0.072	0.000	0.005
350 IndFamHealth	0.241	0.068	0.000	0.000	376 PrivHhlds	0.260	0.068	0.000	0.000
351 SocialSvce	0.269	0.068	0.000	0.000	377 FedGovDef	-0.001	0.068	0.000	0.000
352 ChildCare	0.260	0.068	0.000	0.000	378 FedGovNonD	-0.001	0.068	0.000	0.000
353 PerfArts	0.229	0.094	0.000	0.028	379 PostalSvc	0.178	0.076	0.000	0.009
354 SpectSports	0.188	0.072	0.000	0.004	380 OthFedGEnt	0.306	0.068	0.000	0.000
355 Promoters	0.267	0.119	0.000	0.053	381 SLG	-0.001	0.068	0.000	0.000
356 IndArtists	0.212	0.102	0.000	0.035	382 OthSLGEnt	0.125	0.068	0.000	0.000
357 MuseumZoo	0.253	0.068	0.000	0.000	386 Holiday	0.339	0.068	0.000	0.000
358 AmusePark	0.246	0.068	0.000	0.000	387 FgnHol	0.400	0.068	0.000	0.000
359 Gambling	0.228	0.068	0.000	0.000	388 ExpTour	1.144	1.019	0.000	1.000
360 OthAmuse	0.232	0.068	0.000	0.000	389 ExpEdu	1.038	1.019	0.000	1.000
361 AccHotels	0.191	0.068	0.000	0.000	390 OthNonRes	-0.030	1.019	0.000	1.000
362 FullResto	0.255	0.073	0.000	0.006	391 AirInt	0.720	0.479	0.000	0.432
363 LimResto	0.247	0.072	0.000	0.004	392 WatInt	0.903	1.019	0.000	1.000
364 OthFoodDrink	0.250	0.072	0.000	0.004					
365 AutoRepair	0.229	0.068	0.000	0.000					
366 ElEquiRepair	0.116	0.068	0.000	0.000					

* Commodities in USAGE are numbered from 1 to 392. This table lists the commodities except 383Scrap, 384Used2HndGds and 385NonCompImprt.
Note that only commodities 15 to 273 were subject to shocks through elimination of the Buy America and Buy American programs.
For technical reasons the USAGE database shows an export share of 1 for 387Foreign holiday. For the regression it is appropriate to use zero.

Table 5.2. Employment effects by industry of Buy America(n) cessation: changes and percentage changes in jobs

Industry	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs
Agriculture	**7477**	**0.207**	**Construction**	**4486**	**0.045**	50 GrdMinEarth	-83	-1.012
1 OilSeedFarm	849	0.349	25 NResMainRepa	292	0.100	51 MinWool	-90	-0.456
2 GrainFarm	1307	0.561	26 ResMaintRepa	40	0.030	52 MscNonMetMin	-73	-0.625
3 VegMelonFarm	853	0.230	27 HeaCareStruc	845	0.047	53 IronStlManuf	-1596	-1.545
4 FruitNutFarm	780	0.331	28 ManufStruc	1956	0.106	54 PurchStlProd	-697	-1.754
5 GreenNursPrd	335	0.221	29 PowComStruc	450	0.078	55 AlRefManuf	-211	-1.275
6 OthCropFarm	692	0.316	30 EducVocStruc	-48	-0.002	56 PurchAlProd	-194	-0.634
7 CattRancFarm	828	0.255	31 HwayStreets	-82	-0.016	57 CopperSmelt	-91	-1.479
8 DairCattProd	653	0.276	32 ComFarmStruc	200	0.049	58 NonferrMetl	-76	-0.813
9 OtherAnimal	604	0.198	33 OthNResStruc	72	0.020	59 CopperProd	-427	-1.441
10 PoultryEgg	1125	0.351	34 SFamResStruc	531	0.086	60 NonferMetlPr	-88	-0.370
11 ForestLog	-2167	-1.592	35 MFamResStruc	75	0.069	61 FerrFoundry	-548	-0.964
12 FishHuntTrap	739	0.660	36 OthResStruc	156	0.062	62 NonFerrFound	-281	-0.722
13 AggForSupp	877	0.123	**Manufacturing**	**-57424**	**-0.439**	63 OthForgStmp	-266	-0.761
Mining	**-1449**	**-0.096**	37 SawWoodPres	-1984	-2.578	64 RollForming	-50	-0.315
14 OIlGas	166	0.020	38 EngWoodProd	-2392	-3.217	65 CrwnMtlStamp	-216	-0.377
15 Coal	-165	-0.214	39 Millwork	-2058	-1.433	66 CutHandTool	-151	-0.412
16 GoldOthMetl	-85	-0.267	40 OthWoodProd	-395	-0.294	67 PlateWork	-2998	-1.728
17 CopNickMine	-72	-0.210	41 ClayRefrac	-1920	-4.341	68 OrnArchMetal	-1453	-0.862
18 Stone	-596	-0.955	42 Glass	-697	-0.660	69 Boiler	-416	-1.731
19 OtherNonMetl	-498	-0.931	43 Cement	-323	-1.387	70 MetalTank	-235	-0.665
20 OilGasDrill	-107	-0.097	44 ReadyMix	49	0.058	71 MetalCntnr	-142	-0.261
21 OthMineSupp	-92	-0.030	45 ConcPipeBric	-26	-0.101	72 Hardware	-1026	-2.760
Utilities	**1010**	**0.172**	46 OthConcPrd	-386	-0.939	73 SprnWirePrd	-650	-1.266
22 PowerGener	805	0.212	47 LimeGypsum	-55	-0.271	74 MachShops	-1156	-0.412
23 NatGasDist	195	0.095	48 Abrasives	-349	-2.013	75 ScrewNut	-2033	-1.469
24 WaterSewage	10	0.248	49 CutStonePrd	-964	-4.651	76 CoatEngrave	-423	-0.299

Table 5.2 continues …

Table 5.2 continued

Industry	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs
77 Valves	-2568	-2.134	104 OthEngEquip	-1017	-1.675	131 WatchClock	-20	-0.164
78 Plumbing materials	-1204	-6.046	105 Pumps	-343	-0.612	132 MagOptiMedia	7	0.071
79 BallBearng	-655	-1.389	106 AirGasCmprs	6	0.017	133 Lightbulbs	-36	-1.817
80 Ammunition	212	0.428	107 MatlHandl	-479	-0.514	134 LightFxtr	-864	-8.966
81 FabPipeFtng	-158	-0.449	108 PdrivnHandTl	21	0.187	135 SmAppliaMf	-19	-0.360
82 OthFabMetl	-1328	-1.512	109 Scales	-30	-0.051	136 HshldStove	16	0.412
83 FarmMach	156	0.252	110 PackngMach	-28	-0.181	137 HshldFridge	22	0.326
84 LawnEquip	19	0.089	111 IndFurnace	56	0.547	138 HshldLaundry	33	0.572
85 ConstMach	-14	-0.018	112 FluidPower	-783	-2.595	139 OthHshldApp	-79	-1.323
86 MinOilMach	134	0.263	113 Computers	98	0.033	140 PwrTrnsfrmr	-38	-0.664
87 OthInduMach	-195	-0.314	114 CmptrStorage	-1795	-2.948	141 MotorGenratr	-201	-2.298
88 PlstRbrMach	4	0.034	115 CompTermin	-1415	-1.562	142 Switchboard	-122	-1.639
89 SemicondMach	291	0.822	116 Telephone	217	0.436	143 Relays	-284	-2.376
90 VendingMach	35	0.060	117 BroadcastEq	-203	-0.135	144 StorBattery	-6	-0.160
91 OfficeMach	49	0.464	118 CommunEquip	-484	-1.350	145 PrimBatter	4	0.142
92 OptInstLens	70	0.334	119 AudVidEquip	329	0.275	146 ComElecWire	-319	-4.227
93 PhotoEquip	51	0.342	120 OtElectrnic	-6963	-2.524	147 WireDevice	-751	-6.155
94 AirPurVentil	-214	-1.004	121 Semicondctr	-2075	-2.319	148 CarbonProds	-18	-0.771
95 HeatingEq	-310	-1.656	122 PrintCircuit	-7	-0.034	149 MsElEquip	-14	-0.147
96 ACRefrig	-1068	-1.205	123 ElectroMedic	81	0.298	150 Automobile	367	0.389
97 MoldMfg	1	0.003	124 SearchNavig	-15	-0.024	151 LightTruck	551	0.453
98 RollMillMach	-23	-0.080	125 EnviroContrl	-216	-3.865	152 HeavyTruck	82	0.254
99 ToolDieJig	-17	-0.039	126 ProcVblInsts	-101	-0.578	153 VehicleBody	79	0.209
100 MtlWorkMach	-216	-0.623	127 FluidMeters	-27	-0.491	154 TruckTrailer	124	0.356
101 Turbine	149	0.498	128 ElecTestInst	-276	-1.371	155 MotorHome	72	0.536
102 GearManuf	-493	-3.432	129 LabInsts	46	0.313	156 TravlTrlr	198	0.557
103 MechPowTrans	-582	-3.392	130 RadiationIns	46	0.757	157 GasEngPrts	-56	-0.082

Table 5.2 continues …

Table 5.2 continued

Industry	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs
158 ElecEngPrts	-576	-1.077	185 DentalEquip	95	0.448	212 CookiePasta	-20	147
159 SteerBrake	-754	-1.395	186 Ophthalmic	168	0.484	213 SnackFood	7	200
160 PwrTrainPrts	-176	-0.177	187 DentalLab	114	0.295	214 CoffTea	-36	37
161 SeatingInter	64	0.126	188 Jewelry	240	0.887	215 FlavorSyrup	-864	-177
162 AutoMtlStamp	199	0.208	189 SportGoods	141	0.326	216 SeasDressing	-19	70
163 OthAuto	-830	-0.662	190 Toys	57	0.789	217 OthrFoodMf	16	140
164 Aircraft	1355	0.600	191 OfficSupply	-126	-0.782	218 SoftDrinks	22	171
165 AirEngines	-1476	-2.575	192 Signs	4	0.007	219 Breweries	33	68
166 OthAirParts	-2397	-2.525	193 AllOthManuf	-104	-0.100	220 Wineries	-79	49
167 Missiles	161	0.184	194 DogCatFood	104	0.220	221 Distilleries	-38	56
168 MissilPrts	-39	-0.128	195 OthAnFood	94	0.220	222 Tobacco	-201	221
169 RlrdCars	13	0.068	196 FlourMalMill	50	0.202	223 FiberYarn	-122	-65
170 Ships	58	0.078	197 WetCornMill	-3	-0.012	224 FabricMills	-284	-748
171 Boats	153	0.436	198 SoyOilProc	-27	-0.153	225 TextFabrCoat	-6	-289
172 MotrBikes	61	0.238	199 FatsOils	11	0.103	226 Carpet	4	54
173 ArmyTanks	-497	-1.456	200 BrkCereal	112	0.238	227 CurtainLinen	-319	42
174 OthrTransEq	59	0.307	201 SugarConfec	-74	-0.081	228 OthTextMills	-751	-683
175 WoodKitcCabt	-40	-0.038	202 FrozFood	103	0.134	229 ApparelMf	-18	168
176 UphlHldFurn	67	0.136	203 FrtVegCDry	139	0.138	230 LeatherMf	-14	-74
177 NonUpHhlFurn	-85	-0.228	204 MilkButter	179	0.188	231 PulpMills	367	-168
178 OthInsHhFurn	25	0.158	205 Cheese	100	0.201	232 Paper	551	-546
179 InstFurn	80	0.343	206 DCEDairy	9	0.033	233 Paperboard	82	-284
180 OfficeFurn	56	0.057	207 IceCream	63	0.247	234 PprContainer	79	-216
181 ShcaseShlv	-234	-0.606	208 AnimalProc	444	0.155	235 PprBagTreat	124	-213
182 OthFurn	75	0.131	209 PoultryProc	323	0.237	236 Stationry	72	65
183 SrgMedInst	592	0.340	210 Seafood	91	0.249	237 SanitPpr	198	75
184 SurgAppSupp	592	0.322	211 BreadBakery	333	0.201	238 OthPprProd	-56	-65

Table 5.2 continued

Industry	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs
239 Printing	1182	0.242	266 LamPlstPlate	-33	-0.186	288 DataPub	212	0.259
240 SuppPrint	59	0.173	267 Polystyrene	51	0.179	289 SoftwrPub	1763	0.404
241 PetrolRefine	-43	-0.064	268 UrethaneFoam	60	0.191	290 MoviesVideo	1567	0.364
242 AsphaltPave	-2	-0.026	269 PlstBottle	-8	-0.023	291 SoundRecord	192	0.259
243 AsphltShngl	-36	-0.643	270 OthPlastic	-1524	-0.516	292 RadTVBroad	172	0.094
244 OthPetroCoal	-8	-0.133	271 Tires	-541	-0.829	293 Cable	317	0.206
245 Petrochem	-167	-0.961	272 RbrPlstHose	-179	-0.763	294 WiredTelco	1821	0.266
246 IndGas	-29	-0.231	273 OthRbrProd	-280	-0.472	295 WirelesTelco	663	0.306
247 SynthDye	-108	-1.072	**Wholesale & Retail**	**46191.**	**0.178**	296 SatOthTelco	250	0.305
248 OthInorgChem	-324	-0.919	274 WholesaleTr	6840	0.101	297 DataHostServ	481	0.125
249 OthOrgChem	-167	-0.414	275 RetailTr	39351	0.206	298 NewsInfoServ	239	0.326
250 Plastics	-456	-0.660	**Transport**	**18159**	**0.275**	299 NetPubSearch	441	0.228
251 SynRubbFiber	-108	-0.652	276 AirTrans	777	0.404	**Finance, Realestate, Rent**	**54345**	**0.322**
252 Fertilizer	-188	-1.140	277 RailTrans	96	0.045	300 MonetDepCred	9206	0.300
253 Pesticide	81	0.437	278 WaterTrans	241	0.609	301 NonDepCredit	3934	0.256
254 MedicBotanic	60	0.269	279 TruckTrans	2456	0.115	302 SecComBroker	5923	0.401
255 Pharma	1076	0.383	280 GrdPassTrans	3031	0.284	303 OthFinance	1217	0.420
256 InVitroDiag	65	0.262	281 Pipeline	91	0.178	304 InsCarriers	7242	0.290
257 BiologicProd	161	0.382	282 ScenSuppTran	2985	0.384	305 InsBrokers	1868	0.272
258 Paint	-81	-0.349	283 Couriers	3927	0.452	306 FundsTrusts	307	0.340
259 Adhesives	-41	-0.408	284 Warehousing	1573	0.172	307 Housing	3553	0.227
260 Soap	147	0.164	386 AirInt	2555	0.863	308 OthRealEst	18499	0.288
261 ToiletPrep	251	0.338	387 WatInt	426	1.019	309 AutoRental	296	0.238
262 Ink	-96	-1.549	**Information**	**9205**	**0.273**	310 GenrlRentl	338	0.281
263 OthChemical	-589	-0.847	285 NewspaperPb	348	0.254	311 MachEquRntl	377	0.227
264 PlstPacking	-643	-0.671	286 PerdclPub	343	0.299	312 AssetLessors	1586	0.488
265 PlstPipe	-469	-0.821	287 BookPub	398	0.308			

Table 5.2 continues …

Table 5.2 continued

Industry	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs	*Industry*	change in jobs	% effect on jobs
Profess. & Busin Serv	**41577**	**0.150**	338 Colleges	9420	0.330	363 LimResto	15581	0.283
313 LegalSvces	7156	0.238	339 OtherEducSv	3094	0.288	364 OthFoodDrink	1937	0.414
314 CustCptrProg	797	0.042	340 Physician	12282	0.292	**Other Services**	**29748**	**0.270**
315 cptrSysDesgn	2070	0.112	341 Dentists	3400	0.293	365 AutoRepair	3945	0.291
316 OthCptrSvce	2400	0.212	342 OthHealth	2410	0.288	366 ElEquiRepair	393	0.157
317 Accounting	4002	0.192	343 Outpatient	2214	0.293	367 MachinerRp	460	0.104
318 ArchEngSvce	5221	0.180	344 MedDiagLab	1282	0.290	368 HhGoodsRpr	422	0.220
319 DesignSvce	228	0.060	345 HomeHlthSvc	2063	0.318	369 PersCareSvce	4412	0.289
320 MgmtCnsltSv	3673	0.309	346 OthAmbul	1101	0.294	370 DeathCareSv	1855	0.291
321 EnvCnsltSvc	486	0.176	347 Hospitals	15434	0.314	371 CleanLaundry	2255	0.253
322 ResDevelSvc	1749	0.181	348 NursingHome	10000	0.291	372 OthPerSvce	3059	0.285
323 Advertising	2573	0.263	349 MentlHealth	2940	0.291	373 ReligiousOrg	2122	0.281
324 MscProfSvces	660	0.124	350 IndFamHealth	4589	0.293	374 GrantOrg	2836	0.286
325 PhotoSvce	208	0.249	351 SocialSvce	2534	0.291	375 CivSocialOr	4214	0.261
326 VetSvces	533	0.272	352 ChildCare	3173	0.291	376 PrivHhlds	3775	0.289
327 CompanyMgmt	477	0.011	**Arts, Entertainment**	**12547**	**0.293**	**Government**	**22267**	**0.092**
328 OffAdmSvces	1002	0.173	353 PerfArts	859	0.290	377 FedGovDef	1089	0.056
329 FacilSupSvc	206	0.098	354 SpectSports	2621	0.243	378 FedGovNonDef	1096	0.047
330 EmplSvce	3192	0.168	355 Promoters	1059	0.317	379 PostalSvc	985	0.249
331 BusnsSupSvc	747	0.125	356 IndArtists	1289	0.296	380 FedElecUtil	280	0.710
332 TravelSvce	846	0.300	357 MuseumZoo	495	0.313	381 OthFedGEnt	58	0.178
333 DetectivSvce	603	0.133	358 AmusePark	1129	0.285	382 SLG	16913	0.091
334 BldgSvce	1596	0.131	359 Gambling	1516	0.423	383 SLGPassTrans	74	0.054
335 OthSuppSvce	269	0.090	360 OthAmuse	3580	0.290	384 SLGElecUtil	163	0.173
336 WasteMgmt	886	0.204	**Accomm. & FoodServ**	**40171**	**0.286**	385 OthSLGEnt	1608	0.311
Educat., Health, Social	**78031**	**0.300**	361 AccHotels	6183	0.289			
337 EleSecSchool	2094	0.286	362 FullResto	16470	0.279	**Total**	**306,341**	**0.161**

While Buy America(n) is often cited as a way of protecting U.S. steel manufacturing, Table 5.1 does not show Iron and steel manufacturing (C53) as a shaded commodity [TCave(C53) = -0.998]. Iron and steel is importable but the USAGE database implies that sales to industries that are supplying the government is a relatively minor part of the commodity's total sales. This is consistent with Hufbauer *et al.* (2013) who estimated that over the three year peak ARRA period, 2009-11, sales of U.S. iron and steel to government financed projects were about $19.95 billion, an annual average of $6.65 billion (= 19.95/3). This can be compared with the total sales of U.S. iron and steel. Various sources, e.g. U.S. input-output tables published by the BEA and shipments data indicate that U.S. iron and steel production over the last decade or so has averaged about $120 billion per annum. Consequently, it appears that sales to U.S. government infrastructure projects are only about 6 per cent of total sales.

In addition to TCave(c), we expected export orientation to play a role in determining the output results in Table 5.1. As we saw in section 4, scrapping Buy America(n) would have a large positive effect on U.S. exports. Consequently, *a priori* we expected USAGE output effects across commodities (c) to be positively correlated with Xsh(c) where this is the share of c's sales accounted for by exports. The Xsh(c) values are in Table 5.1.

To test our expectations concerning the USAGE determination of the output results in Table 5.1, we ran the regression:

$$y(c) = \alpha_0 + \alpha_1 * TCave(c) + \alpha_2 * Xsh(c), \qquad \text{for c = 1 to 389} \qquad (5.2)$$

where

y(c) is the USAGE result in Table 5.1 for the percentage effect on U.S. output of commodity c of scrapping Buy America(n); and

α_0, α_1 and α_2 are parameters to be estimated. The expected signs of α_1 and α_2 are positive.

The resulting regression equation is:

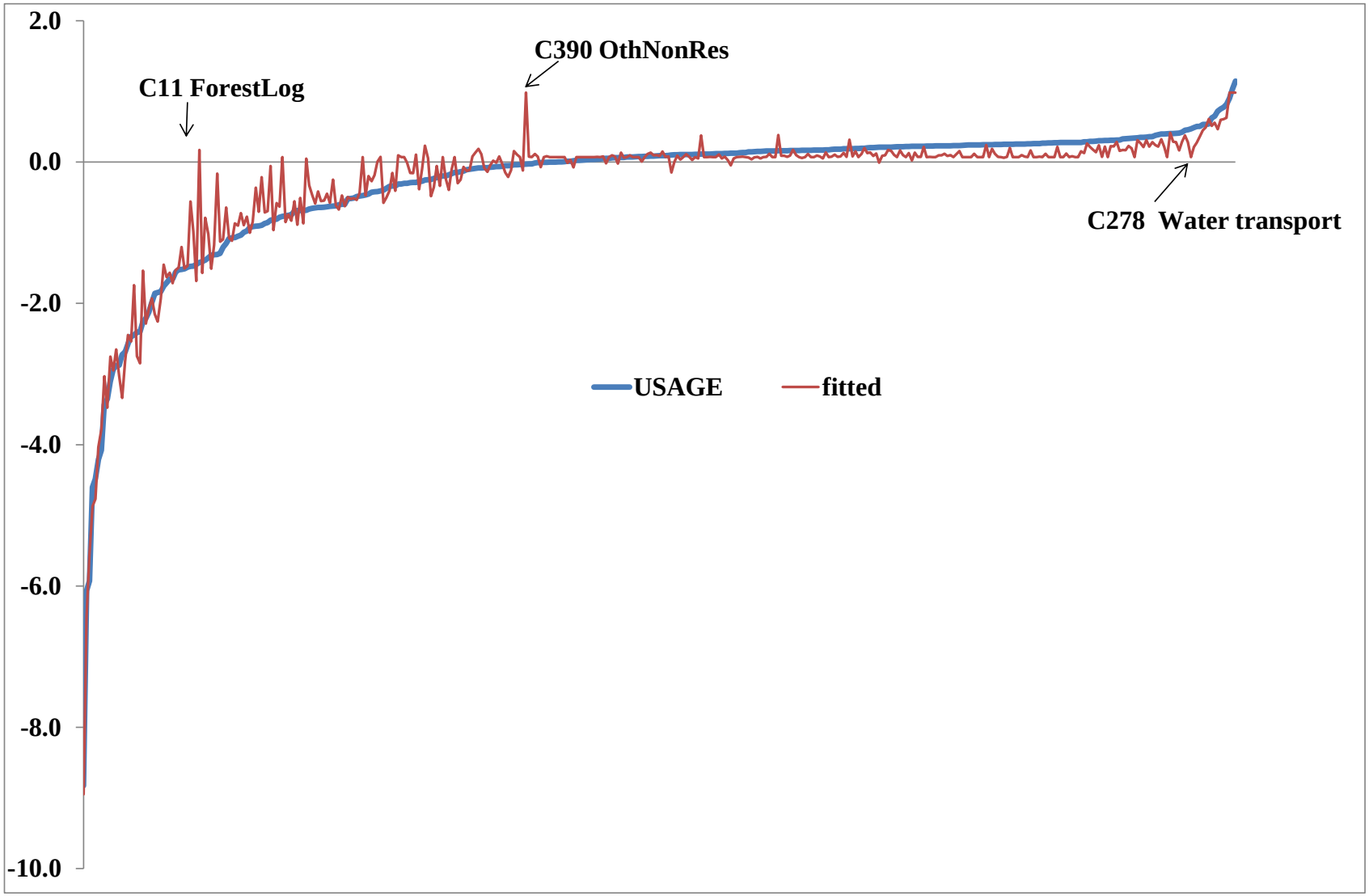
$$y(c) = 0.068 + 0.956 * TCave(c) + 0.951 * Xsh(c), \qquad R^2 = 0.952 \qquad (5.3)$$

The coefficients α_1 and α_2 have the expected signs and the equation explains 95.2 per cent of the variance across commodities in the USAGE results. This indicates that our prior expectations correctly anticipated most of what is important in explaining these results. Nevertheless, it is informative to try to work out what explains the remaining 4.8 per cent of the variance. Put another way, we want to investigate what USAGE knows that is not included in the regression equation.

The process of conducting this investigation is facilitated by examining Figure 5.1. The smooth line shows the USAGE results for commodity outputs ranked from the worst affected at the left hand side to the most favorably affected at the right hand side. The jagged line shows fitted regression values from equation (5.3). The gaps reflect factors in USAGE that are relevant to the results but are left out of the regression.

To illustrate the process of locating these factors, we examine a few of the large gaps in Figure 5.1, beginning with Forestry and logging (C11). The USAGE result (see Table 5.1) for this commodity is a contraction of 1.424 per cent. The fitted result is an expansion of 0.173 per cent, reflecting a TCave value of zero and an Xsh value of 0.111. So where is the bad news that causes USAGE to generate an unfavorable result? Over 50 per cent of U.S. production of Forestry and logging is sold to industries producing Sawmills, Veneers &

Figure 5.1. Commodity output effects (%) of scrapping Buy America(n): USAGE & fitted results from equation (5.3)



plywood and Millwork (C37-C39). These three commodities are used in construction projects for government. Consequently, they have relatively large negative TCave values and correspondingly negative results in the USAGE simulation. This input-output link adversely affects Forestry and Logging and is taken into account by USAGE but not by the regression.

Next we look at Other non-residential (C390). This is an amalgam services provided to international organizations and their foreign employees located in the U.S. It includes direct purchases by organizations such as the World Bank and expenditures on accommodation, food etc by foreign World Bank officials. The export share for this artificial commodity is 100 per cent. Consequently, the regression equation sees a positive outcome for the commodity, a 1.019 per cent output expansion, from scrapping of Buy America(n). Unlike the regression, USAGE knows that the volume of activity by international organizations in the U.S. is not affected by U.S. competitiveness in U.S. markets. Consequently, the USAGE result is close to zero.

The final product that we will consider here is Water transport (C278). USAGE shows output expansion of 0.471 per cent. Water transportation receives no protection from Buy America(n) and its export share is zero. Consequently, the regression result for Water transportation is simply the regression intercept, 0.068. The factor missing from the regression is the link between Water transport and international trade. The stimulation of trade is good for Water transportation because this service is used to move traded goods around the U.S. coast and along the internal waterways.

The process of comparing USAGE and fitted results for individual commodities can encompass any commodity of interest to a policy maker or analyst. This process is important for understanding what is included in the model and assessing the realism of the results.

Table 5.2 shows employment effects by industry from scrapping Buy America(n). The table shows job losses of 57,424 for Manufacturing, offset by substantial gains across the service sectors. At the end of the table, total job gains are 306,341 (a gain of 0.161 per cent). Put another way, Buy America(n) supports 57,424 manufacturing jobs at the cost of 363,765 jobs (= 306,341 +57,424) in the rest of the economy.

As mentioned in section 4, industry results are the key to the difference in the two macro employment results: 0.117 per cent for labor input and 0.161 for jobs (Table 4.1). The manufacturing sector has higher wages per job than the economy as a whole. Within manufacturing the 30 shaded commodities in Table 5.1, those with the largest negative TCave values indicating the highest protection under Buy America(n), are all produced by industries that have at least average wages per job. Most of them have considerably greater than average wages. Among the industries that would benefit from scrapping Buy America(n) are many providing consumer goods and services. These industries would benefit from the projected expansion in consumption. They include the industries producing: Retail trade (C275), Restaurants (C362 & C363), Nursing homes (C348), Accommodation and hotels (C361) and Auto repairs (C365), all of which are shown in Table 5.2 with substantial job gains. Production of these commodities is undertaken by industries in which wages per job are less than the economy-wide average. With the scrapping of Buy America(n) favoring industries with low wages per job, relative to those with high wages per job, the percentage stimulation of jobs is projected to be greater than that in labor input.

6. Effects of scrapping Buy America(n) on employment in states and congressional districts

Tables 6.1 and 6.2 show job effects in the 51 states (includes the District of Columbia) and 436 congressional districts from scrapping Buy America(n) calculated by the top-down methods outlined in section 2.

It is the nature of trade policies to reallocate employment between a country's regions. This is because trade policies reallocate resources between a country's industries and for many industries, especially those producing traded goods, there is strong regional specialization. Regions specializing in industries that gain from a trade policy are winners and those specializing in industries that are harmed by the policy are losers. So it is a rare trade policy from which we would expect every region to win. But scrapping Buy America(n) comes close. Table 6.1 shows 50 winning states out of 51 and Table 6.2 shows 430 winning congressional districts out of 436.

6.1. State results

We explain these results starting with the states in Table 6.1. The first column shows job gains (a small loss in Oregon). As in Table 5.2, these total 306,341, 0.161 per cent of the 190 million U.S. jobs in 2015.[12] The second column expresses the job gains as percentages. The third column shows the deviation in the percentage result for each state from the national result, that is, the state result less 0.161. Columns (4) and (5) help us to understand column (3). They aim to show why some states have a more than average percentage gain while others have a less than average gain.

A state's percentage gain relative to the national gain depends on two factors: its mix of industries and the performance of its industries relative to the national performance of those industries. A state does well relative to the nation if it has a mix of industries containing a relatively high share of gaining industries and its industries in general do better than their counterparts in the rest of the U.S. To disentangle these two factors, we start by writing the relative percentage gain appearing in column (3) for each state r as:

$$\text{Relative gain}(r) = e(r) - e(\text{nation}), \tag{6.1}$$

where

e(r) is the percentage gain for state r; and

e(nation) is the national percentage gain of 0.161 per cent.

Next we express the state and national gains as weighted averages of the state and national gains at the industry level. This leads to

$$\text{Relative gain}(r) = \sum_j JSh(j,r) * e(j,r) - \sum_j JSh(j) * e(j,\text{nation}), \tag{6.2}$$

where

JSh(j,r) is industry j's share in jobs in state r;

JSh(j) is industry j's share in jobs in the nation;

e(j,r) is the percentage change in jobs in industry j in state r; and

e(j,nation) is the national percentage change in jobs in industry j.

[12] See SA25N in the BEA's Regional data for 2015 in Local area personal income and employment, available at https://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=30&isuri=1&7022=4&7023=0&7024=naics&7033=-1&7025=0&7026=00000&7027=2015&7001=44&7028=10&7031=0&7040=-1&7083=levels&7029=30&7090=70

Table 6.1. Employment effects by state of scrapping Buy America(n) programs: USAGE results and explanatory decomposition

		Jobs	% effect on employment	State less national	Contribution of:	
					Mix of industries	Relative performance
		(1)	(2)	(3) = (4)+(5)	(4)	(5)
1	Alabama	1,026	0.0488	-0.112	-0.030	-0.082
2	Alaska	980	0.1759	0.015	0.009	0.006
3	Arizona	4,030	0.1293	-0.032	-0.001	-0.030
4	Arkansas	1,181	0.0822	-0.079	-0.020	-0.058
5	California	57,403	0.2428	0.082	0.008	0.074
6	Colorado	5,099	0.1545	-0.007	0.012	-0.019
7	Connecticut	4,000	0.1450	-0.016	0.004	-0.020
8	Delaware	1,714	0.2552	0.094	0.045	0.049
9	Florida	26,526	0.2782	0.117	0.033	0.084
10	Georgia	11,940	0.2342	0.073	0.011	0.062
11	Hawaii	2,738	0.2892	0.128	0.038	0.090
12	Idaho	490	0.0705	-0.091	-0.024	-0.066
13	Illinois	9,006	0.1106	-0.050	-0.001	-0.050
14	Indiana	1,984	0.0594	-0.102	-0.034	-0.068
15	Iowa	1,974	0.1078	-0.053	-0.001	-0.052
16	Kansas	953	0.0587	-0.102	-0.016	-0.087
17	Kentucky	2,369	0.1173	-0.044	-0.010	-0.033
18	Louisiana	2,967	0.1236	-0.037	-0.016	-0.022
19	Maine	872	0.1341	-0.027	0.004	-0.031
20	Maryland	7,432	0.1987	0.038	0.022	0.016
21	Massachusetts	8,565	0.1621	0.001	0.014	-0.013
22	Michigan	6,365	0.1294	-0.032	-0.010	-0.022
23	Minnesota	3,155	0.0846	-0.076	-0.010	-0.067
24	Mississippi	1,426	0.1158	-0.045	-0.008	-0.038
25	Missouri	3,151	0.0945	-0.067	0.016	-0.083
26	Montana	788	0.1624	0.001	0.013	-0.012
27	Nebraska	2,153	0.1654	0.004	0.020	-0.016
28	Nevada	4,361	0.2395	0.078	0.036	0.042
29	New Hampshire	840	0.1084	-0.053	-0.011	-0.042
30	New Jersey	12,654	0.2116	0.051	0.028	0.023
31	New Mexico	1,283	0.1293	-0.032	-0.001	-0.031
32	New York	40,966	0.2716	0.111	0.044	0.066
33	North Carolina	5,649	0.1058	-0.055	-0.014	-0.041
34	North Dakota	846	0.1506	-0.010	0.002	-0.013
35	Ohio	2,950	0.0459	-0.115	-0.030	-0.085
36	Oklahoma	1,456	0.0780	-0.083	-0.028	-0.056
37	Oregon	-3,247	-0.1378	-0.299	-0.173	-0.126
38	Pennsylvania	11,576	0.1510	-0.010	0.005	-0.015
39	Rhode Island	1,066	0.1633	0.002	0.021	-0.018
40	South Carolina	4,797	0.2359	0.075	-0.037	0.112
41	South Dakota	938	0.1740	0.013	0.032	-0.019
42	Tennessee	3,298	0.0985	-0.063	-0.005	-0.058
43	Texas	15,536	0.1049	-0.056	-0.024	-0.032
44	Utah	1,501	0.0968	-0.064	-0.021	-0.043
45	Vermont	486	0.1366	-0.025	0.005	-0.029
46	Virginia	11,681	0.2155	0.054	0.007	0.047
47	Washington	8,538	0.1907	0.030	-0.043	0.073
48	West Virginia	1,725	0.1232	-0.038	-0.001	-0.037
49	Wisconsin	2,460	0.0384	-0.123	-0.027	-0.095
50	Wyoming	835	0.1111	-0.050	-0.020	-0.030
51	Dist. of Columbia	3,854	0.2267	0.066	0.048	0.018
	Total or average	306,341	0.161	0	0	0

Table 6.2 Employment effects by Congressional district of BuyAmerica(n) cessation: USAGE results

		Jobs	% effect on jobs	% Mix effect			Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)			(1)	(2)	(3)
	Alabama	**1026**	**0.0488**		29	CA08	604	0.2317	-0.0111
1	AL01	166	0.0558	0.0070	30	CA09	718	0.2289	-0.0139
2	AL02	129	0.0488	-0.0001	31	CA10	690	0.2321	-0.0107
3	AL03	81	0.0355	-0.0134	32	CA11	1037	0.2459	0.0031
4	AL04	57	0.0226	-0.0262	33	CA12	3251	0.2778	0.0350
5	AL05	181	0.0474	-0.0015	34	CA13	1205	0.2381	-0.0047
6	AL06	269	0.0745	0.0256	35	CA14	2258	0.2790	0.0362
7	AL07	145	0.0454	-0.0035	36	CA15	1209	0.2410	-0.0018
	Alaska	**980**	**0.1759**		37	CA16	626	0.2262	-0.0166
8	AK00	980	0.1759	0.0000	38	CA17	1556	0.2434	0.0007
	Arizona	**4030**	**0.1293**		39	CA18	1835	0.2535	0.0108
9	AZ01	330	0.1363	0.0070	40	CA19	1419	0.2475	0.0048
10	AZ02	381	0.1255	-0.0039	41	CA20	866	0.2346	-0.0082
11	AZ03	448	0.1338	0.0045	42	CA21	607	0.2121	-0.0307
12	AZ04	273	0.1179	-0.0114	43	CA22	683	0.2298	-0.0130
13	AZ05	491	0.1284	-0.0010	44	CA23	791	0.2119	-0.0309
14	AZ06	604	0.1281	-0.0013	45	CA24	948	0.2282	-0.0145
15	AZ07	449	0.1355	0.0062	46	CA25	1242	0.2406	-0.0022
16	AZ08	495	0.1227	-0.0066	47	CA26	846	0.2175	-0.0253
17	AZ09	557	0.1348	0.0054	48	CA27	1365	0.2360	-0.0068
	Arkansas	**1181**	**0.0822**		49	CA28	1659	0.2624	0.0196
18	AR01	235	0.0882	0.0059	50	CA29	1106	0.2615	0.0187
19	AR02	436	0.1078	0.0256	51	CA30	1693	0.2684	0.0256
20	AR03	394	0.0874	0.0052	52	CA31	664	0.2311	-0.0117
21	AR04	116	0.0368	-0.0454	53	CA32	1038	0.2283	-0.0145
	California	**57403**	**0.2428**		54	CA33	1938	0.2591	0.0163
22	CA01	630	0.1986	-0.0442	55	CA34	1136	0.2565	0.0137
23	CA02	1047	0.2302	-0.0125	56	CA35	626	0.2206	-0.0222
24	CA03	695	0.2215	-0.0213	57	CA36	557	0.2393	-0.0035
25	CA04	763	0.2274	-0.0154	58	CA37	1462	0.2591	0.0164
26	CA05	906	0.2428	0.0000	59	CA38	1041	0.2286	-0.0142
27	CA06	792	0.2398	-0.0030	60	CA39	1152	0.2205	-0.0223
28	CA07	849	0.2439	0.0011	61	CA40	825	0.2323	-0.0104

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect			Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)			(1)	(2)	(3)
62	CA41	483	0.2205	-0.0223	91	FL04	1259	0.2866	0.0084
63	CA42	580	0.2214	-0.0214	92	FL05	1225	0.2856	0.0074
64	CA43	1099	0.2450	0.0022	93	FL06	719	0.2696	-0.0086
65	CA44	822	0.2366	-0.0062	94	FL07	1045	0.2789	0.0007
66	CA45	1503	0.2475	0.0047	95	FL08	768	0.2579	-0.0203
67	CA46	1076	0.2520	0.0092	96	FL09	1137	0.2892	0.0110
68	CA47	1250	0.2367	-0.0060	97	FL10	1115	0.2821	0.0039
69	CA48	1503	0.2428	0.0000	98	FL11	500	0.2419	-0.0363
70	CA49	982	0.2415	-0.0013	99	FL12	739	0.2674	-0.0108
71	CA50	900	0.2468	0.0040	100	FL13	1046	0.2730	-0.0052
72	CA51	709	0.2336	-0.0092	101	FL14	1158	0.2830	0.0048
73	CA52	1143	0.2496	0.0068	102	FL15	989	0.2783	0.0001
74	CA53	1012	0.2376	-0.0052	103	FL16	810	0.2641	-0.0141
	Colorado	**5099**	**0.1545**		104	FL17	710	0.2628	-0.0154
75	CO01	1511	0.1795	0.0250	105	FL18	867	0.2752	-0.0030
76	CO02	650	0.1312	-0.0232	106	FL19	842	0.2766	-0.0016
77	CO03	598	0.1490	-0.0055	107	FL20	1022	0.2830	0.0048
78	CO04	523	0.1374	-0.0170	108	FL21	1139	0.2839	0.0057
79	CO05	590	0.1597	0.0052	109	FL22	1185	0.2852	0.0070
80	CO06	753	0.1638	0.0093	110	FL23	1259	0.2903	0.0121
81	CO07	473	0.1344	-0.0200	111	FL24	1122	0.2889	0.0107
	Connecticut	**4000**	**0.1450**		112	FL25	1113	0.2905	0.0123
82	CT01	991	0.1500	0.0050	113	FL26	1312	0.2919	0.0137
83	CT02	590	0.1386	-0.0064	114	FL27	1285	0.2974	0.0192
84	CT03	564	0.1235	-0.0215		**Georgia**	**11940**	**0.2342**	
85	CT04	1139	0.1660	0.0210	115	GA01	760	0.2433	0.0091
86	CT05	716	0.1352	-0.0098	116	GA02	596	0.2046	-0.0296
	Delaware	**1714**	**0.2552**		117	GA03	561	0.2048	-0.0295
87	DE00	1714	0.2552	0.0000	118	GA04	856	0.2460	0.0118
	Florida	**26526**	**0.2782**		119	GA05	1774	0.2655	0.0312
88	FL01	781	0.2677	-0.0105	120	GA06	1796	0.2655	0.0312
89	FL02	773	0.2561	-0.0221	121	GA07	898	0.2479	0.0136
90	FL03	608	0.2387	-0.0395	122	GA08	509	0.1952	-0.0390

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect			Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)			(1)	(2)	(3)
123	GA09	694	0.2239	-0.0103	152	IN02	170	0.0421	-0.0173
124	GA10	549	0.2087	-0.0255	153	IN03	76	0.0198	-0.0396
125	GA11	981	0.2458	0.0115	154	IN04	135	0.0419	-0.0175
126	GA12	593	0.2069	-0.0273	155	IN05	473	0.1090	0.0496
127	GA13	967	0.2522	0.0180	156	IN06	81	0.0257	-0.0337
128	GA14	404	0.1546	-0.0796	157	IN07	596	0.1078	0.0484
	Hawaii	**2738**	**0.2892**		158	IN08	189	0.0530	-0.0065
129	HI01	1328	0.2840	-0.0053	159	IN09	213	0.0745	0.0151
130	HI02	1410	0.2944	0.0051		**Iowa**	**1974**	**0.1078**	
	Idaho	**490**	**0.0705**		160	IA01	344	0.0797	-0.0280
131	ID01	159	0.0472	-0.0233	161	IA02	329	0.0795	-0.0282
132	ID02	331	0.0924	0.0219	162	IA03	693	0.1426	0.0348
	Illinois	**9006**	**0.1106**		163	IA04	607	0.1215	0.0137
133	IL01	608	0.1424	0.0317		**Kansas**	**953**	**0.0587**	
134	IL02	534	0.1354	0.0247	164	KS01	396	0.0973	0.0387
135	IL03	597	0.1199	0.0093	165	KS02	169	0.0503	-0.0084
136	IL04	602	0.1293	0.0186	166	KS03	351	0.0690	0.0103
137	IL05	1047	0.1455	0.0348	167	KS04	38	0.0101	-0.0486
138	IL06	595	0.1017	-0.0090		**Kentucky**	**2369**	**0.1173**	
139	IL07	761	0.1453	0.0347	168	KY01	190	0.0627	-0.0546
140	IL08	485	0.0943	-0.0163	169	KY02	297	0.1036	-0.0137
141	IL09	868	0.1512	0.0405	170	KY03	700	0.1404	0.0232
142	IL10	559	0.1000	-0.0106	171	KY04	414	0.1269	0.0096
143	IL11	362	0.0883	-0.0224	172	KY05	204	0.0869	-0.0303
144	IL12	340	0.1146	0.0040	173	KY06	565	0.1521	0.0348
145	IL13	433	0.1237	0.0131		**Louisiana**	**2967**	**0.1236**	
146	IL14	285	0.0783	-0.0323	174	LA01	597	0.1459	0.0223
147	IL15	125	0.0350	-0.0757	175	LA02	759	0.1455	0.0219
148	IL16	102	0.0293	-0.0814	176	LA03	512	0.1185	-0.0050
149	IL17	243	0.0693	-0.0413	177	LA04	330	0.0924	-0.0312
150	IL18	459	0.1148	0.0042	178	LA05	255	0.0848	-0.0387
	Indiana	**1984**	**0.0594**		179	LA06	515	0.1351	0.0115
151	IN01	53	0.0182	-0.0413					

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect			Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)			(1)	(2)	(3)
	Maine	**872**	**0.1341**		209	MI11	891	0.1610	0.0315
180	ME01	591	0.1557	0.0216	210	MI12	731	0.1771	0.0477
181	ME02	281	0.1038	-0.0303	211	MI13	549	0.1807	0.0513
	Maryland	**7432**	**0.1987**		212	MI14	800	0.1651	0.0356
182	MD01	689	0.1777	-0.0210		**Minnesota**	**3155**	**0.0846**	
183	MD02	868	0.1963	-0.0024	213	MN01	236	0.0618	-0.0228
184	MD03	1139	0.2038	0.0050	214	MN02	322	0.0858	0.0012
185	MD04	723	0.1943	-0.0045	215	MN03	714	0.0975	0.0129
186	MD05	698	0.1945	-0.0042	216	MN04	496	0.1014	0.0168
187	MD06	967	0.1929	-0.0058	217	MN05	695	0.0962	0.0116
188	MD07	1251	0.2116	0.0128	218	MN06	179	0.0541	-0.0305
189	MD08	1096	0.2080	0.0093	219	MN07	411	0.1055	0.0209
	Massachusetts	**8565**	**0.1621**		220	MN08	101	0.0330	-0.0516
190	MA01	379	0.1038	-0.0584		**Mississippi**	**1426**	**0.1158**	
191	MA02	406	0.1116	0.0078	221	MS01	214	0.0774	-0.0384
192	MA03	893	0.1462	0.0346	222	MS02	426	0.1319	0.0161
193	MA04	722	0.1446	-0.0016	223	MS03	403	0.1236	0.0078
194	MA05	1461	0.1699	0.0253	224	MS04	383	0.1251	0.0093
195	MA06	739	0.1381	-0.0318		**Missouri**	**3151**	**0.0945**	
196	MA07	2257	0.2150	0.0769	225	MO01	962	0.1300	0.0354
197	MA08	1091	0.1785	-0.0365	226	MO02	693	0.1161	0.0215
198	MA09	617	0.1595	-0.0190	227	MO03	94	0.0309	-0.0636
	Michigan	**6365**	**0.1294**		228	MO04	239	0.0859	-0.0086
199	MI01	328	0.1100	-0.0195	229	MO05	469	0.1135	0.0190
200	MI02	219	0.0715	-0.0579	230	MO06	352	0.0969	0.0024
201	MI03	326	0.0918	-0.0376	231	MO07	241	0.0662	-0.0283
202	MI04	274	0.1105	-0.0189	232	MO08	101	0.0370	-0.0575
203	MI05	325	0.1349	0.0054		**Montana**	**788**	**0.1624**	
204	MI06	285	0.0909	-0.0385	233	MT00	788	0.1624	0.0000
205	MI07	343	0.1152	-0.0142		**Nebraska**	**2153**	**0.1654**	
206	MI08	672	0.1575	0.0280	234	NE01	549	0.1481	-0.0173
207	MI09	408	0.1049	-0.0245	235	NE02	886	0.1739	0.0085
208	MI10	214	0.0745	-0.0549	236	NE03	718	0.1704	0.0050

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)
	Nevada	**4361**	**0.2395**	
237	NV01	1189	0.2734	0.0339
238	NV02	742	0.1800	-0.0594
239	NV03	1272	0.2526	0.0131
240	NV04	1158	0.2461	0.0066
	NewHampshire	**840**	**0.1084**	
241	NH01	413	0.1116	0.0032
242	NH02	427	0.1055	-0.0029
	NewJersey	**12654**	**0.2116**	
243	NJ01	672	0.1983	-0.0133
244	NJ02	811	0.2067	-0.0049
245	NJ03	710	0.1892	-0.0224
246	NJ04	886	0.2177	0.0061
247	NJ05	1180	0.2145	0.0029
248	NJ06	1055	0.2094	-0.0022
249	NJ07	1408	0.2073	-0.0043
250	NJ08	1062	0.2249	0.0133
251	NJ09	975	0.2105	-0.0011
252	NJ10	1035	0.2215	0.0099
253	NJ11	1487	0.2138	0.0022
254	NJ12	1374	0.2161	0.0045
	NewMexico	**1283**	**0.1293**	
255	NM01	387	0.1083	-0.0210
256	NM02	428	0.1386	0.0093
257	NM03	468	0.1435	0.0142
	NewYork	**40966**	**0.2716**	
258	NY01	1138	0.2527	-0.0189
259	NY02	1165	0.2577	-0.0139
260	NY03	1320	0.2646	-0.0070
261	NY04	1426	0.2695	-0.0021
262	NY05	1572	0.2746	0.0030
263	NY06	1859	0.2839	0.0123
264	NY07	1962	0.2908	0.0192
265	NY08	1436	0.2699	-0.0017
266	NY09	1631	0.2798	0.0082
267	NY10	3077	0.2927	0.0211
268	NY11	677	0.2429	-0.0287
269	NY12	3971	0.2934	0.0218
270	NY13	2016	0.2911	0.0195
271	NY14	1799	0.2854	0.0138
272	NY15	508	0.2349	-0.0367
273	NY16	1286	0.2655	-0.0061
274	NY17	1434	0.2630	-0.0086
275	NY18	931	0.2487	-0.0229
276	NY19	773	0.2396	-0.0320
277	NY20	1155	0.2564	-0.0152
278	NY21	795	0.2360	-0.0356
279	NY22	711	0.2255	-0.0461
280	NY23	895	0.2289	-0.0426
281	NY24	1090	0.2448	-0.0268
282	NY25	1181	0.2284	-0.0432
283	NY26	3340	0.3067	0.0351
284	NY27	1820	0.2830	0.0115
	NorthCarolina	**5649**	**0.1058**	
285	NC01	417	0.1037	-0.0021
286	NC02	260	0.0750	-0.0308
287	NC03	405	0.1272	0.0214
288	NC04	589	0.1324	0.0266
289	NC05	347	0.0896	-0.0162
290	NC06	399	0.0941	-0.0117
291	NC07	435	0.1193	0.0136
292	NC08	194	0.0629	-0.0429
293	NC09	918	0.1430	0.0372
294	NC10	184	0.0540	-0.0517
295	NC11	176	0.0577	-0.0481
296	NC12	753	0.1289	0.0231

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)
297	NC13	572	0.1211	0.0153
	NorthDakota	**846**	**0.1506**	
298	ND00	846	0.1506	0.0000
	Ohio	**2950**	**0.0459**	
299	OH01	176	0.0313	-0.0146
300	OH02	205	0.0484	0.0025
301	OH03	527	0.1029	0.0570
302	OH04	-49	-0.0161	-0.0620
303	OH05	47	0.0128	-0.0331
304	OH06	46	0.0170	-0.0290
305	OH07	-38	-0.0123	-0.0582
306	OH08	111	0.0329	-0.0130
307	OH09	257	0.0600	0.0141
308	OH10	263	0.0638	0.0179
309	OH11	381	0.0710	0.0251
310	OH12	309	0.0741	0.0282
311	OH13	110	0.0340	-0.0119
312	OH14	69	0.0169	-0.0290
313	OH15	318	0.0890	0.0431
314	OH16	216	0.0478	0.0019
	Oklahoma	**1456**	**0.0780**	
315	OK01	254	0.0516	-0.0264
316	OK02	207	0.0747	-0.0033
317	OK03	268	0.0818	0.0038
318	OK04	295	0.0971	0.0191
319	OK05	432	0.0926	0.0146
	Oregon	**-3247**	**-0.1378**	
320	OR01	-2155	-0.3098	-0.1720
321	OR02	-515	-0.1436	-0.0058
322	OR03	66	0.0110	0.1488
323	OR04	-386	-0.1155	0.0223
324	OR05	-257	-0.0690	0.0687
	Pennsylvania	**11576**	**0.1510**	
325	PA01	1074	0.2092	0.0582
326	PA02	1228	0.2112	0.0602
327	PA03	239	0.0784	-0.0727
328	PA04	423	0.1180	-0.0330
329	PA05	231	0.0785	-0.0725
330	PA06	814	0.1508	-0.0003
331	PA07	841	0.1649	0.0138
332	PA08	669	0.1511	0.0001
333	PA09	367	0.1215	-0.0295
334	PA10	282	0.1006	-0.0505
335	PA11	526	0.1431	-0.0079
336	PA12	600	0.1441	-0.0069
337	PA13	1145	0.1869	0.0359
338	PA14	1017	0.1684	0.0173
339	PA15	578	0.1440	-0.0070
340	PA16	494	0.1301	-0.0209
341	PA17	368	0.1254	-0.0256
342	PA18	678	0.1471	-0.0039
	RhodeIsland	**1066**	**0.1633**	
343	RI01	568	0.1741	0.0108
344	RI02	498	0.1526	-0.0108
	SouthCarolina	**4797**	**0.2359**	
345	SC01	854	0.2582	0.0223
346	SC02	734	0.2414	0.0055
347	SC03	522	0.2079	-0.0280
348	SC04	813	0.2428	0.0069
349	SC05	565	0.2272	-0.0087
350	SC06	664	0.2312	-0.0047
351	SC07	646	0.2330	-0.0029
	SouthDakota	**938**	**0.1740**	
352	SD00	938	0.1740	0.0000

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)
	Tennessee	**3298**	**0.0985**	
353	TN01	209	0.0651	-0.0334
354	TN02	443	0.1133	0.0148
355	TN03	370	0.0988	0.0004
356	TN04	212	0.0752	-0.0233
357	TN05	884	0.1501	0.0516
358	TN06	101	0.0364	-0.0621
359	TN07	287	0.0841	-0.0144
360	TN08	300	0.0855	-0.0130
361	TN09	491	0.1165	0.0180
	Texas	**15536**	**0.1049**	
362	TX01	213	0.0551	-0.0498
363	TX02	393	0.0551	-0.0498
364	TX03	655	0.1392	0.0343
365	TX04	169	0.0556	-0.0493
366	TX05	448	0.0954	-0.0095
367	TX06	493	0.1289	0.0240
368	TX07	558	0.0935	-0.0114
369	TX08	349	0.1005	-0.0044
370	TX09	344	0.0651	-0.0398
371	TX10	454	0.1283	0.0234
372	TX11	365	0.0821	-0.0228
373	TX12	594	0.1298	0.0249
374	TX13	453	0.1170	0.0121
375	TX14	377	0.1192	0.0143
376	TX15	210	0.1064	0.0015
377	TX16	339	0.1349	0.0300
378	TX17	420	0.1046	-0.0003
379	TX18	546	0.1055	0.0006
380	TX19	423	0.1151	0.0102
381	TX20	492	0.1474	0.0425
382	TX21	586	0.1409	0.0360
383	TX22	364	0.1079	0.0030
384	TX23	432	0.1378	0.0329
385	TX24	775	0.1251	0.0202
386	TX25	380	0.0989	-0.0060
387	TX26	442	0.1330	0.0282
388	TX27	395	0.1104	0.0055
389	TX28	311	0.1368	0.0320
390	TX29	294	0.0687	-0.0362
391	TX30	298	0.0638	-0.0411
392	TX31	315	0.1078	0.0029
393	TX32	595	0.0920	-0.0129
394	TX33	1050	0.1408	0.0359
395	TX34	239	0.1065	0.0016
396	TX35	436	0.1199	0.0151
397	TX36	331	0.0772	-0.0277
	Utah	**1501**	**0.0968**	
398	UT01	136	0.0418	-0.0550
399	UT02	391	0.1047	0.0079
400	UT03	387	0.1064	0.0097
401	UT04	587	0.1201	0.0234
	45 Vermont	**486**	**0.1366**	
402	VT00	486	0.1366	0.0000
	46 Virginia	**11681**	**0.2155**	
403	VA01	721	0.2062	-0.0092
404	VA02	806	0.2151	-0.0004
405	VA03	955	0.2121	-0.0034
406	VA04	670	0.1998	-0.0157
407	VA05	657	0.1838	-0.0316
408	VA06	808	0.1965	-0.0189
409	VA07	1284	0.2332	0.0177
410	VA08	2255	0.2386	0.0231
411	VA09	514	0.1535	-0.0620
412	VA10	1286	0.2274	0.0120
413	VA11	1727	0.2310	0.0155

Table 6.2 continues …

Table 6.2 continued

		Jobs	% effect on jobs	% Mix effect			Jobs	% effect on jobs	% Mix effect
		(1)	(2)	(3)			(1)	(2)	(3)
	Washington	**8538**	**0.1907**			**Wisconsin**	**2460**	**0.0384**	
414	WA01	1150	0.2019	0.0112	427	WI01	234	0.0305	-0.0079
415	WA02	596	0.1560	-0.0347	428	WI02	681	0.0726	0.0342
416	WA03	427	0.1182	-0.0725	429	WI03	264	0.0378	-0.0007
417	WA04	682	0.1859	-0.0048	430	WI04	607	0.0674	0.0290
418	WA05	682	0.1817	-0.0090	431	WI05	168	0.0184	-0.0200
419	WA06	525	0.1519	-0.0388	432	WI06	21	0.0030	-0.0355
420	WA07	1559	0.2371	0.0464	433	WI07	179	0.0265	-0.0120
421	WA08	1061	0.2005	0.0098	434	WI08	305	0.0389	0.0004
422	WA09	1210	0.2224	0.0317		**Wyoming**	835	**0.1111**	
423	WA10	646	0.1869	-0.0038	435	WY00	835	0.1111	0.0000
	WestVirginia	**1725**	**0.1232**			**DistColumbia**	**3854**	**0.2267**	
424	WV01	575	0.1216	-0.0016	436	DC98	3854	0.2267	0.0000
425	WV02	679	0.1359	0.0127					
426	WV03	471	0.1101	-0.0131		**U.S.**	**306,341**	**-0.161**	**0.0**

Equation (6.2) can be rewritten as:

$$\text{Relative gain(r)} = \sum_{j}\left[\text{JSh}(j,r) - \text{JSh}(j)\right]*\text{e}(j,\text{nation}) + \sum_{j}\text{JSh}(j,r)*\left[\text{e}(j,r) - \text{e}(j,\text{nation})\right], \quad (6.3)$$

The first term on the right hand side is the *mix* effect [column (4), Table 6.1]. It is positive if state r has a relatively high share of its jobs in industries such as retail trade that do well at the national level and a relatively low share in industries such as plumbing materials that do poorly at the national level. The second term on the right hand side is the relative *performance* effect [column (5)]. It is positive if state r has sufficient industries j that do better than the national performance of j [e(j,r)>e(j,nation)].

The states with the best mix of industries [those with the highest positive entries in column (4)] from the point of view of benefitting from scrapping Buy America(n) are District of Columbia, Delaware, New York, Hawaii, Nevada and Florida. These states have little employment in industries that supply materials to government construction projects. On the otherhand they have over representation of industries supplying tourism services (C386-388), financial services (C300-306) and other services shown in Table 5.1 as benefitting from the overall expansion of consumption. States with the worst mix of industries [largest negative entries in column (4)] are Oregon, Washington and South Carolina. These states have over representation of industries producing construction materials (e.g. C37, C38 and C41), electrical equipment (e.g. C140-147) and computing equipment (e.g. C113-118), all of which contract or have below average expansion in Table 5.1.

To a large extent the performance column in Table 6.1 magnifies the mix effect. If a state has a favorable mix of industries, then multiplier effects will help all of the industries in the state towards a percentage expansion greater than that for the nation. However, as shown in Figure 6.1, there is not a tight relationship. For 14 of the 51 states, the performance column has the opposite sign from the mix column: the corresponding dots in Figure 6.1 are in the north-west or south-east quadrants. For Oregon, the performance and mix effects have the same sign (negative) but the performance effect is noticeably muted relative to the mix effect.

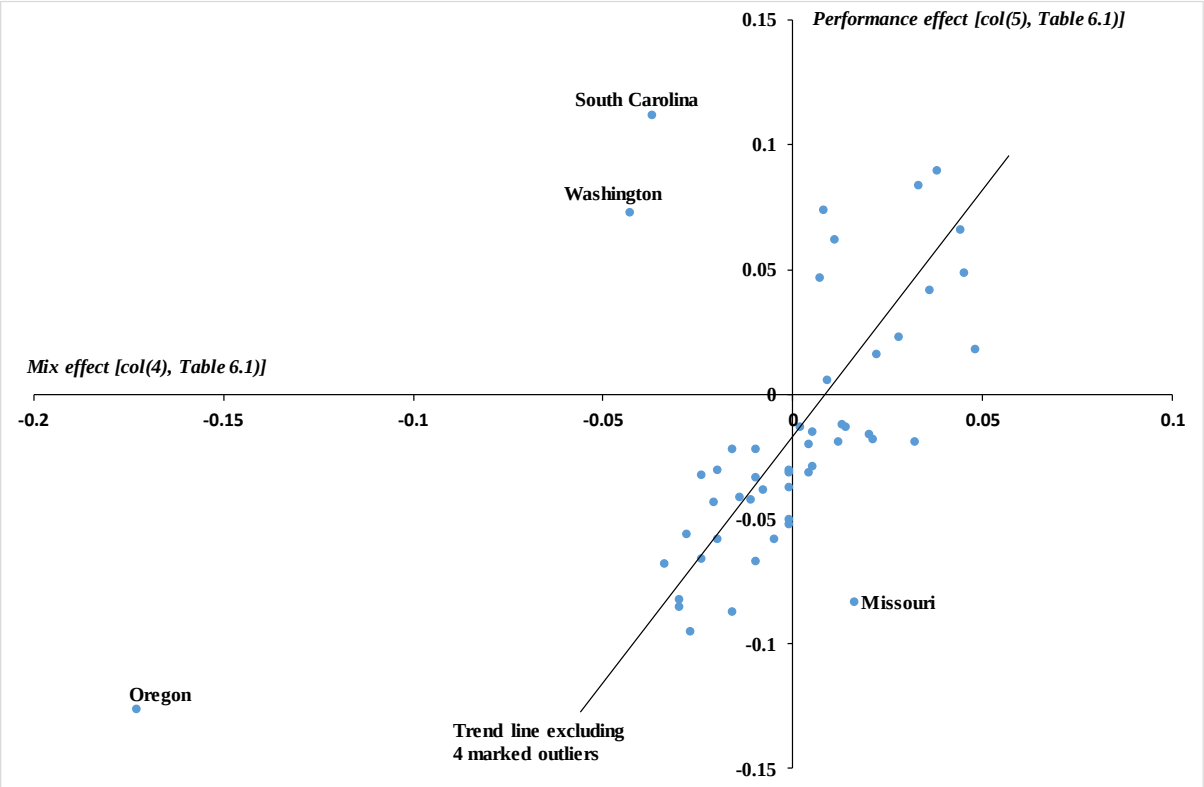
We explain these results for four leading cases marked in the figure: Washington, South Carolina and Oregon whose dots are well north of where we would expect on the basis of their mix effect, that is, north of the trend line through the bulk of the dots in Figure 6.1, and Missouri whose dot is far south of where we would expect. Put another way, we explain what aspect of the U.S. economy USAGE is capturing that causes it to give industries in Washington, South Carolina and Oregon stronger performance effects than could be explained taking account of multiplier effects and why the reverse is true for Missouri.

The explanation focuses on export orientation. We find that Washington, South Carolina and Oregon's industries generally have higher export shares in their outputs than is true for the corresponding industries at the national level, while the opposite is the case for Missouri.[13] For example, consider Semi-conductors (C121). All four states produce this commodity but the export shares in their outputs are quite different. For Oregon, South Carolina and Washington they are 0.47, 0.70 and 0.63, all above the national share which is 0.42. For

[13] The USAGE database contains estimates of commodity flows between states. These are denoted as F(c,"dom",r,d) where this is the value of commodity c produced in state r and shipped to state d (includes r to r). Using the flow estimates together with estimates of the share of c received in r that is exported, EXIT_SH(c,d), we calculate state r's export share in its production of commodity c according to

$$\sum_{d}\text{FLOW}(c,\text{"dom"},r,d)*\text{EXIT\_SH}(c,d)\Big/\sum_{dd}\text{FLOW}(c,\text{"dom"},r,dd)$$

Figure 6.1. Performance effect related to mix effect



Missouri the export share is 0.13, well below the national share. As explained already, scrapping Buy America(n) stimulates exports to a far greater extent than it stimulates the economy in general (see Table 4.1). If industry j in state r has a high export share in its output relative to industry j in the nation then, on this account, USAGE will project a better outcome for industry j in state r from scrapping Buy America(n) than it projects for industry j nationally. In other words, high export orientation is a positive factor in determining industry performance.

What determines differences in export orientation? In USAGE, states with easy access to major ports tend to have relatively high export shares in the outputs of each of their industries. This applies to Oregon, South Carolina and Washington. Both South Carolina and Washington have major ports while Oregon has easy access to the port in Washington. Missouri has an inland port for handling trade in bulk commodities. However, Missouri's considerable manufacturing industries producing commodities such as Aircraft (C164), Animal processing (C208) and Poultry processing (C209) do not have easy access to suitable international ports and are therefore focused on the U.S. domestic market. This gives them export shares in their production that are low relative to national shares.

6.2. Congressional district results

Table 6.2 shows for each congressional district the employment effects of scrapping Buy America(n) as the change in the number of jobs and the percentage change in jobs. Added over a state's congressional districts, the job change for a state is (apart from rounding errors) the same as the state result in Table 6.1.

The percentage changes for the congressional districts in a state vary from the state's result because of differences across the congressional districts in the industrial composition of their activity. As mentioned in section 2, we move from state level results to congressional district

results by assuming that the percentage effect of a shock such as scrapping Buy America(n) is the same for industry j in congressional district ρ as for industry j in the state to which ρ belongs. Under this assumption, the difference (shown in column (3) of Table 6.2) between the aggregate jobs result for ρ and that for ρ's state is given by the percentage mix effect which can be calculated according to:

$$\%\text{Mix}(\rho) = \sum_{j}\left[\text{DistSh}(j,\rho) - \text{StateSh}(j,\rho)\right] * \left[e\_\text{state}(j,\rho) - e\_\text{state}(\rho)\right],\ \rho = 1, ..., 436 \quad (6.4)$$

where

%Mix(ρ) is the percentage point difference between congressional district ρ's result for jobs and the result for the state to which ρ belongs;

DistSh(j, ρ) is the share of ρ's jobs accounted for by the production of j;

Statesh(j, ρ) is the share of the jobs in the state to which ρ belongs accounted for by the production of j;

e_state(j, ρ)is the percentage change in employment in the production of j in the state to which ρ belongs; and

e_state(ρ) is the percentage change in aggregate employment in the state to which ρ belongs (see Table 6.1).

Equation (6.4) quantifies the idea that ρ's employment result relative to the state's result depends on whether or not ρ has a better mix of industries than its state from the point of view of the effects of scrapping Buy America(n). As can be seen from (6.4), %Mix(ρ) will tend to be positive if ρ has high shares of its employment, relative to the state shares, in industries j $\left[\text{DistSh}(j,\rho) - \text{StateSh}(j,\rho) > 0\right]$ for which the state employment gain is strong relative to the state's aggregate employment gain $\left[e\_\text{state}(j,\rho) - e\_\text{state}(\rho) > 0\right]$. Similarly, %Mix(ρ) will tend to be positive if ρ has low shares of its employment relative to the state shares in industries j for which the state employment gain is weak relative to the state's aggregate employment gain. %Mix(ρ) will tend to be negative, that is, ρ's employment result will be below that for its state, if ρ has a high share of its employment in industries that do not do well at the state level, or a low share of its employment in industries that do well at the state level.

On average the absolute value of %Mix(ρ) over the 436 congressional districts is 0.0204 implying that the average gap between the percentage gain of jobs for a congressional district and the percentage gain of jobs for its state is 0.0204 percentage points. With the average gain of jobs across all congressional districts being 0.161 per cent, we see that for most congressional districts the percentage gain of jobs is quite close to that of the state to which it belongs. Given the dominance of state effects, it is not surprising that four of the six congressional districts with negative results in columns (1) and (2) of Table 6.2 are in Oregon, the only state with a negative employment result. The other two negatives at the congressional district level are in Ohio, OH04 and OH07.

Ohio ranks 49th in the 51 state results. This relatively weak state outcome is not sufficient to shield OH04 and OH07 from small negative outcomes arising from quite large negatives for their percentage mix effects in column (3) of Table 6.2 (-0.0620 and -0.0582). For OH04 the main contributors to the negative mix effect are Other auto (C163), Steering & brakes (C159), Glass (C42), Electrical engineering parts (C158) and Tures (C271). OH04 has an over representation of employment in the production of these commodities and the Ohio state

employment result for them is low relative to Ohio's aggregate employment result. For OH07, the main contributors to the negative mix effect are Iron & steel manufacture (C53), Other plastic (C270), Ferrous foundry (C61), Steel products (C54) and Clay refractories (C41). These negative contributions arise from over representation in OH07 of employment in the production of these commodities all of which have weak employment outcomes under the policy of scrapping Buy America(n).

7. Concluding remarks

Buy America(n) schemes are seductively attractive to politicians and the public more generally. What could possibly be wrong with channeling public expenditures towards U.S. producers? Economic modelling helps us to understand what is wrong.

Buy America(n) increases the costs to the U.S. government of infrastructure projects. With biting budget constraints, this means that governments can undertake a lower volume of projects than would otherwise be possible. By scrapping Buy America(n), the government could undertake more projects or, as modeled in this paper, return the savings to the private sector in the form of tax cuts. Returning the savings in this way would, as shown in our modeling, allow a greater level of employment at any given average real wage rate. Alternatively, we could have modelled the benefit of reducing the cost of government projects as an increase in real wage rates while holding aggregate employment constant.

With the discipline of an economic model, it is clear that Buy America(n) fails as a policy to promote aggregate employment and economic growth.

What about Buy America(n) as a policy for safeguarding national security by boosting key manufacturing industries? Iron and steel is often mentioned in this context. There is no need for us to take a position on whether the concept of key industries is legitimate. What our results show is that U.S. manufacturing is not strongly dependent on Buy America(n). Scrapping Buy America(n) reduces manufacturing jobs by 0.439 per cent (57 thousand jobs, Table 5.2). For iron and steel the reduction is 1.545 per cent (16 hundred jobs, I53, Table 5.2). The industries with the biggest percentage job losses in the simulation described in this paper are Light fixtures, Plumbing materials and Wiring devices. Job losses in these three industries would be about 9 per cent (9 hundred jobs, I134) for Light fixtures, 6 per cent (12 hundred jobs, I78) for Plumbing materials and 6 per cent (8 hundred jobs, I147) for Wiring devices. We conclude that Buy America(n) offers U.S. manufacturing industries only a small level of protection against import competition. This level of protection is not only small, but it is also expensive. By protecting 57 thousand manufacturing jobs, Buy America(n) leaves the rest of the economy with 363 thousand less jobs than it would otherwise have had. If U.S. policy makers have legitimate security concerns centered on the viability of U.S. manufacturing, then these should be addressed in a more cost efficient manner.

Trade policies are often contentious. There are always losers. Scrapping Buy America(n) would move resources (capital and labor) away from industries that produce inputs to public sector construction projects and are import competing. But there are also winners. The exchange-rate effect would help resources move towards export-oriented industries. This includes many in the manufacturing sector such as those producing various types of machinery.[14] In Table 5.1, over 40 per cent of the manufactured commodities and nearly all of the non-manufactured commodities have positive results. Reflecting this wide spread of positive results across industries, USAGE shows wide spread positive results across regions.

[14] See, for example, the results for C86, C88-C92, C94, C101, C108, C111, C116, C119, C123, C129 and C130 in Table 5.1.

Fifty out of 51 states and 430 out of 436 congressional districts would gain jobs (see Tables 6.1 and 6.2).

Abandoning Buy America(n) would be good for the U.S. It would also be good for other countries. This is not just because other countries would have better access to U.S. markets for manufactured construction materials. More importantly, the U.S. would set an example that would help to forestall Buy Canada, Buy Mexico, Buy EU, etc.

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