

TSCAPE: A Time Series of Consistent Accounts for Policy Evaluation

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May 2003

Abstract:

This paper documents the construction of consistent social accounts that cover the period from 1978 to 2001 for the U.S. economy at a two-digit level of aggregation. There are four primary data sources for the construction of the accounts. First, the Bureau of Economic Analysis (BEA) publishes a Gross Domestic Product by Industry (GDPI) series that includes value added by factor and sector (at approximately the two-digit level). The series also includes other useful measures of total intermediate inputs and various double-deflation indices for conversion of current dollar measures into real measures. The second primary data source is the benchmark input-output (BIO) accounts published by the BEA. The input-output accounts allow us to decompose intermediate inputs by two-digit commodity, although they are only available for select years. The third source is the U.S. Department of Commerce (DOC) customs level data on annual merchandise trade (Trade Policy Information Service of the DOC). The final data source is the National Income and Product Accounts (NIPA) also published by the BEA. Given the primary mission of analyzing trade policy, the highest weight is given to maintaining the integrity of the merchandise trade data in the final dataset. We also maintain real two-digit value added by factor and sector. The input-output accounts are used to generate targets for intermediate-input shares. When a year lies between two different input-output observations a weighted average is used to generate the target. To the extent possible, respect is given to the NIPA account in maintaining final demand, income, and balance-of-payments levels. In this document we outline the process used to reconcile each of the data sources. The resulting annual balanced social accounting matrix is suitable for structural empirical work at the two-digit level.

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1. Introduction

This paper documents the construction of consistent social accounts that cover the period from 1978 to 2000 for the US economy at a two-digit level of aggregation. There are four primary data sources for the construction of the accounts. First, the Bureau of Economic Analysis (BEA) publishes a time series that includes value added by factor and sector (at approximately the two-digit level). The series also includes other useful sectoral measures of intermediate inputs and various chain-type deflators. The second primary data source is the benchmark input-output accounts published by the BEA. The input-output accounts allow us to decompose intermediate inputs by two-digit commodity, although they are only available for select years. The third source is the U.S. Department of Commerce (DOC) customs level data on annual merchandise trade (Trade Policy Information Service of the DOC). The final data source is the National Income and Product Accounts (NIPA) also published by the BEA.

Given our primary mission of analyzing trade policy, the highest weight is given to maintaining the integrity of the merchandise trade data in the final dataset. We also maintain real two-digit value added by factor and sector. The input-output accounts are used to generate targets for intermediate-input shares. When a year lies between two different input-output observations, a weighted average is used to generate the target. To the extent possible, respect is given to the NIPA account in maintaining final demand, income, and balance of payments levels. In this document we explicitly outline the process used to reconcile each of the data sources. The resulting annual balanced social accounting matrix is suitable for structural empirical work at the two-digit level.

2. The Scope of TSCAPE

The level of aggregation in the primary series on Gross Domestic Product by Industry (GDPI) determines the overall scope of the industry and commodity aggregations.¹ The data is available at approximately the two-digit level of aggregation. Where possible, detail was maintained for the merchandise industries, but many of the service industries were aggregated together. This was consistent with our primary goal of identifying sectors associated with customs-level data on trade and duties. Table 1 contains the final set of 42 industries available in the TSCAPE data series. The first column is the 3-letter index used in the database, and the final column is the approximate mapping to SIC sectors.

The scope of the TSCAPE data series across time was limited by data on the Quantity Index for Gross Domestic Product by Industry in the GDPI data and the TPIS customs-level trade data. The quantity-index data begin in 1977 and the TPIS data start in 1978. Thus, the first year for the TSCAPE accounts is 1978. The series is annual, covering 1978 through 2001. We caution that the GDPI data used a 1972 SIC basis for classification prior to 1987, and a 1987 SIC basis for classification in the subsequent series (from 1987 to 2001).

The TPIS trade data also fall into two groups. Trade data from 1978 through 1988 were collected according to the TSUS and Schedule B classification systems, while data for 1989 through 2001 were collected as HTS 10-digit data. The two classification schemes require the use of two different concordances to the SIC classification system. The concordance from TSUS and Schedule B to SIC is based on a concordance provided by the Department of Commerce and considerably updated by the authors. The second concordance, mapping HTS 10-digit codes to SIC classification, is maintained by the Bureau of the Census and made available through the

¹Robert J. McCahill and Brian C. Moyer, "Gross Product by Industry for 1999-2001", *Survey of Current Business*, Washington: Bureau of Economic Analysis, U.S. Department of Commerce, v. 82, n. 11 (November 2002),

Department of Commerce and the USITC. This newer concordance is used in its entirety and required no modification or extension.

These jumps in classification are generally not a concern for models that are calibrated to each year. However, for trend analysis or intertemporally-linked models that rely on the constructed series, we note the following caveat: while every effort has been made to make the two concordances consistent with one another, there are still data splicing issues that need to be addressed. The data should be handled accordingly.

3. The TSCAPE Architecture

Figure 1 illustrates the general architecture for a given year in the TSCAPE series. Although TSCAPE is more aggregate, its structure is modeled directly off of the conventions used by the BEA in constructing the Benchmark Input-Output (BIO) accounts. The Use matrix indicates the intermediate purchases of commodities (rows) by industry (columns). The remaining columns are final demand categories. These include final purchases by consumers, purchases for investment purposes, and government purchases.

The other component of final demand is trade (exports and imports) by commodity.² Summing across all of the columns yields the Gross Make or total commodity output vector. The final element of figure 1 is the matrix of value added. This contains the payments to factors (rows) for each of the industries (columns). Summing down the columns (across use and value added) yields the Gross Output vector, which equals total intermediate plus factor payments. As an accounting identity, total value added across all commodities and industries must equal the sum of final demand across all categories and commodities.

The remaining element in the overall architecture of the TSCAPE system is the Make matrix, illustrated in Figure 2. This matrix indicates how industry production translates into

² Imports enter the accounts with a negative sign, such that final demand = $C + I + G + X - M$.

commodity output. The distinction between industries and commodities is necessary because many establishments produce significant output in commodities that cannot be classified with the predominant output of the establishment. A typical element of the matrix is the value of output from an industry (row) of a particular commodity (column).

4. Construction of the Social Accounts

In order to specify the elements of TSCAPE, data from various sources are combined and reconciled with each other. The BIO data contains all of the necessary elements, but only for the benchmark years (1982, 1987, 1992, and 1997). Furthermore the BIO data is in current dollars and not generally consistent with our primary source data on trade flows and distortions. As a first step in building the full series, we use the GDPI data on the quantity index of value added times gross domestic product in 1996 (the base year for the index) to generate a real gross product by industry series. The elements of the value-added matrix for each year are completed by using information (in the GDPI data) on shares of payments to factor by industry. One highlighted feature of the TSCAPE series is that using this technique guarantees aggregate measures of GDP that are consistent with the real GDP series as reported in the National Income and Products Accounts (NIPA), which are widely reported in the Economic Report of the President.

The other contribution of the GDPI data is to establish an estimate of total real intermediate purchases by sector. These estimates are used as targets in the subsequent least-squares procedure, which reconciles the GDPI, TPIS, and BIO data. For a majority of the industries the GDPI includes quantity indexes for total intermediate purchases by industry (this is a single number for each industry – not individual commodity inputs by industry). Multiplying this times the 1996 current dollar intermediate purchases produces an estimate of the real

contributions of intermediates in gross output. This information is used to establish the target ratio of real gross output to real value added. If quantity indexes are not available in the GDPI data, a similar calculation is made using the BIO data (interpolating for non-benchmark years). With the ratio of real gross output to real value added established for each industry, estimates of real gross output or estimates of real intermediate purchases can be found by simply using the ratio in conjunction with the established GDP by industry.

The estimates of real intermediate purchases establish the column sums of the Use matrix. The BIO data is used to fill in the individual cells of the Use matrix. The BIO Use data are converted into coefficients (by dividing through by total current dollar intermediate use). The time series of coefficients is completed by interpolation. These coefficients are then applied to the estimates of real intermediate purchases using the GDPI data. The procedure converts current dollar Use estimates into real (1996) dollar estimates.

The real Make estimates are established similarly. The BIO current dollar estimates are converted into coefficients to cancel the unit of measure, and the time series is completed by interpolation. Multiplying the series of coefficients by the real-gross-output estimates from the GDPI data generates the real Make estimates.

The final demand components of TSCAPE are informed by a number of sources. The share of current dollar net commodity output (gross Make less intermediate Use) allocated to each of the final demand institutions (consumption, investment, exports, imports, federal government, and state and local government) is computed using the BIO data (interpolating for non-benchmark years). This is then multiplied by the real net commodity output to derive a set of final demand accounts (by commodity and institution). The resulting final demand block is generally inconsistent with the accounting principles embedded in the overall architecture. To

reconcile the social accounts, assumptions about maintaining the integrity of particular series are made and other series are adjusted (in a way that minimizes a normality condition).

TSCAPE maintains consistency with the aggregate NIPA and GDPI data on value added so no adjustments are made in the value added block. Also, given the primary goal of analyzing trade policy, no adjustments are made to the merchandise trade accounts deflated by the appropriate NIPA import or export deflator. Holding these data fixed, the remaining accounts must be adjusted to satisfy the three fundamental conditions for a consistent set of social accounts: 1) zero profits – gross output from an industry must equal the sum of payments for intermediate inputs plus the sum of all payments to factors of production; 2) no excess demand – gross make of a commodity must equal the sum of all intermediate uses and final demand for that commodity; and 3) income balance – total factor income (value added) must be equal to total final demand. The program that produces a set of consistent accounts minimizes the adjustments (between the target estimates and the consistent estimates) subject to these three fundamental conditions. The actual objective that is minimized is the sum of the squared deviations between the target estimates and the consistent estimates (weighted by the inverse of the target account). The consistent estimates are collected for each year and form the core elements of the TSCAPE data series.

The following is a symbolic representation of the non-linear programming problem that finds the consistent accounts for a given year. The free variables in the system are the levels of gross output by industry (GO_i), the elements of final demand by commodity and final-demand category ($IUSE_{gd}$), and the proportional change in total intermediate demand by industry (ϕ_i). These are chosen to minimize the objective;

$$\begin{aligned}
& \sum_g \sum_d \left[|TGTUSE_{g,d}|^{-1} \cdot (IUSE_{g,d} - TGTUSE_{g,d})^2 \right] \\
& + \sum_g \sum_i \left[|TGTUSE_{g,i}|^{-1} \cdot (\phi_i \cdot TGTUSE_{g,i} - TGTUSE_{g,i})^2 \right] \\
& + \sum_d \left[|TGT\xi_d \cdot \sum_g TGTUSE_{g,d}|^{-1} \cdot \left(\sum_g TGTUSE_{g,d} - TGT\xi_d \cdot \sum_g TGTUSE_{g,d} \right)^2 \right]
\end{aligned}$$

subject to the three consistency conditions:

$$\begin{aligned}
GO_i &= \sum_g (\phi_i \cdot TGTUSE_{g,i}) + \sum_f (ValueAdded_{f,i}) \\
\sum_i (MakeCoef_{i,g} \cdot GO_i) &= \sum_i (\phi_i \cdot TGTUSE_{g,i}) + \sum_d (IUSE_{g,d}) \\
\sum_d \sum_g (IUSE_{g,d}) &= \sum_f \sum_i (ValueAdded_{f,i})
\end{aligned}$$

The first term in the objective is the weighted squared deviations between the consistent final demand estimates and the target estimates (merchandise import and export estimates are constrained to be equal to their target estimates). The index d covers the final demand categories (i and g indicate the industry and commodity respectively). The second term in the objective is the weighted squared deviations in the target intermediate use of commodity by industry. The relative material input mix (from the BIO data) is preserved by only allowing proportional changes by varying ϕ_i . The final term in the objective helps the program maintain proximity to the aggregate final demand mix found in the NIPA accounts ($TGT\xi_i$). Solution values for ϕ_i and $IUSE_{gd}$, for each year in the series, makes it possible to generate each of the unknown component blocks of TSCAPE.

5. Resulting Baseline

To evaluate TSCAPE as a data source for structural policy evaluation it is important to review some of the key baseline series. Although the system imposes a set of consistency conditions that will generally fail when combining data from different sources, priority was given to maintaining the integrity of data from certain sources. For example, the aggregate NIPA series on real Gross Domestic Product, published in the annual Economic Report of the

President, is reproduced in the baseline model run. Figure 3 presents these data in a chart. Figure 3 also decomposes GDP into its labor and other-value-added components. Labor's value share of GDP over the series averages about 58%. Other value added includes payments to property type income, and indirect business taxes and non-tax liabilities.

The integrity of the merchandise trade flows and duty payments is maintained in the calibration process because of our intention to use TSCAPE to analyze international trade policy. Figure 4 presents aggregate real imports and real exports in the accounts.

Trade has become a much larger component of the U.S. economy over the baseline period. In 1978 imports were 7% of GDP, but by 2001 they had risen to 16%. In 1978 exports were 6% of GDP, increasing to 12% in 2001. The dramatic relative growth in baseline trade is important as a point of context. Clearly, some of the trade growth is directly attributable to liberalization, but much of it cannot be directly linked to the easily measured changes in distortions. If the growth is not attributed to the changes in tariff and non-tariff distortions, the baseline indicates significant structural change. Figure 5 illustrates the relative trade growth by converting real-baseline GDP, imports, and exports into quantity indices normalized on their respective 1978 levels.

Table 2 presents gross commodity make by commodity for select years across the baseline. The detailed baseline imports, exports, and calculated duties are reported in Table 3 for select years across the baseline. The sectors with the largest flows appear at the top of the table, but it is important note the relative importance of protection. While Services Not Elsewhere Classified is the largest trade sector, the data indicate negligible measured protection. The Electronic Equipment and Industrial Machinery sectors are particularly important. Both of these sectors have substantial trade flows and substantial initial protection. The protection rates in

these sectors drop off significantly by 2001. The calculated rate falls by 86% for Electronic Equipment from 1981 to 2001, and the calculated rate falls by 88% for Industrial Machinery. It is also important to note that these are important export sectors. Other important import-competing sectors include Apparel and Other Textile Products, and the Miscellaneous Manufacturing, and the Stone, Clay, and Glass Products industries. These industries experience substantial decreases in their relative rates of protection.

6. Conclusion

This document outlines the general scope and architecture of a Time Series of Consistent Accounts for Policy Evaluation (TSCAPE). The important characteristics of TSCAPE are its consistency with published series on real gross domestic product by industry and merchandise trade flows (including calculated duties on imports). Furthermore, the series uses information from the benchmark input-output tables to fully specify production technologies. The data and programs are available upon request. We suspect that these will be useful for researchers interested in incorporating different data, exploring alternative procedures for generating the missing data, and alternative procedures for imposing consistency in the accounts.

Table 1: Available Commodities and Industries

Industry	Description	SIC equivalent
Frm	Farms	(01-02)
Asv	Ag services, forestry, and fishing	(07-09)
Met	Metal mining	(10)
Col	Coal mining	(11-12)
Cru	Oil and gas extraction	(13)
Nmm	Nonmetallic minerals, except fuel	(14)
Cns	Construction	(15-17)
Lum	Lumber and wood products	(24)
Frn	Furniture and fixtures	(25)
Scg	Stone, clay, and glass products	(32)
Pmp	Primary metal industry	(33)
Fmp	Fabricated metal products	(34)
Ime	Industrial machinery and equipment	(35)
Eei	Electronic equipment and instruments	(36, 38)
Mve	Motor vehicles and equipment	(371)
Ote	Other transportation equipment	(372-379)
Mmi	Misc manufacturing industry	(39)
Foo	Food and kindred products	(20)
Tob	Tobacco products	(21)
Tex	Textile mill products	(22)
Atp	Apparel and other textile products	(23)
Pap	Paper and allied products	(26)
Prn	Printing and publishing	(27)
Chm	Chemicals and allied products	(28)
Oil	Petroleum and coal products	(29)
Rmp	Rubber and misc. plastic products	(30)
Lea	Leather and leather products	(31)
Rrt	Railroad transportation	(40)
Lit	Local and interurban passenger transit	(41)
Trk	Trucking and warehouseing	(42)
Wtr	Water transportation	(44)
Air	Air transportation	(45)
Pip	Pipelines, except natural gas	(46)
Trs	Transportation services	(47)
Tel	Telephone and telegraph	(481, 482, 489)
Rtv	Radio and television	(483)
Egw	Electric, gas, and sanitary services	(49)
Who	Wholesale trade	(50, 51)
Rtl	Retail trade	(52-59)
Fir	Finance, insurance, and real estate	(60-67)
Srv	Services not elsewhere classified	(70-89)
Gov	Government Services	(43, 91-97)

Table 2: Baseline gross output by commodity (billions of 1996 dollars and share of total)

Sector	1978		1981		1986		1991		1996		2001	
	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.
Services Not Elsewhere Classified	1,352	15.7	1,570	17.6	2,136	20.7	2,147	18.7	2,808	20.6	2,475	16.0
Finance, insurance, and real estate	1,102	12.8	1,201	13.5	1,461	14.2	1,990	17.3	2,171	15.9	2,832	18.3
Government Services	835	9.7	867	9.7	918	8.9	1,010	8.8	1,022	7.5	1,166	7.5
Retail trade	652	7.6	661	7.4	784	7.6	871	7.6	1,044	7.7	1,312	8.5
Wholesale trade	413	4.8	435	4.9	506	4.9	593	5.2	765	5.6	967	6.3
Construction	533	6.2	477	5.3	571	5.5	477	4.1	605	4.4	698	4.5
Food and kindred products	326	3.8	342	3.8	391	3.8	420	3.6	453	3.3	506	3.3
Electric, gas, and sanitary services	360	4.2	397	4.5	355	3.4	396	3.4	353	2.6	326	2.1
Electronic equipment and instruments	174	2.0	200	2.2	236	2.3	292	2.5	472	3.5	720	4.7
Chemicals and allied products	282	3.3	278	3.1	283	2.7	350	3.0	381	2.8	400	2.6
Motor vehicles and equipment	281	3.3	180	2.0	248	2.4	227	2.0	321	2.4	345	2.2
Industrial machinery and equipment	172	2.0	196	2.2	191	1.9	226	2.0	362	2.7	450	2.9
Telephone and telegraph	100	1.2	127	1.4	162	1.6	181	1.6	257	1.9	474	3.1
Farms	178	2.1	185	2.1	175	1.7	199	1.7	229	1.7	250	1.6
Fabricated metal products	200	2.3	186	2.1	183	1.8	180	1.6	214	1.6	227	1.5
Petroleum and coal products	168	2.0	160	1.8	169	1.6	189	1.6	195	1.4	194	1.3
Trucking and warehousing	98	1.1	92	1.0	122	1.2	160	1.4	209	1.5	229	1.5
Primary metal industries	137	1.6	137	1.5	122	1.2	146	1.3	183	1.3	205	1.3
Other transportation equipment	120	1.4	135	1.5	153	1.5	166	1.4	135	1.0	161	1.0
Paper and allied products	118	1.4	121	1.4	137	1.3	146	1.3	159	1.2	150	1.0
Rubber and miscellaneous plastics products	77	0.9	73	0.8	92	0.9	117	1.0	147	1.1	165	1.1
Printing and publishing	92	1.1	97	1.1	117	1.1	116	1.0	122	0.9	121	0.8
Oil and gas extraction	110	1.3	100	1.1	102	1.0	104	0.9	88	0.6	86	0.6
Lumber and wood products	73	0.9	70	0.8	47	0.5	97	0.8	113	0.8	105	0.7
Transportation by air	49	0.6	55	0.6	77	0.7	92	0.8	113	0.8	125	0.8
Stone, clay, and glass products	83	1.0	72	0.8	87	0.8	81	0.7	101	0.7	97	0.6
Apparel and other textile products	79	0.9	73	0.8	79	0.8	78	0.7	78	0.6	80	0.5
Textile mill products	65	0.8	58	0.7	59	0.6	62	0.5	76	0.6	71	0.5
Furniture and fixtures	41	0.5	40	0.4	51	0.5	44	0.4	53	0.4	55	0.4
Agricultural services, forestry, and fishing	30	0.3	30	0.3	40	0.4	52	0.5	56	0.4	75	0.5

Table 2: Baseline gross output by commodity (billions of 1996 dollars and share of total)

Sector	1978		1981		1986		1991		1996		2001	
	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.	Value	Pct.
Tobacco products	64	0.7	65	0.7	43	0.4	37	0.3	40	0.3	38	0.2
Miscellaneous manufacturing industries	42	0.5	40	0.4	37	0.4	42	0.4	48	0.4	54	0.4
Railroad transportation	31	0.4	33	0.4	33	0.3	38	0.3	38	0.3	36	0.2
Local and interurban passenger transit	32	0.4	29	0.3	30	0.3	30	0.3	37	0.3	46	0.3
Coal mining	35	0.4	43	0.5	36	0.3	32	0.3	23	0.2	18	0.1
Water transportation	26	0.3	28	0.3	24	0.2	29	0.3	26	0.2	24	0.2
Transportation services	13	0.1	15	0.2	18	0.2	22	0.2	35	0.3	46	0.3
Radio and television	2	0.0	2	0.0	3	0.0	27	0.2	42	0.3	55	0.4
Nonmetallic minerals, except fuels	13	0.2	13	0.1	14	0.1	15	0.1	15	0.1	18	0.1
Leather and leather products	18	0.2	16	0.2	11	0.1	11	0.1	16	0.1	20	0.1
Pipelines, except natural gas	9	0.1	9	0.1	9	0.1	9	0.1	19	0.1	22	0.1
Metal mining	8	0.1	9	0.1	8	0.1	8	0.1	7	0.1	10	0.1
Grand Total	8,595	100.0	8,917	100.0	10,318	100.0	11,507	100.0	13,627	100.0	15,454	100.0

Table 3: Baseline trade flows by commodity (millions of 1996 dollars)

Sector	Variable	1978	1981	1986	1991	1996	2001
Services Not Elsewhere Classified	Imports	53,606	75,140	87,042	138,143	107,107	146,288
	Exports	52,851	79,743	70,527	102,922	99,957	107,873
	Calculated Duties	51	32	5	20	24	35
Electronic equipment and instruments	Imports	24,544	23,223	61,787	77,669	142,613	211,993
	Exports	24,308	27,936	33,614	70,488	129,684	178,475
	Calculated Duties	1,623	1,315	2,466	2,705	2,633	1,669
Industrial machinery and equipment	Imports	16,656	15,970	45,458	55,569	113,882	153,832
	Exports	36,960	43,402	41,927	69,512	111,983	131,571
	Calculated Duties	821	674	1,236	1,227	1,360	770
Motor vehicles and equipment	Imports	38,060	29,728	84,448	73,905	111,800	178,207
	Exports	16,609	13,383	19,842	32,007	52,138	63,639
	Calculated Duties	706	785	1,687	1,201	1,585	2,204
Chemicals and allied products	Imports	10,334	10,388	19,648	23,185	43,612	84,377
	Exports	19,235	23,907	26,594	41,635	59,590	82,026
	Calculated Duties	510	394	764	887	877	765
Finance, insurance, and real estate	Imports	644	903	2,938	2,696	48,319	95,058
	Exports	5,619	8,477	32,548	47,463	71,565	88,787
	Calculated Duties	-	-	-	-	-	-
Oil and gas extraction	Imports	58,459	63,025	30,325	45,168	57,054	81,784
	Exports	750	971	350	684	1,214	1,434
	Calculated Duties	393	65	167	186	169	88
Other transportation equipment	Imports	3,934	5,189	10,181	14,734	17,840	42,185
	Exports	17,022	19,935	23,648	44,791	44,429	68,463
	Calculated Duties	182	109	134	114	137	157
Primary metal industries	Imports	23,675	18,915	27,525	21,383	35,492	45,161
	Exports	6,726	9,660	5,612	14,817	21,902	25,262
	Calculated Duties	835	569	591	513	621	334
Farms	Imports	11,780	7,658	12,251	9,518	14,529	16,842
	Exports	31,397	31,511	18,197	22,422	34,132	27,133
	Calculated Duties	211	126	197	197	139	106
Apparel and other textile products	Imports	7,735	6,579	18,821	24,250	39,486	68,042
	Exports	1,597	1,616	1,389	3,818	8,400	8,918
	Calculated Duties	2,247	1,871	4,127	4,486	5,416	8,043

Table 3: Baseline trade flows by commodity (millions of 1996 dollars)

Sector	Variable	1978	1981	1986	1991	1996	2001
Food and kindred products	Imports	13,462	11,016	15,405	15,814	21,876	32,251
	Exports	12,453	12,207	11,616	17,506	27,568	31,828
	Calculated Duties	605	418	689	508	455	571
Wholesale trade	Imports	-	-	-	-	-	-
	Exports	6,061	9,145	14,795	28,747	54,567	69,310
	Calculated Duties	-	-	-	-	-	-
Miscellaneous manufacturing industries	Imports	6,998	6,474	15,691	19,552	31,608	50,789
	Exports	2,938	2,849	2,382	6,544	10,338	14,333
	Calculated Duties	555	362	601	754	532	647
Fabricated metal products	Imports	5,989	4,790	9,845	10,855	17,661	28,372
	Exports	7,518	7,716	6,310	11,757	17,103	22,383
	Calculated Duties	314	374	367	404	485	514
Petroleum and coal products	Imports	11,744	13,232	12,363	11,809	19,881	44,018
	Exports	2,098	4,536	4,010	7,077	7,305	9,398
	Calculated Duties	88	27	65	87	105	175
Paper and allied products	Imports	6,593	5,666	9,627	10,953	15,423	21,108
	Exports	3,705	4,959	5,120	9,245	14,205	15,647
	Calculated Duties	56	32	58	56	58	56
Rubber and miscellaneous plastics products	Imports	3,995	2,969	6,423	10,190	16,944	25,390
	Exports	2,768	3,078	3,467	7,008	12,397	18,617
	Calculated Duties	358	265	354	544	790	974
Trucking and warehousing	Imports	-	-	-	2,351	16,738	31,851
	Exports	1,812	2,735	6,023	11,263	18,886	23,546
	Calculated Duties	-	-	-	-	-	-
Lumber and wood products	Imports	7,199	3,674	6,667	5,692	12,851	18,611
	Exports	3,625	3,672	3,466	6,544	7,486	5,810
	Calculated Duties	177	75	97	67	75	94
Leather and leather products	Imports	4,686	4,013	9,879	9,586	13,400	17,468
	Exports	484	564	596	1,434	1,890	2,151
	Calculated Duties	460	392	923	1,095	1,422	1,936
Stone, clay, and glass products	Imports	2,677	2,434	5,995	5,630	9,436	15,146
	Exports	1,985	2,033	1,912	3,421	5,229	7,012
	Calculated Duties	748	231	370	332	402	476

Table 3: Baseline trade flows by commodity (millions of 1996 dollars)

Sector	Variable	1978	1981	1986	1991	1996	2001
Textile mill products	Imports	2,767	2,077	4,613	5,039	6,880	9,932
	Exports	2,174	2,379	1,893	4,162	6,315	9,418
	Calculated Duties	466	299	575	576	604	596
Furniture and fixtures	Imports	1,750	1,615	5,567	5,269	9,771	21,389
	Exports	440	570	533	2,178	3,307	4,520
	Calculated Duties	62	49	137	117	83	20
Government Services	Imports	478	610	1,233	3,234	4,943	8,296
	Exports	2,734	4,030	4,115	6,928	6,970	10,133
	Calculated Duties	3	3	10	3	3	0
Agricultural services, forestry, and fishing	Imports	4,665	3,740	6,123	5,727	7,743	10,470
	Exports	1,060	889	1,355	3,069	3,008	3,395
	Calculated Duties	14	12	20	6	5	6
Railroad transportation	Imports	76	106	139	232	1,623	3,113
	Exports	1,806	2,725	4,605	5,060	6,397	7,760
	Calculated Duties	-	-	-	-	-	-
Printing and publishing	Imports	862	718	1,835	1,956	3,112	4,718
	Exports	1,221	1,383	1,487	3,718	4,632	5,511
	Calculated Duties	11	6	9	15	17	10
Coal mining	Imports	159	38	115	139	300	848
	Exports	3,039	5,937	4,500	4,571	3,697	1,962
	Calculated Duties	-	-	-	-	-	-
Telephone and telegraph	Imports	-	-	-	-	-	-
	Exports	689	1,040	3,147	4,363	6,307	7,775
	Calculated Duties	-	-	-	-	-	-
Water transportation	Imports	-	-	-	-	-	-
	Exports	868	1,310	5,235	7,466	3,686	2,782
	Calculated Duties	-	-	-	-	-	-
Tobacco products	Imports	75	161	94	191	246	512
	Exports	1,136	1,336	1,743	4,524	5,268	2,944
	Calculated Duties	9	17	6	11	5	17
Nonmetallic minerals, except fuels	Imports	3,395	2,341	2,459	1,038	1,305	2,375
	Exports	757	955	869	1,134	1,322	1,511
	Calculated Duties	21	5	4	2	2	3

Table 3: Baseline trade flows by commodity (millions of 1996 dollars)

Sector	Variable	1978	1981	1986	1991	1996	2001
Metal mining	Imports	3,739	2,500	1,736	1,405	1,618	1,310
	Exports	865	1,120	675	1,112	1,169	1,117
	Calculated Duties	6	2	1	4	0	0
Local and interurban passenger transit	Imports	-	-	-	-	-	-
	Exports	-	-	-	30	7,118	10,521
	Calculated Duties	-	-	-	-	-	-
Transportation services	Imports	-	-	-	-	-	-
	Exports	394	594	2,201	2,777	1,823	1,745
	Calculated Duties	-	-	-	-	-	-
Pipelines, except natural gas	Imports	-	-	-	-	-	-
	Exports	141	213	265	535	527	563
	Calculated Duties	-	-	-	-	-	-
Retail trade	Imports	-	-	-	-	-	-
	Exports	19	28	105	354	557	673
	Calculated Duties	-	-	-	-	-	-
Construction	Imports	-	-	-	-	-	-
	Exports	38	57	126	112	130	158
	Calculated Duties	-	-	-	-	-	-
Electric, gas, and sanitary services	Imports	-	-	12	-	-	-
	Exports	-	-	-	-	-	-
	Calculated Duties	-	-	-	-	-	-
Transportation by air	Imports	15	-	-	-	-	-
	Exports	-	-	-	-	-	-
	Calculated Duties	14	-	-	-	-	-

Figure 1: Use Architecture

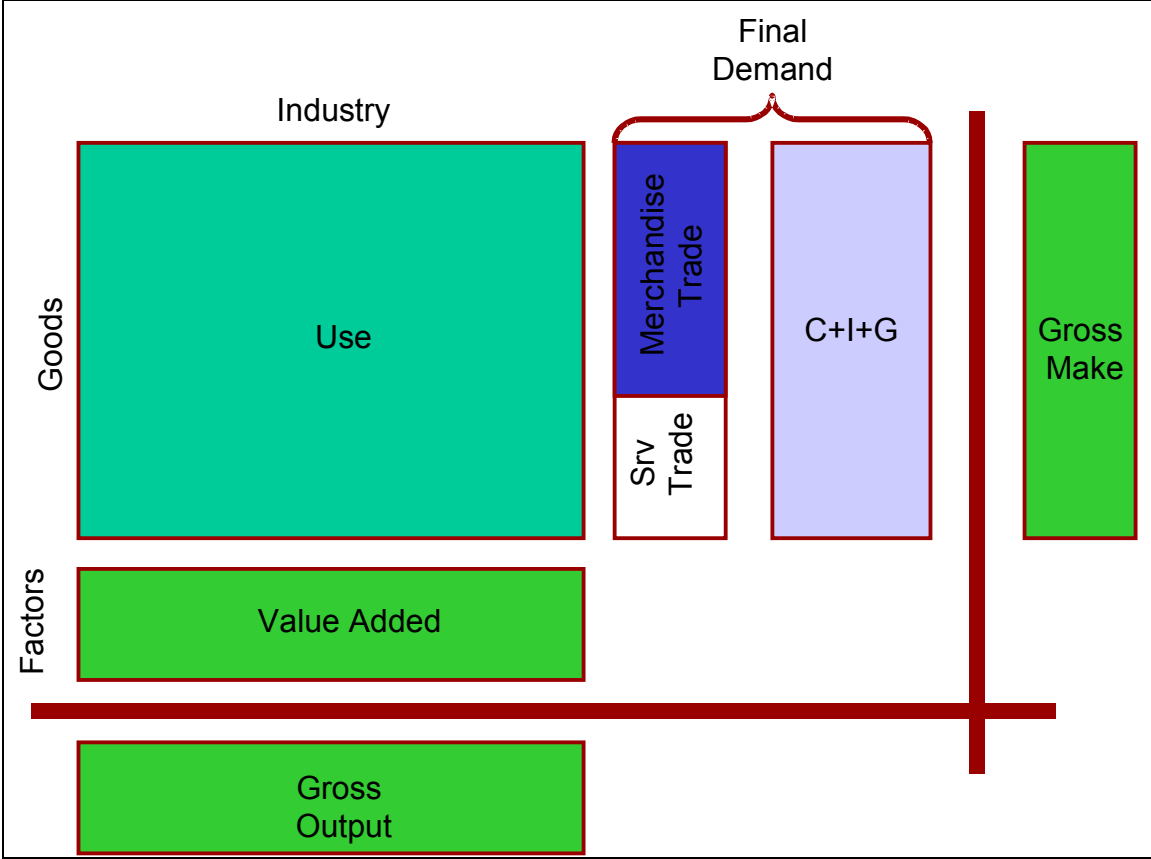


Figure 2: Make Architecture

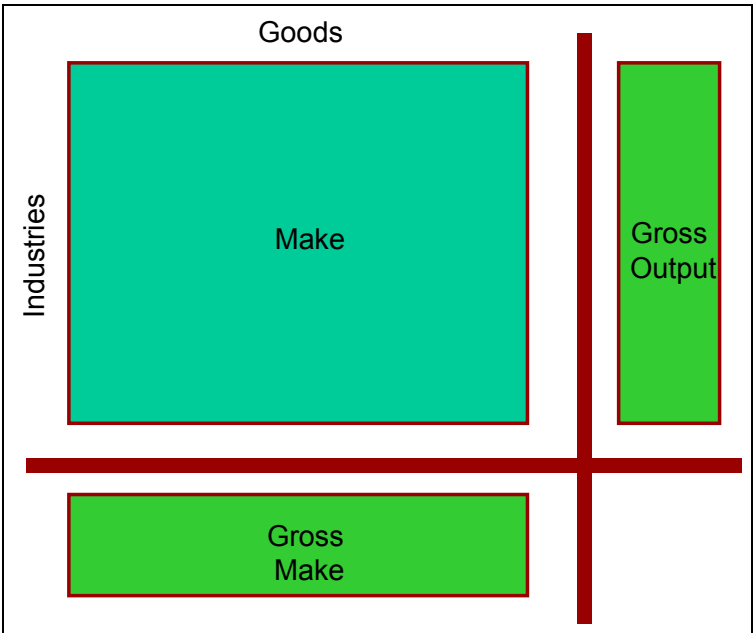


Figure 3: Gross Domestic Product

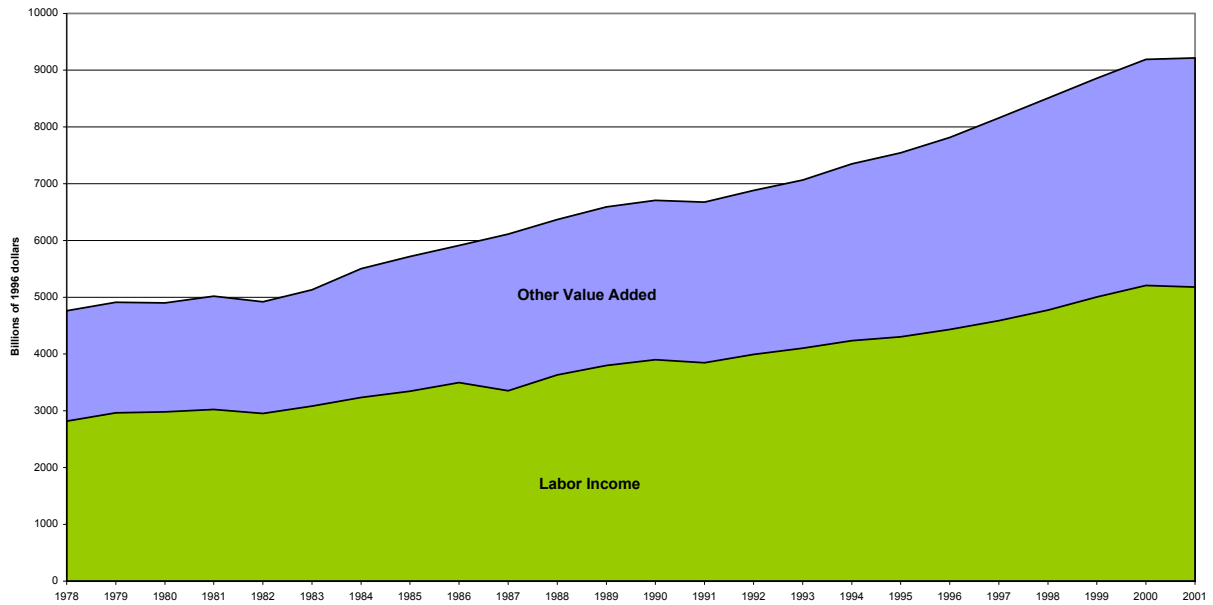


Figure 4: Aggregate Imports and Exports

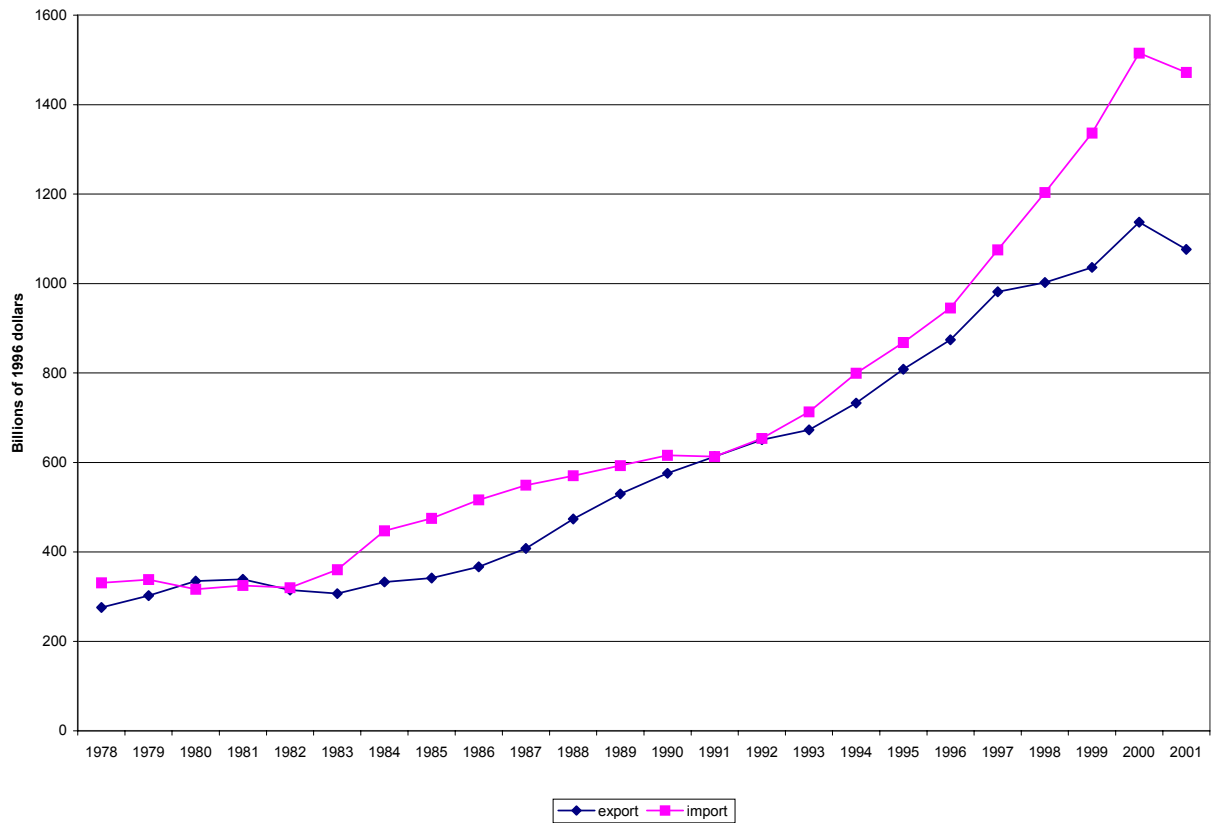


Figure 5: Relative Growth of Trade and Income

