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U.S. Energy Demand and Supply

By

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Daniel T. Slesnick, Peter J. Wilcoxen

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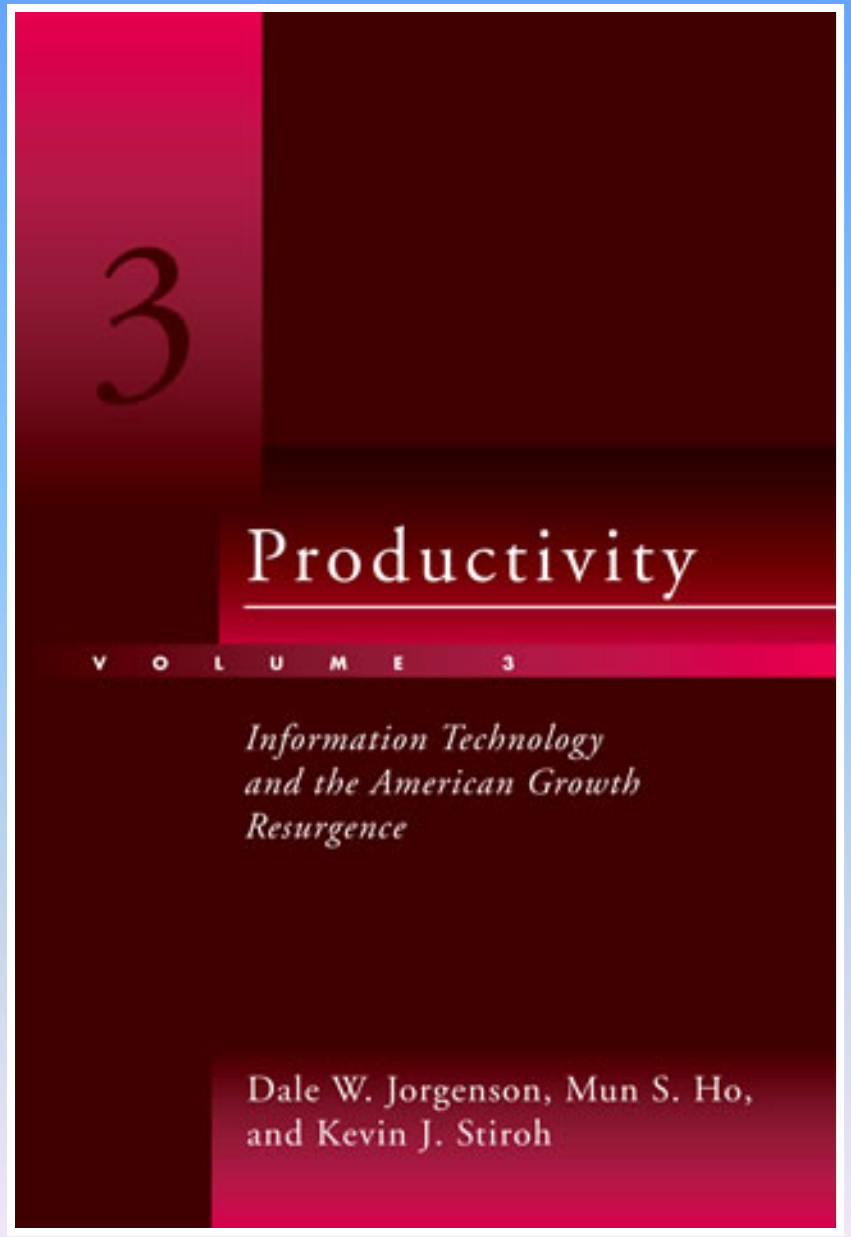

3
Productivity
VOLUME 3
Information Technology and the American Growth Resurgence
Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh

U.S. Energy Demand and Supply

Demography, Technology, and Resources

Demography and Labor Supply

Resources and Energy Supply

Technology and Demand for Labor and Energy

A Long-Run Model of the U.S. Economy

Household Model Incorporates Demography

Demand for Leisure and Supply of Labor

Production Model Incorporates Technology

Rate and Biases of Technical Change

Personal Consumption Expenditures and leisure, IGEM categories, 2000.

IGEM categories	($bil)	category
1 Food	568.6	3
2 Meals	376.5	4
3 Meals-Employees	9.9	5,6
4 Shoes	46.3	12
5 Clothing	267.4	14,15,16
6 Gasoline	164.4	75
7 Coal	0.2	40
8 Fuel oil	17.9	40
9 Tobacco	72.2	7
10 Cleaning supplies	115.8	21,34
11 Furnishings	38.3	33
12 Drugs	156.3	45
13 Toys	62.7	89
14 Stationery	23.4	35
15 Imports (travel)	3.3	111
16 Reading	51.7	88,95
17 Rental	247.4	25,27
18 Electricity	101.5	37
19 Gas	40.8	38
20 Water	48.8	39
21 Communications	130.6	41
22 Domestic service	16.0	42
23 Other household	48.5	43
24 Own transportation	210.8	74,76,77
25 Transportation	56.9	79,80,82,83,84,85
26 Medical Services	921.3	47,48,49,51,55
27 Health Insurance	70.6	56
28 Personal services	76.2	17,19,22
29 Financial services	517.7	61,62,63,64
30 Other services	114.8	65,66,67
31 Recreation	255.5	94,97,98,99,100,101,102,103
32 Education and Welfare	354.1	105,106,107,108
33 Foreign Travel	80.9	110
34 Owner maintenance	90.0	our imputation
35 Durables flow	1394.4	our imputation
Leisure	13786.3	our imputation

NIPA PCE category refers to the line number in Table 2.4 of SCB 2002.

Industry Output and Valued Added, 2000.

Code	Industry Name	Output	Value-Added	SIC
1	Agriculture	388,994	195,781	01-02, 07-09
2	Metal Mining	15,603	7,167	10
3	Coal Mining	23,081	14,175	11-12
4	Petroleum and Gas	136,651	72,669	13
5	Nonmetallic Mining	18,894	10,619	14
6	Construction	995,279	419,200	15-17
7	Food Products	487,587	156,127	20
8	Tobacco Products	35,853	10,108	21
9	Textile Mill Products	61,629	21,811	22
10	Apparel and Textiles	84,273	32,899	23
11	Lumber and Wood	115,974	43,305	24
12	Furniture and Fixtures	87,965	39,619	25
13	Paper Products	175,955	72,942	26
14	Printing and Publishing	233,523	137,723	27
15	Chemical Products	422,655	183,438	28
16	Petroleum Refining	235,145	26,422	29
17	Rubber and Plastic	170,270	77,459	30
18	Leather Products	10,616	4,028	31
19	Stone, Clay, and Glass	111,040	53,522	32
20	Primary Metals	190,627	59,691	33
21	Fabricated Metals	279,540	125,540	34
22	Industrial Machinery and Equipm	472,251	193,646	35
23	Electronic and Electric Equipmen	433,257	195,913	36
24	Motor Vehicles	427,709	83,072	371
25	Other Transportation Equipment	186,241	87,121	372-379
26	Instruments	183,293	104,351	38
27	Miscellaneous Manufacturing	52,715	21,889	39
28	Transport and Warehouse	553,535	263,335	40-47
29	Communications	430,330	231,027	48
30	Electric Utilities	245,950	166,618	491, %493
31	Gas Utilities	81,196	26,421	492, %493, 496
32	Trade	1,965,715	1,187,180	50-59
33	FIRE	2,009,429	1,240,039	60-67
34	Services	3,455,269	2,197,343	70-87, 494-495
35	Goverment Enterprises	256,268	167,722	
36	Private Households	1,394,410	1,394,410	88
38	General Government	1,194,160	1,194,160	

Notes: All figures in millions of current dollars. % indicates part of an SIC code.

Future U.S. Economic Growth

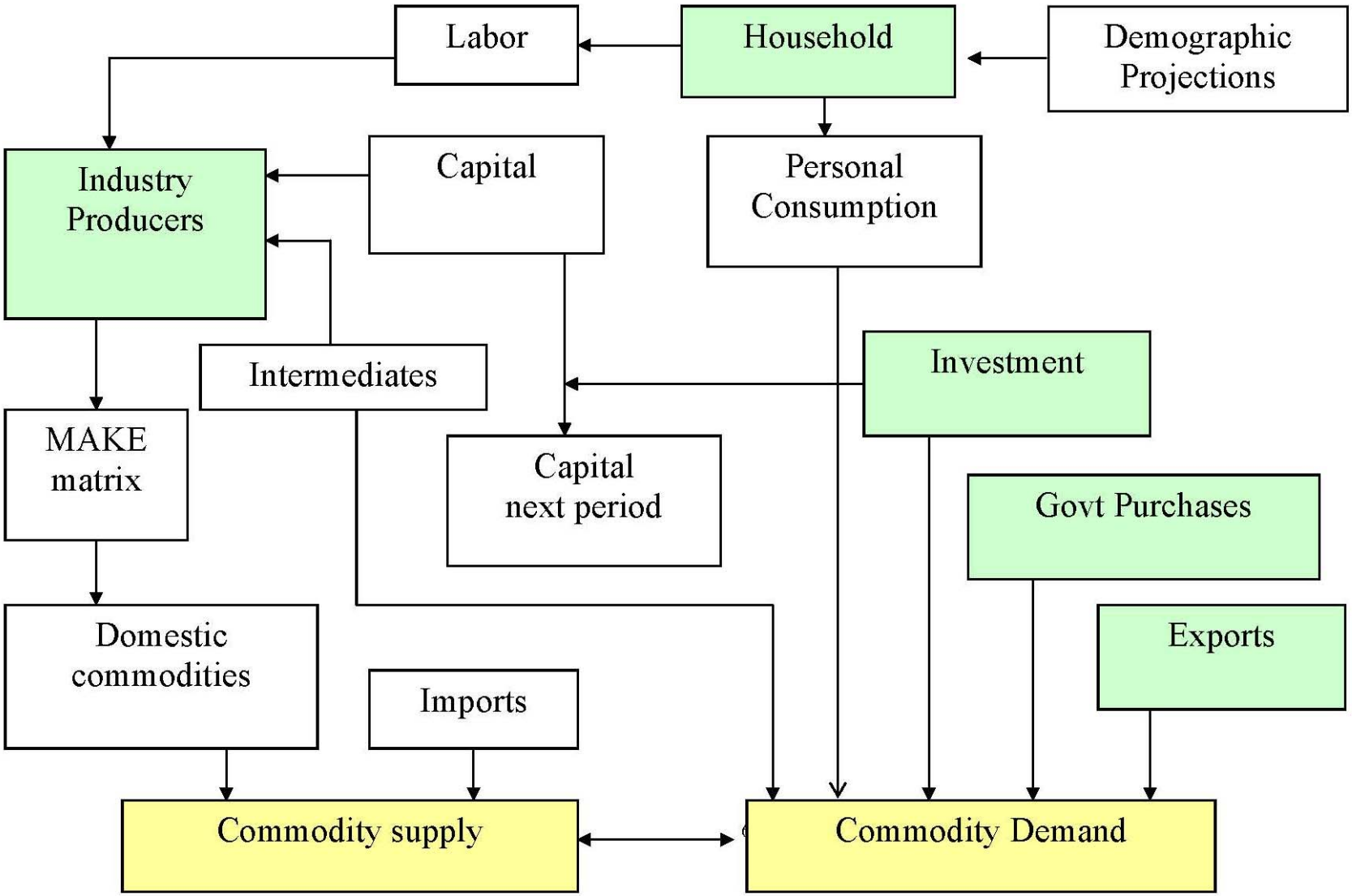
Equilibrating Supply and Demand

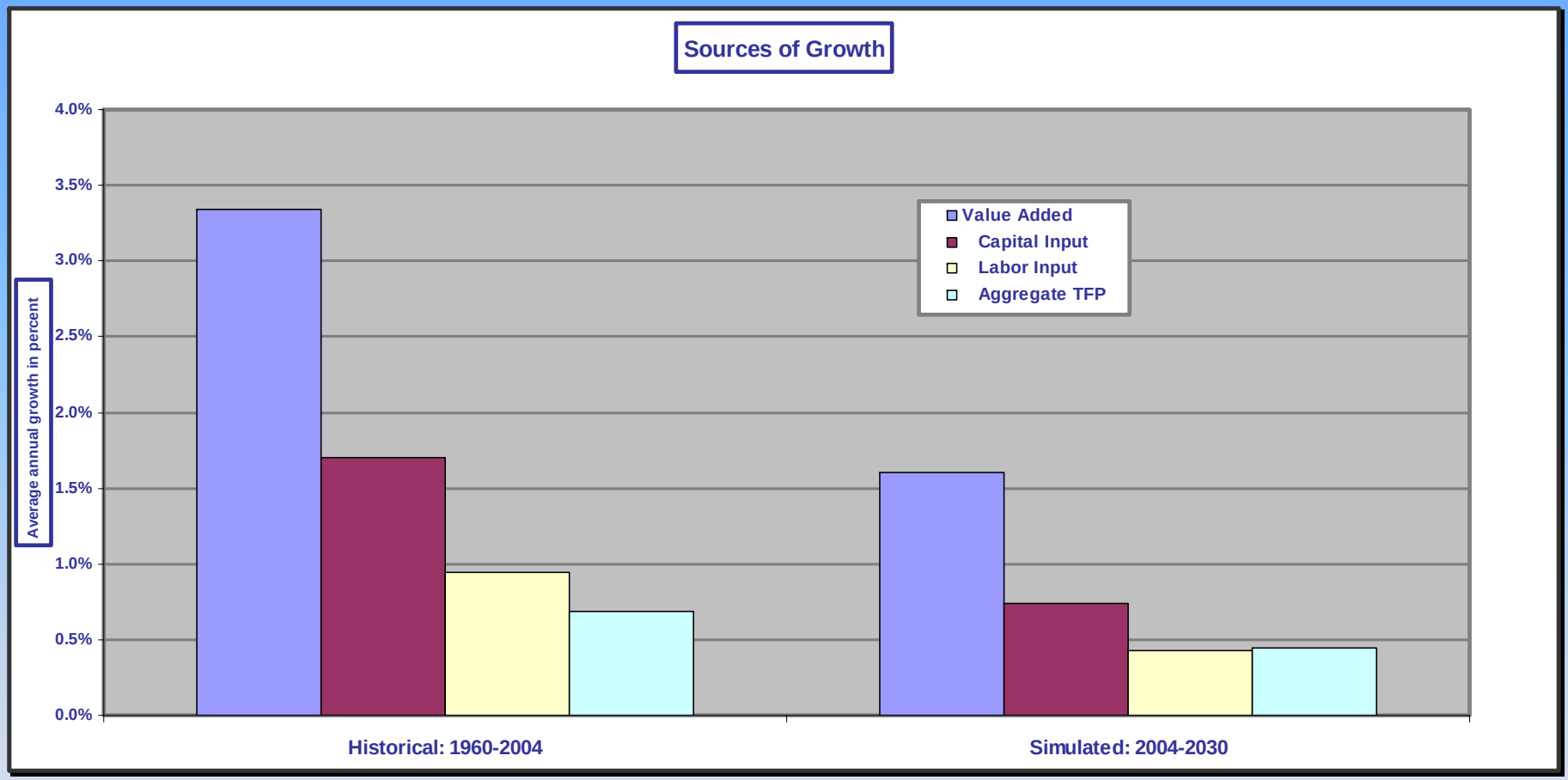
Historical Economic Growth and Its Sources

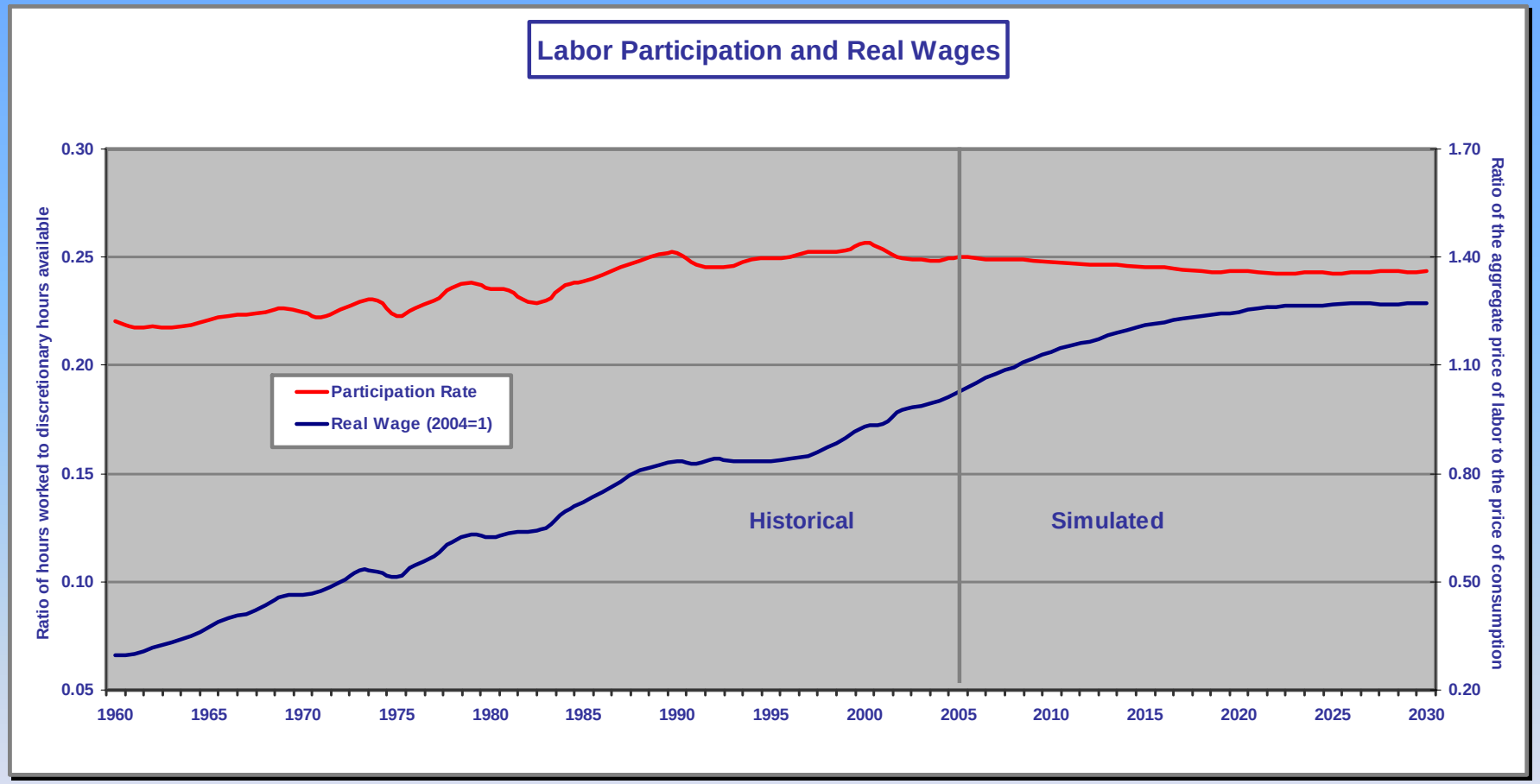
Projected Economic Growth and Its Sources

Participation Rates and the Real Wage

Flow of goods and factors in IGEM




Sources of Growth
Average annual growth in percent
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
Value Added
Capital Input
Labor Input
Aggregate TFP
Historical: 1960-2004
Simulated: 2004-2030


Labor Participation and Real Wages
Ratio of hours worked to discretionary hours available
Ratio of the aggregate price of labor to the price of consumption
0.30
0.25
0.20
0.15
0.10
0.05
1.70
1.40
1.10
0.80
0.50
0.20
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
Participation Rate
Real Wage (2004=1)
Historical
Simulated

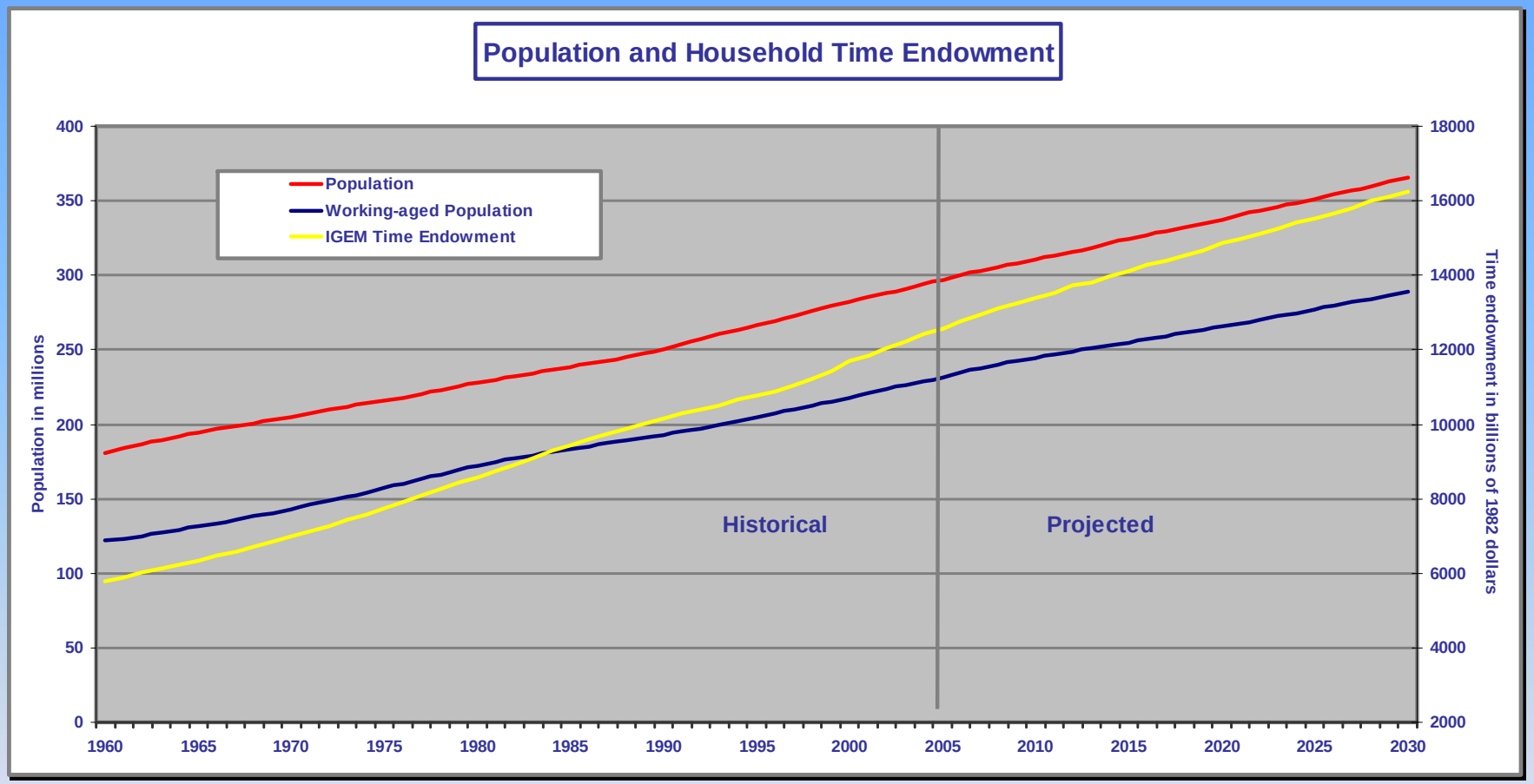
Exogenous Variables in the Projections

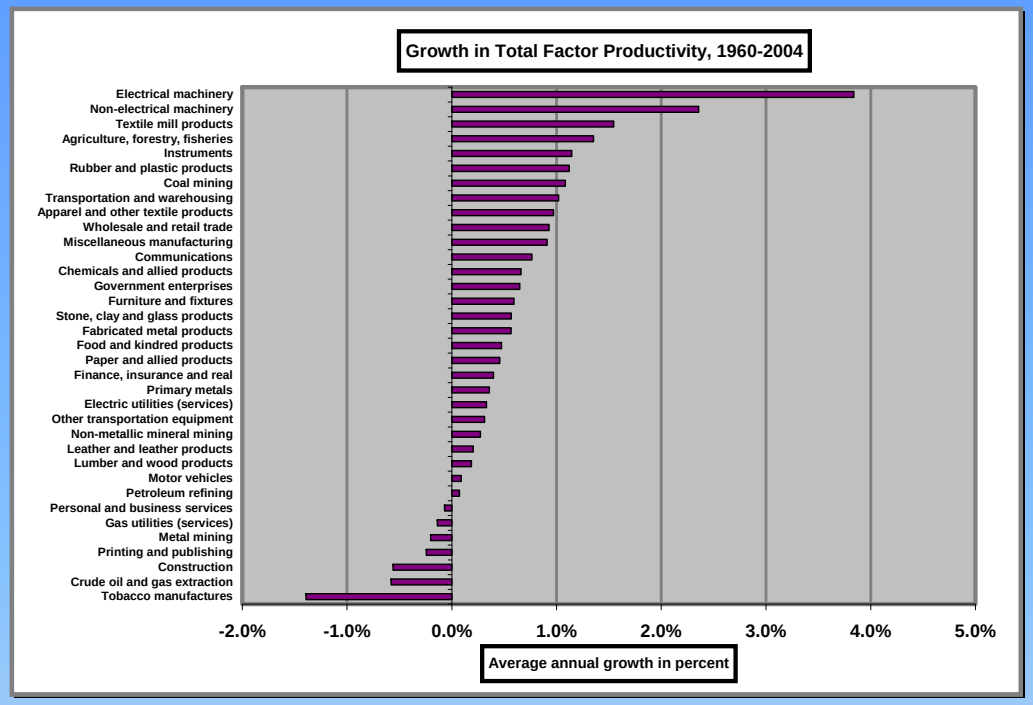
Growth and Composition of the Population

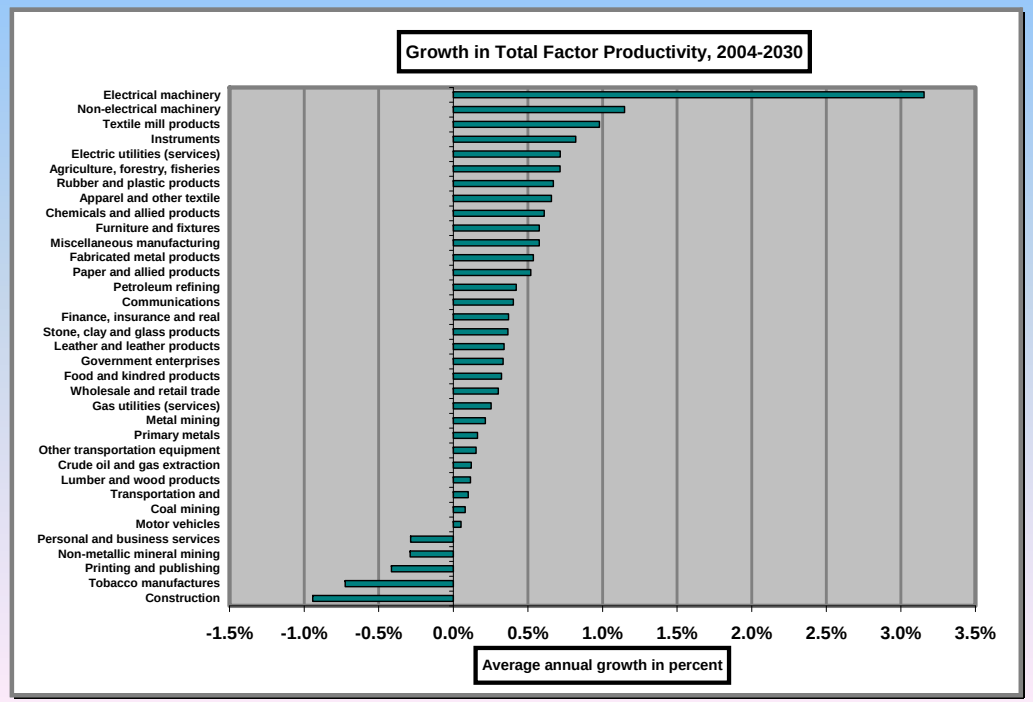
Labor Quality and the Time Endowment

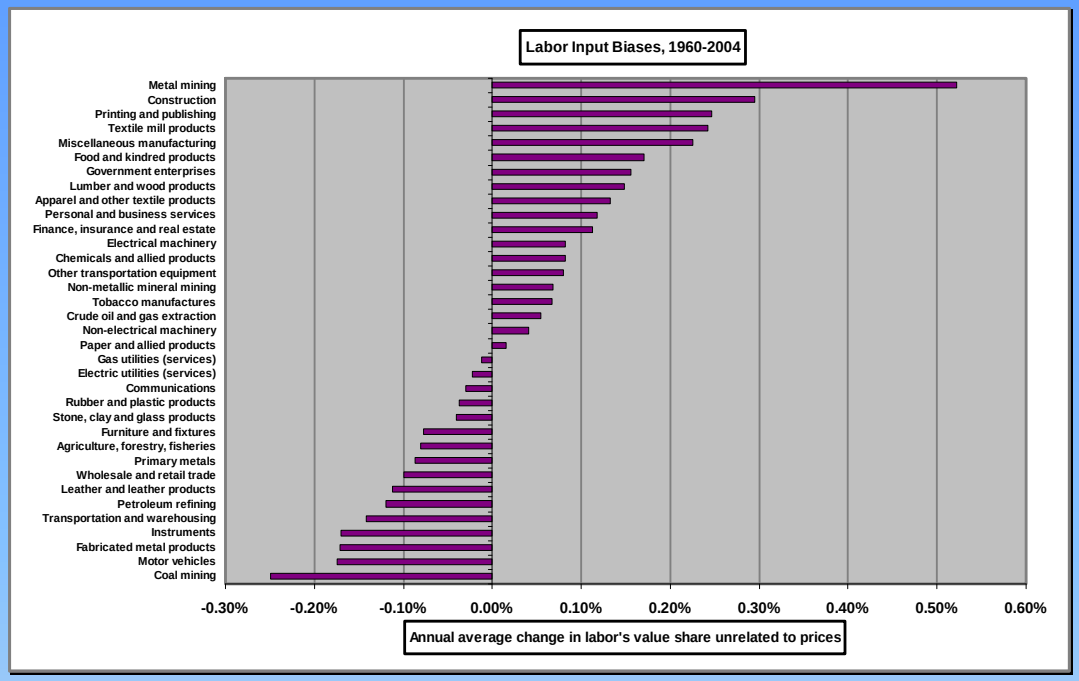
Rates of Technical Change

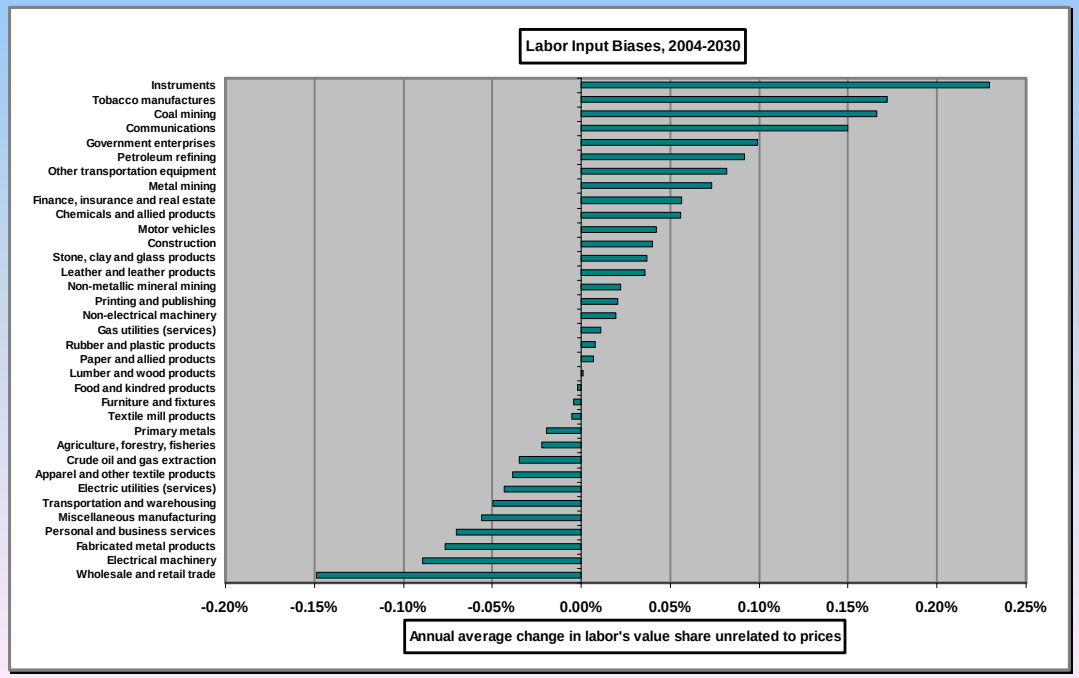
Biases of Technical Change


Population and Household Time Endowment
Population
Working-aged Population
IGEM Time Endowment
Historical
Projected
Population in millions
Time endowment in billions of 1982 dollars
400
350
300
250
200
150
100
50
0
18000
16000
14000
12000
10000
8000
6000
4000
2000
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


Growth in Total Factor Productivity, 1960-2004
Electrical machinery
Non-electrical machinery
Textile mill products
Agriculture, forestry, fisheries
Instruments
Rubber and plastic products
Coal mining
Transportation and warehousing
Apparel and other textile products
Wholesale and retail trade
Miscellaneous manufacturing
Communications
Chemicals and allied products
Government enterprises
Furniture and fixtures
Stone, clay and glass products
Fabricated metal products
Food and kindred products
Paper and allied products
Finance, insurance and real
Primary metals
Electric utilities (services)
Other transportation equipment
Non-metallic mineral mining
Leather and leather products
Lumber and wood products
Motor vehicles
Petroleum refining
Personal and business services
Gas utilities (services)
Metal mining
Printing and publishing
Construction
Crude oil and gas extraction
Tobacco manufactures
-2.0%
-1.0%
0.0%
1.0%
2.0%
3.0%
4.0%
5.0%
Average annual growth in percent


Growth in Total Factor Productivity, 2004-2030
Electrical machinery
Non-electrical machinery
Textile mill products
Instruments
Electric utilities (services)
Agriculture, forestry, fisheries
Rubber and plastic products
Apparel and other textile
Chemicals and allied products
Furniture and fixtures
Miscellaneous manufacturing
Fabricated metal products
Paper and allied products
Petroleum refining
Communications
Finance, insurance and real
Stone, clay and glass products
Leather and leather products
Government enterprises
Food and kindred products
Wholesale and retail trade
Gas utilities (services)
Metal mining
Primary metals
Other transportation equipment
Crude oil and gas extraction
Lumber and wood products
Transportation and
Coal mining
Motor vehicles
Personal and business services
Non-metallic mineral mining
Printing and publishing
Tobacco manufactures
Construction
-1.5%
-1.0%
-0.5%
0.0%
0.5%
1.0%
1.5%
2.0%
2.5%
3.0%
3.5%
Average annual growth in percent


Labor Input Biases, 1960-2004
Metal mining
Construction
Printing and publishing
Textile mill products
Miscellaneous manufacturing
Food and kindred products
Government enterprises
Lumber and wood products
Apparel and other textile products
Personal and business services
Finance, insurance and real estate
Electrical machinery
Chemicals and allied products
Other transportation equipment
Non-metallic mineral mining
Tobacco manufactures
Crude oil and gas extraction
Non-electrical machinery
Paper and allied products
Gas utilities (services)
Electric utilities (services)
Communications
Rubber and plastic products
Stone, clay and glass products
Furniture and fixtures
Agriculture, forestry, fisheries
Primary metals
Wholesale and retail trade
Leather and leather products
Petroleum refining
Transportation and warehousing
Instruments
Fabricated metal products
Motor vehicles
Coal mining
-0.30%
-0.20%
-0.10%
0.00%
0.10%
0.20%
0.30%
0.40%
0.50%
0.60%
Annual average change in labor's value share unrelated to prices


Labor Input Biases, 2004-2030
Instruments
Tobacco manufactures
Coal mining
Communications
Government enterprises
Petroleum refining
Other transportation equipment
Metal mining
Finance, insurance and real estate
Chemicals and allied products
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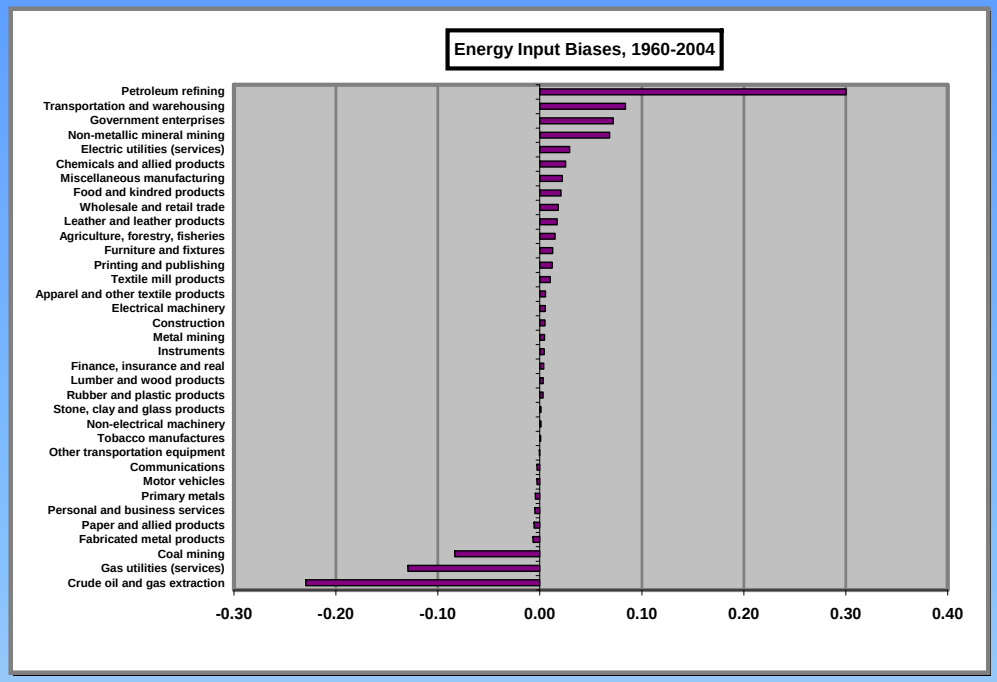
Food and kindred products
Furniture and fixtures
Textile mill products
Primary metals
Agriculture, forestry, fisheries
Crude oil and gas extraction
Apparel and other textile products
Electric utilities (services)
Transportation and warehousing
Miscellaneous manufacturing
Personal and business services
Fabricated metal products
Electrical machinery
Wholesale and retail trade
-0.20%
-0.15%
-0.10%
-0.05%
0.00%
0.05%
0.10%
0.15%
0.20%
0.25%
Annual average change in labor's value share unrelated to prices


Energy Input Biases, 1960-2004
Petroleum refining
Transportation and warehousing
Government enterprises
Non-metallic mineral mining
Electric utilities (services)
Chemicals and allied products
Miscellaneous manufacturing
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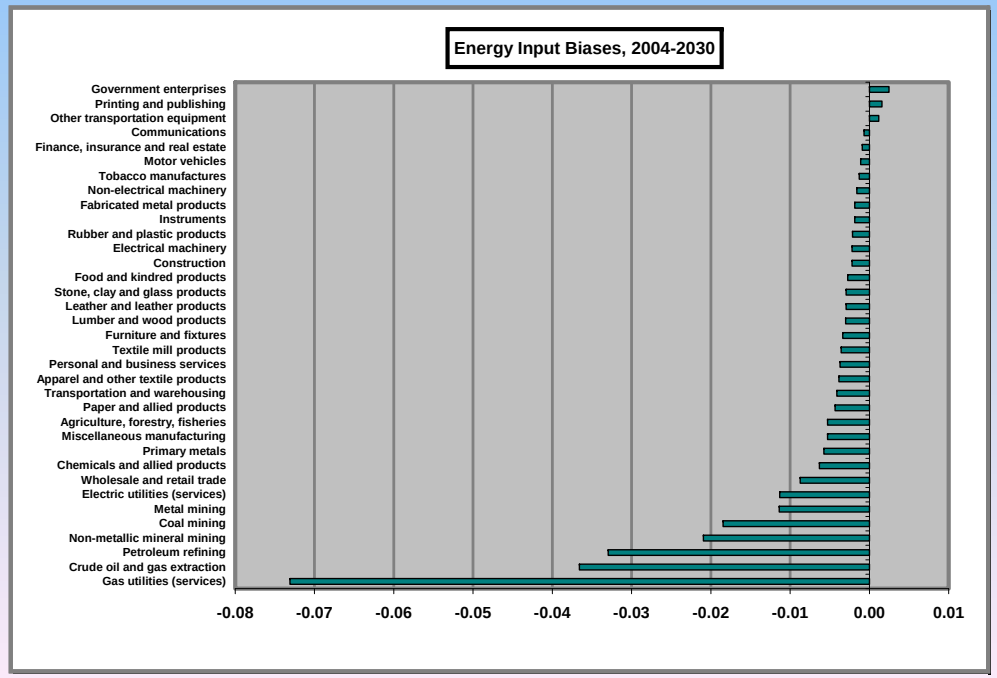
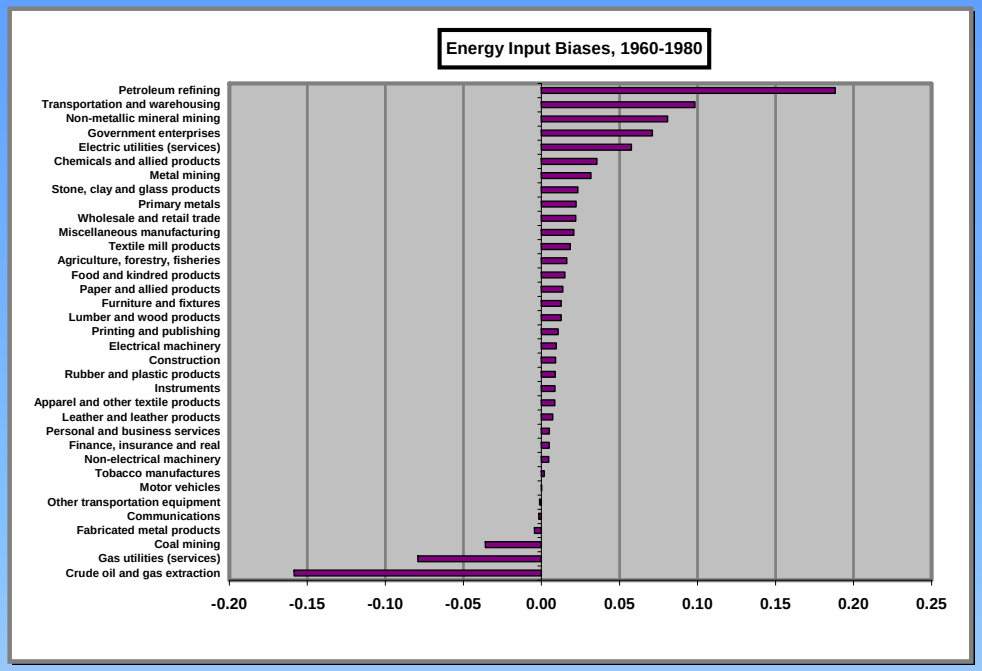
Non-electrical machinery
Tobacco manufactures
Other transportation equipment
Communications
Motor vehicles
Primary metals
Personal and business services
Paper and allied products
Fabricated metal products
Coal mining
Gas utilities (services)
Crude oil and gas extraction
-0.30
-0.20
-0.10
0.00
0.10
0.20
0.30
0.40


Energy Input Biases, 2004-2030
Government enterprises
Printing and publishing
Other transportation equipment
Communications
Finance, insurance and real estate
Motor vehicles
Tobacco manufactures
Non-electrical machinery
Fabricated metal products
Instruments
Rubber and plastic products
Electrical machinery
Construction
Food and kindred products
Stone, clay and glass products
Leather and leather products
Lumber and wood products
Furniture and fixtures
Textile mill products
Personal and business services
Apparel and other textile products
Transportation and warehousing
Paper and allied products
Agriculture, forestry, fisheries
Miscellaneous manufacturing
Primary metals
Chemicals and allied products
Wholesale and retail trade
Electric utilities (services)
Metal mining
Coal mining
Non-metallic mineral mining
Petroleum refining
Crude oil and gas extraction
Gas utilities (services)
-0.08
-0.07
-0.06
-0.05
-0.04
-0.03
-0.02
-0.01
0.00
0.01


Energy Input Biases, 1960-1980
Petroleum refining
Transportation and warehousing
Non-metallic mineral mining
Government enterprises
Electric utilities (services)
Chemicals and allied products
Metal mining
Stone, clay and glass products
Primary metals
Wholesale and retail trade
Miscellaneous manufacturing
Textile mill products
Agriculture, forestry, fisheries
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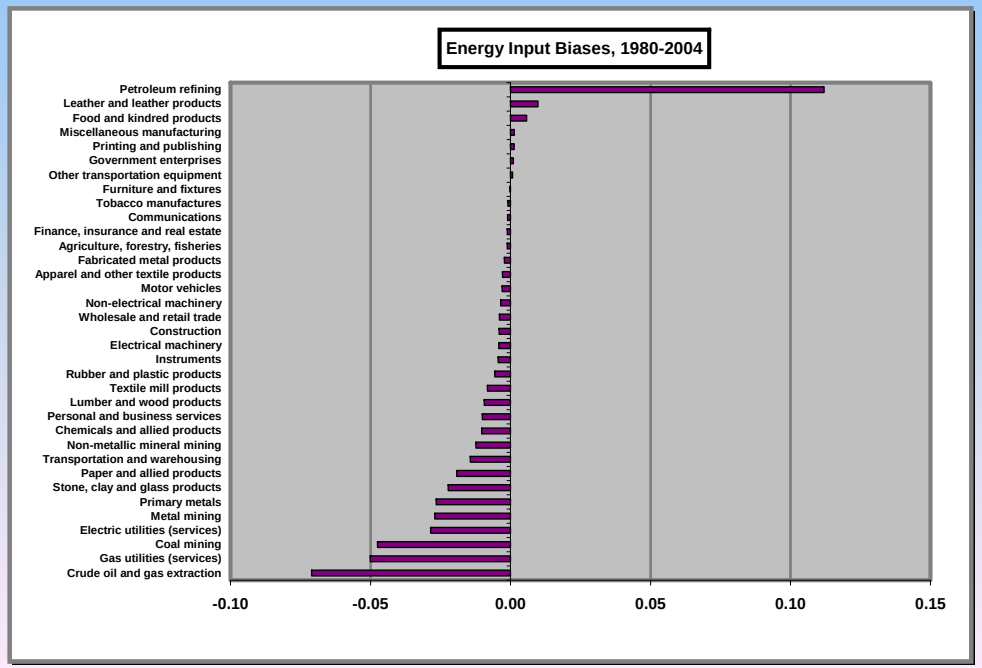
Furniture and fixtures
Lumber and wood products
Printing and publishing
Electrical machinery
Construction
Rubber and plastic products
Instruments
Apparel and other textile products
Leather and leather products
Personal and business services
Finance, insurance and real
Non-electrical machinery
Tobacco manufactures
Motor vehicles
Other transportation equipment
Communications
Fabricated metal products
Coal mining
Gas utilities (services)
Crude oil and gas extraction
-0.20
-0.15
-0.10
-0.05
0.00
0.05
0.10
0.15
0.20
0.25


Energy Input Biases, 1980-2004
Petroleum refining
Leather and leather products
Food and kindred products
Miscellaneous manufacturing
Printing and publishing
Government enterprises
Other transportation equipment
Furniture and fixtures
Tobacco manufactures
Communications
Finance, insurance and real estate
Agriculture, forestry, fisheries
Fabricated metal products
Apparel and other textile products
Motor vehicles
Non-electrical machinery
Wholesale and retail trade
Construction
Electrical machinery
Instruments
Rubber and plastic products
Textile mill products
Lumber and wood products
Personal and business services
Chemicals and allied products
Non-metallic mineral mining
Transportation and warehousing
Paper and allied products
Stone, clay and glass products
Primary metals
Metal mining
Electric utilities (services)
Coal mining
Gas utilities (services)
Crude oil and gas extraction
-0.10
-0.05
0.00
0.05
0.10
0.15

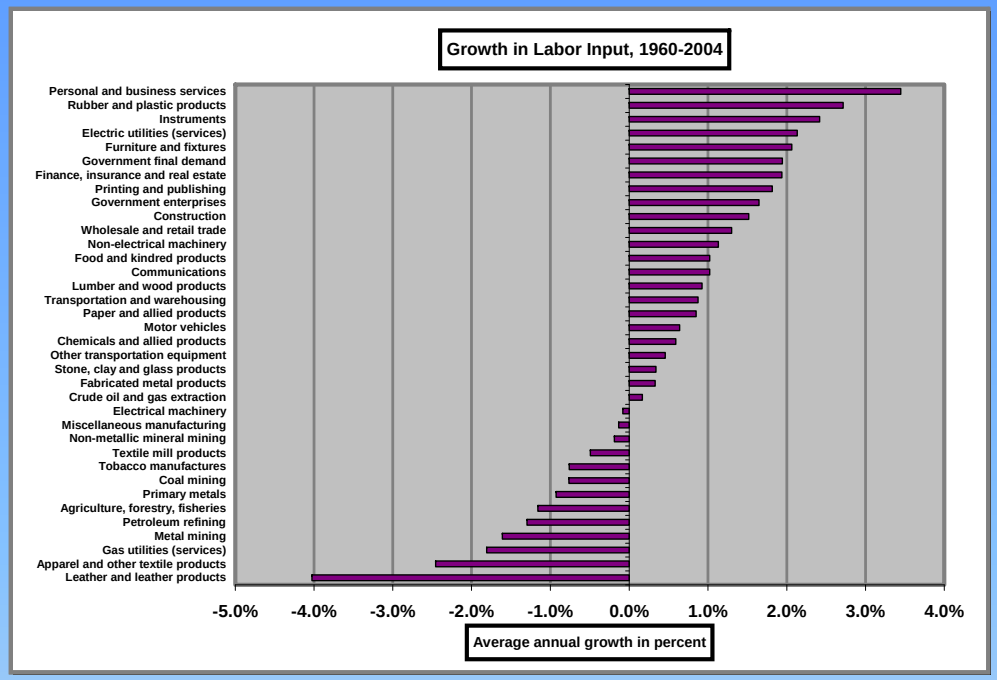
Growth Projections in Detail

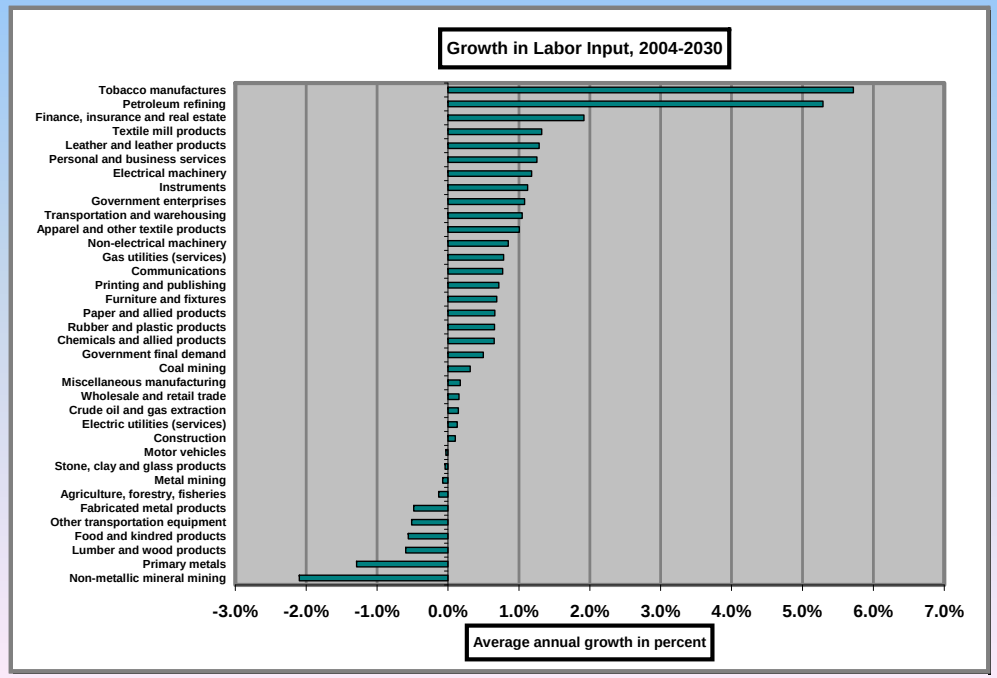
Growth in Labor Input

Growth in Capital Input

Growth in Energy Input

Growth in Output


Growth in Labor Input, 1960-2004
Personal and business services
Rubber and plastic products
Instruments
Electric utilities (services)
Furniture and fixtures
Government final demand
Finance, insurance and real estate
Printing and publishing
Government enterprises
Construction
Wholesale and retail trade
Non-electrical machinery
Food and kindred products
Communications
Lumber and wood products
Transportation and warehousing
Paper and allied products
Motor vehicles
Chemicals and allied products
Other transportation equipment
Stone, clay and glass products
Fabricated metal products
Crude oil and gas extraction
Electrical machinery
Miscellaneous manufacturing
Non-metallic mineral mining
Textile mill products
Tobacco manufactures
Coal mining
Primary metals
Agriculture, forestry, fisheries
Petroleum refining
Metal mining
Gas utilities (services)
Apparel and other textile products
Leather and leather products
-5.0% -4.0% -3.0% -2.0% -1.0% 0.0% 1.0% 2.0% 3.0% 4.0%
Average annual growth in percent


Growth in Labor Input, 2004-2030
Tobacco manufactures
Petroleum refining
Finance, insurance and real estate
Textile mill products
Leather and leather products
Personal and business services
Electrical machinery
Instruments
Government enterprises
Transportation and warehousing
Apparel and other textile products
Non-electrical machinery
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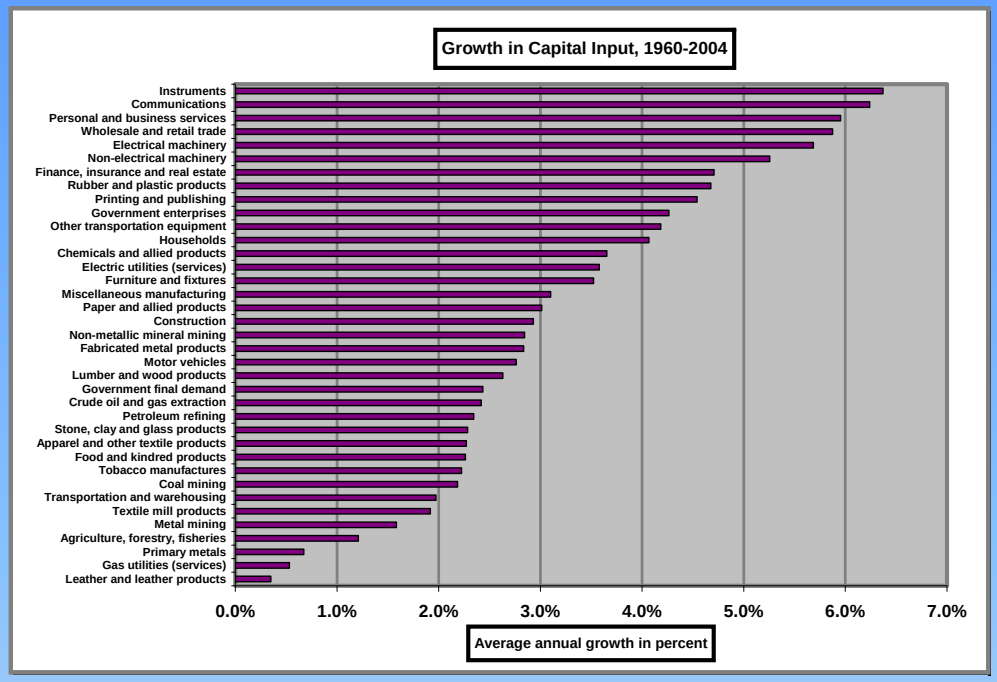
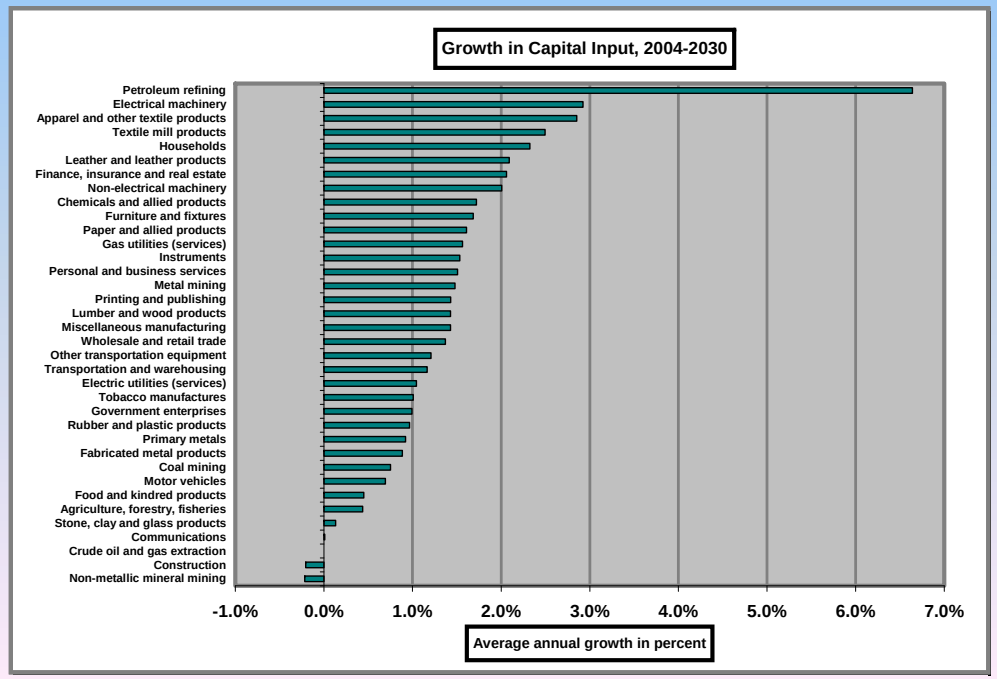
Paper and allied products
Rubber and plastic products
Chemicals and allied products
Government final demand
Coal mining
Miscellaneous manufacturing
Wholesale and retail trade
Crude oil and gas extraction
Electric utilities (services)
Construction
Motor vehicles
Stone, clay and glass products
Metal mining
Agriculture, forestry, fisheries
Fabricated metal products
Other transportation equipment
Food and kindred products
Lumber and wood products
Primary metals
Non-metallic mineral mining
-3.0% -2.0% -1.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0%
Average annual growth in percent


Growth in Capital Input, 1960-2004
Instruments
Communications
Personal and business services
Wholesale and retail trade
Electrical machinery
Non-electrical machinery
Finance, insurance and real estate
Rubber and plastic products
Printing and publishing
Government enterprises
Other transportation equipment
Households
Chemicals and allied products
Electric utilities (services)
Furniture and fixtures
Miscellaneous manufacturing
Paper and allied products
Construction
Non-metallic mineral mining
Fabricated metal products
Motor vehicles
Lumber and wood products
Government final demand
Crude oil and gas extraction
Petroleum refining
Stone, clay and glass products
Apparel and other textile products
Food and kindred products
Tobacco manufactures
Coal mining
Transportation and warehousing
Textile mill products
Metal mining
Agriculture, forestry, fisheries
Primary metals
Gas utilities (services)
Leather and leather products
0.0%
1.0%
2.0%
3.0%
4.0%
5.0%
6.0%
7.0%
Average annual growth in percent


Growth in Capital Input, 2004-2030
Petroleum refining
Electrical machinery
Apparel and other textile products
Textile mill products
Households
Leather and leather products
Finance, insurance and real estate
Non-electrical machinery
Chemicals and allied products
Furniture and fixtures
Paper and allied products
Gas utilities (services)
Instruments
Personal and business services
Metal mining
Printing and publishing
Lumber and wood products
Miscellaneous manufacturing
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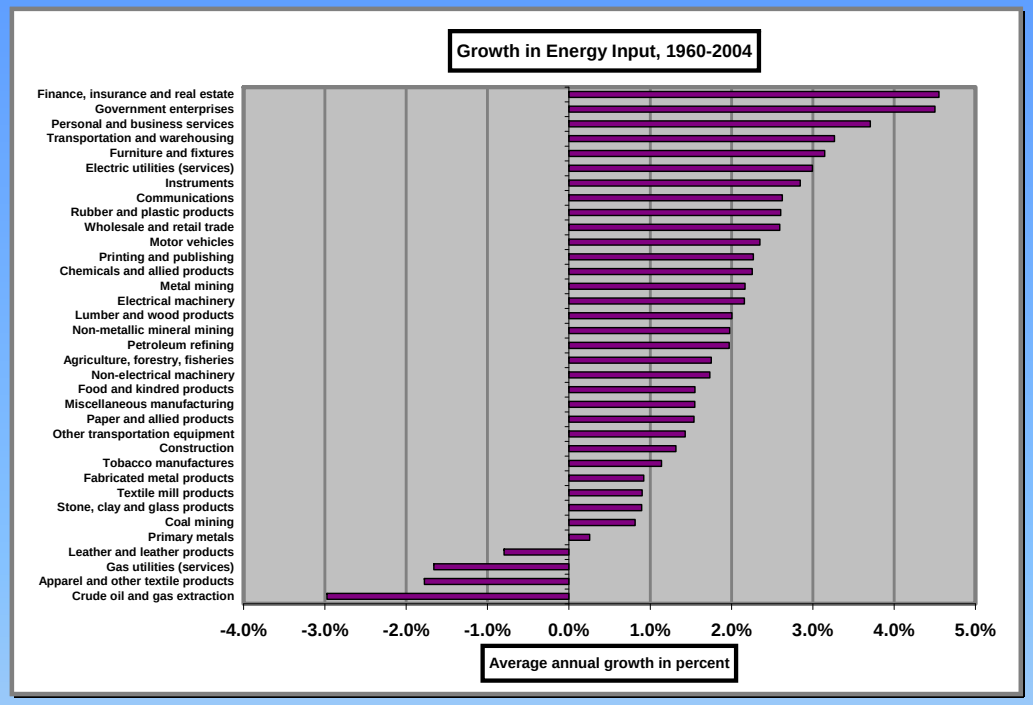
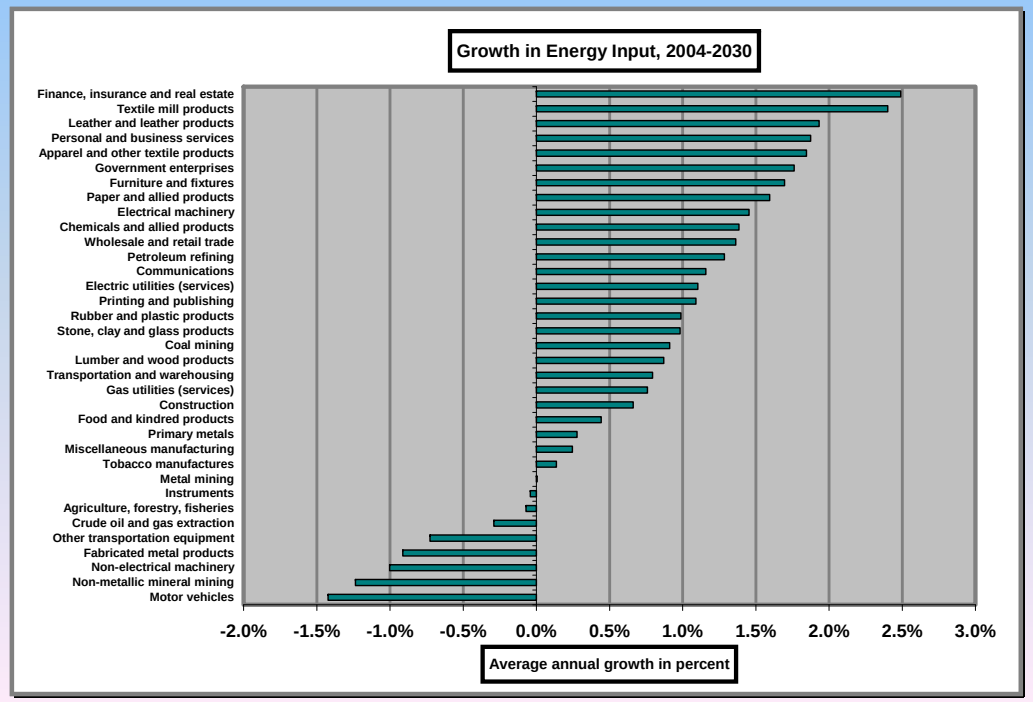
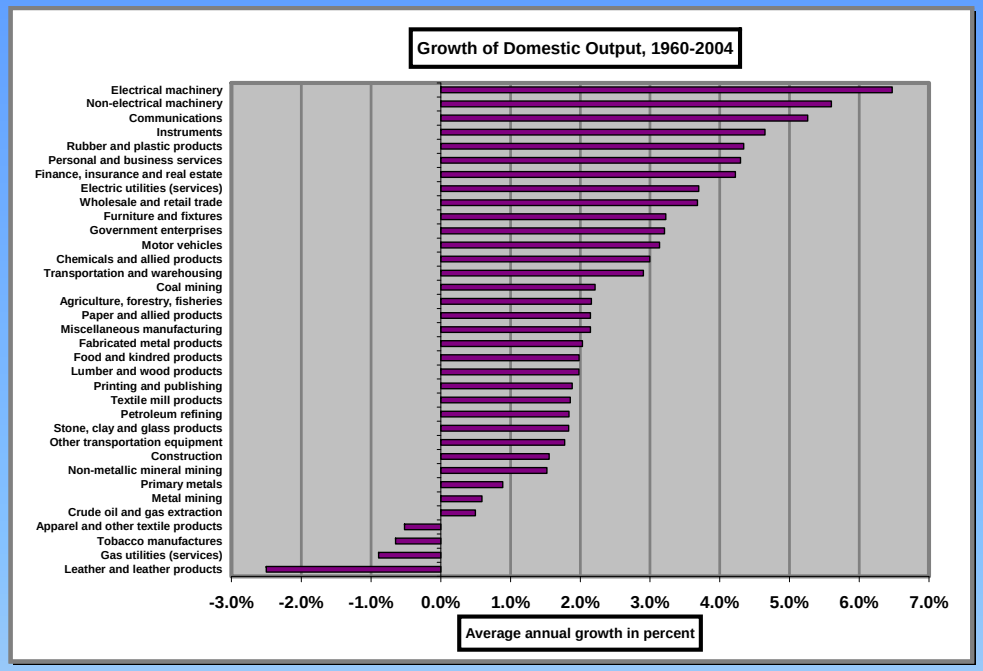
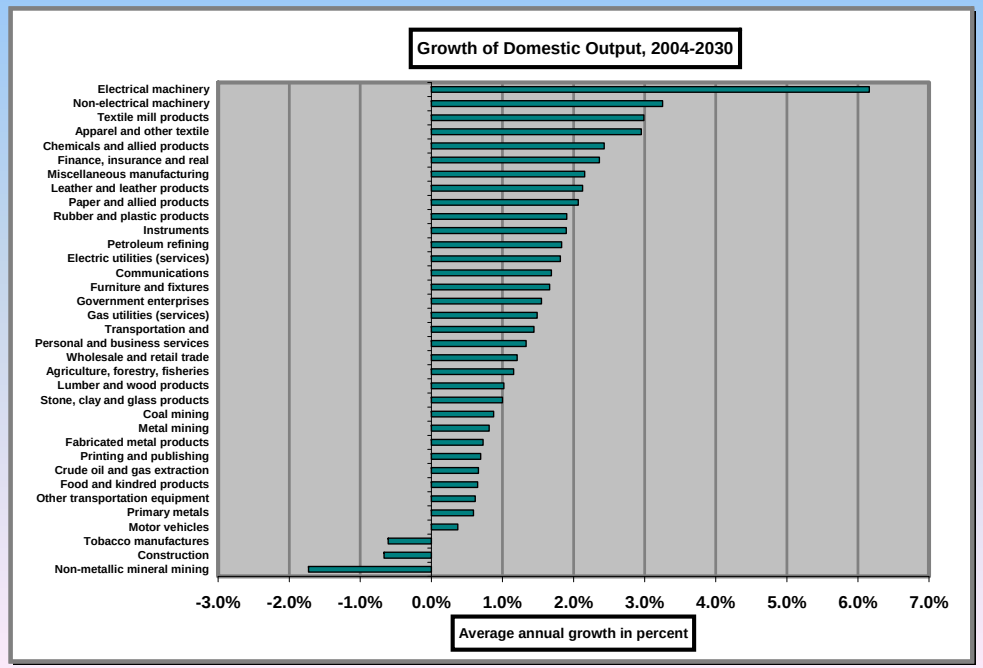
Coal mining
Motor vehicles
Food and kindred products
Agriculture, forestry, fisheries
Stone, clay and glass products
Communications
Crude oil and gas extraction
Construction
Non-metallic mineral mining
-1.0%
0.0%
1.0%
2.0%
3.0%
4.0%
5.0%
6.0%
7.0%
Average annual growth in percent


Growth in Energy Input, 1960-2004
Finance, insurance and real estate
Government enterprises
Personal and business services
Transportation and warehousing
Furniture and fixtures
Electric utilities (services)
Instruments
Communications
Rubber and plastic products
Wholesale and retail trade
Motor vehicles
Printing and publishing
Chemicals and allied products
Metal mining
Electrical machinery
Lumber and wood products
Non-metallic mineral mining
Petroleum refining
Agriculture, forestry, fisheries
Non-electrical machinery
Food and kindred products
Miscellaneous manufacturing
Paper and allied products
Other transportation equipment
Construction
Tobacco manufactures
Fabricated metal products
Textile mill products
Stone, clay and glass products
Coal mining
Primary metals
Leather and leather products
Gas utilities (services)
Apparel and other textile products
Crude oil and gas extraction
-4.0% -3.0% -2.0% -1.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0%
Average annual growth in percent


Growth in Energy Input, 2004-2030
Finance, insurance and real estate
Textile mill products
Leather and leather products
Personal and business services
Apparel and other textile products
Government enterprises
Furniture and fixtures
Paper and allied products
Electrical machinery
Chemicals and allied products
Wholesale and retail trade
Petroleum refining
Communications
Electric utilities (services)
Printing and publishing
Rubber and plastic products
Stone, clay and glass products
Coal mining
Lumber and wood products
Transportation and warehousing
Gas utilities (services)
Construction
Food and kindred products
Primary metals
Miscellaneous manufacturing
Tobacco manufactures
Metal mining
Instruments
Agriculture, forestry, fisheries
Crude oil and gas extraction
Other transportation equipment
Fabricated metal products
Non-electrical machinery
Non-metallic mineral mining
Motor vehicles
-2.0% -1.5% -1.0% -0.5% 0.0% 0.5% 1.0% 1.5% 2.0% 2.5% 3.0%
Average annual growth in percent


Growth of Domestic Output, 1960-2004
Electrical machinery
Non-electrical machinery
Communications
Instruments
Rubber and plastic products
Personal and business services
Finance, insurance and real estate
Electric utilities (services)
Wholesale and retail trade
Furniture and fixtures
Government enterprises
Motor vehicles
Chemicals and allied products
Transportation and warehousing
Coal mining
Agriculture, forestry, fisheries
Paper and allied products
Miscellaneous manufacturing
Fabricated metal products
Food and kindred products
Lumber and wood products
Printing and publishing
Textile mill products
Petroleum refining
Stone, clay and glass products
Other transportation equipment
Construction
Non-metallic mineral mining
Primary metals
Metal mining
Crude oil and gas extraction
Apparel and other textile products
Tobacco manufactures
Gas utilities (services)
Leather and leather products
-3.0% -2.0% -1.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0%
Average annual growth in percent


Growth of Domestic Output, 2004-2030
Electrical machinery
Non-electrical machinery
Textile mill products
Apparel and other textile
Chemicals and allied products
Finance, insurance and real
Miscellaneous manufacturing
Leather and leather products
Paper and allied products
Rubber and plastic products
Instruments
Petroleum refining
Electric utilities (services)
Communications
Furniture and fixtures
Government enterprises
Gas utilities (services)
Transportation and
Personal and business services
Wholesale and retail trade
Agriculture, forestry, fisheries
Lumber and wood products
Stone, clay and glass products
Coal mining
Metal mining
Fabricated metal products
Printing and publishing
Crude oil and gas extraction
Food and kindred products
Other transportation equipment
Primary metals
Motor vehicles
Tobacco manufactures
Construction
Non-metallic mineral mining
-3.0% -2.0% -1.0% 0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0%
Average annual growth in percent

Energy Projections in Detail

Foreign Dependency on Fossil Fuels

Greenhouse Gas and Carbon Dioxide Emissions

Emissions/GDP Ratios

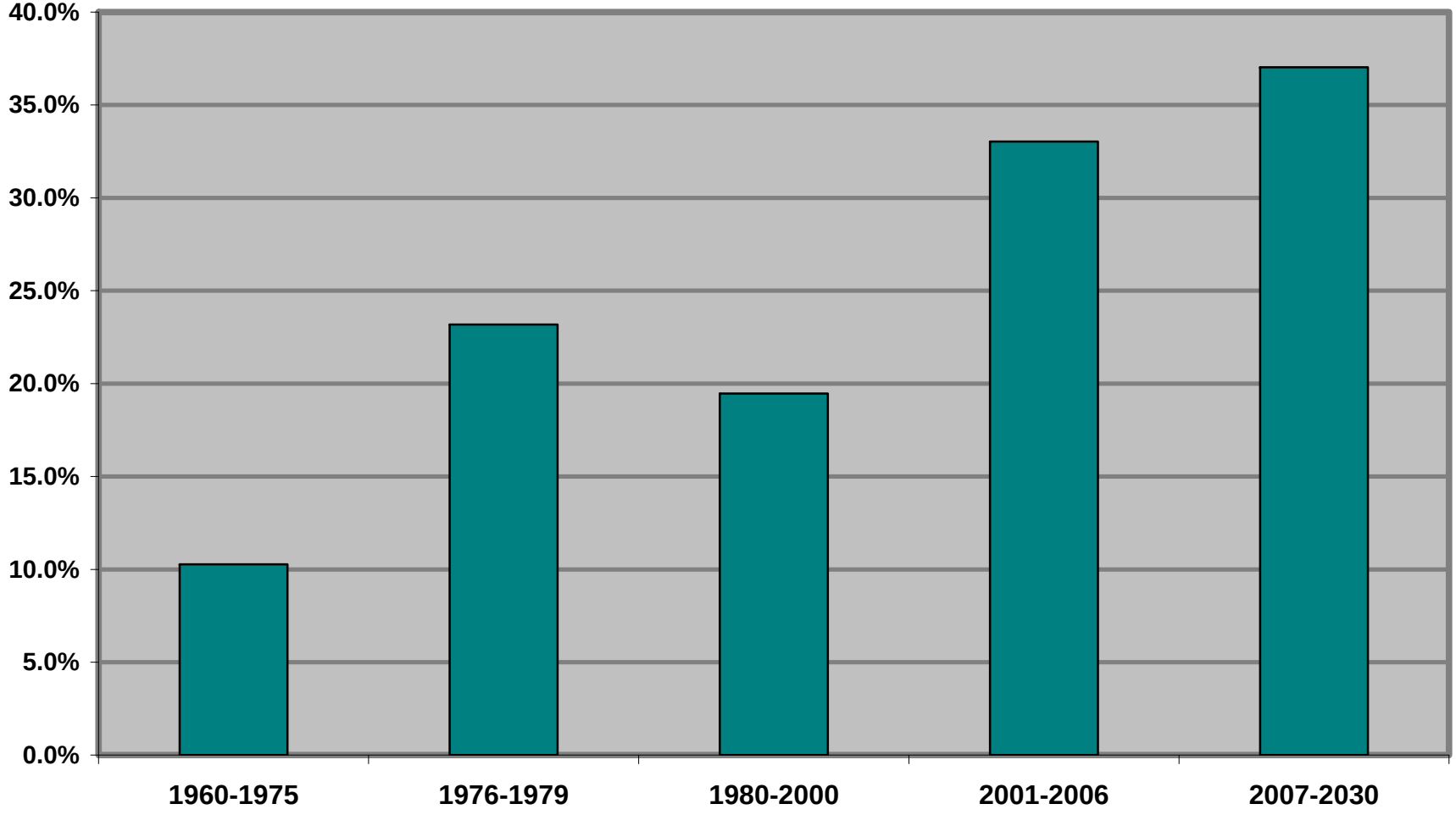
Fossil Fuel Consumption

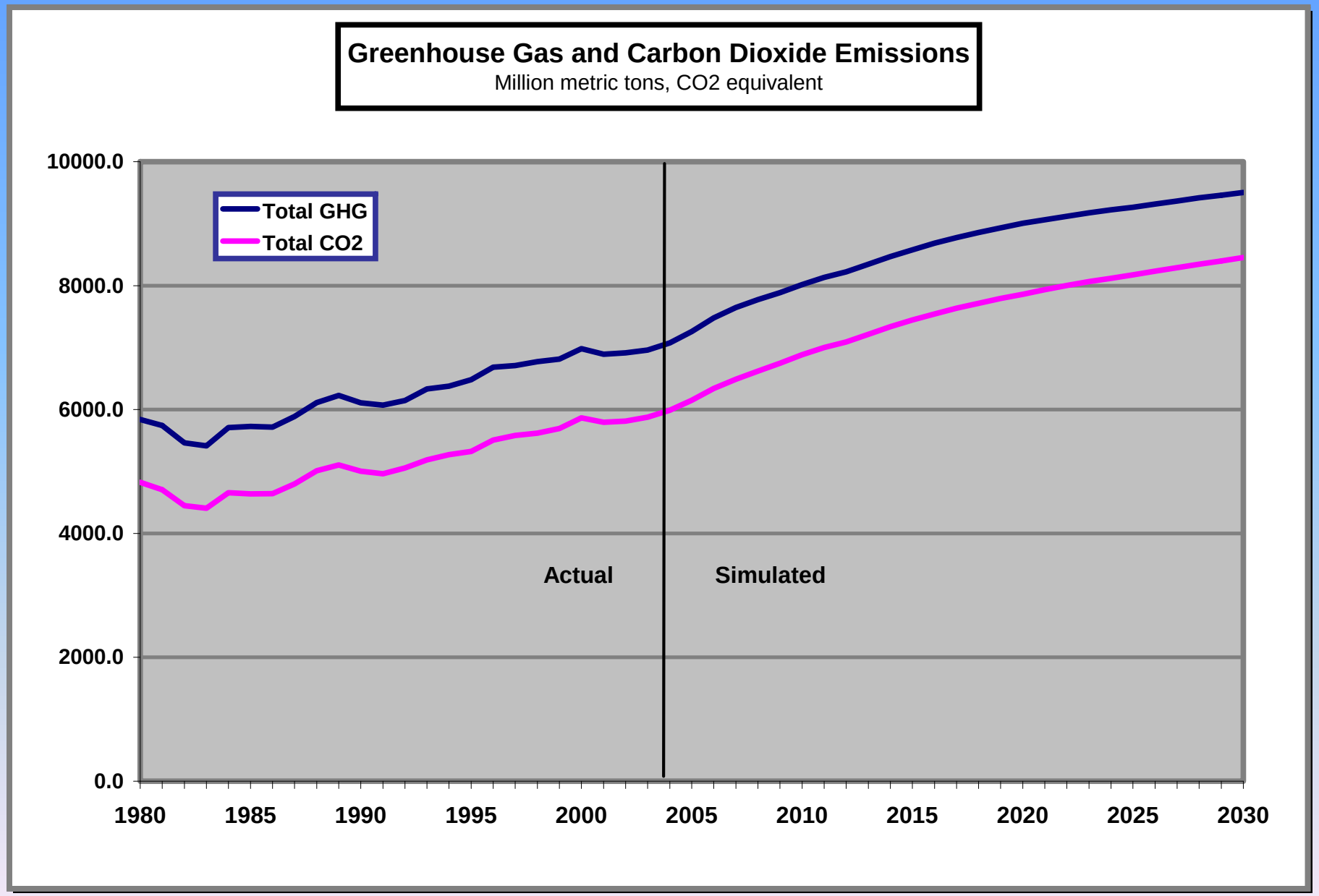
Domestic Energy Production

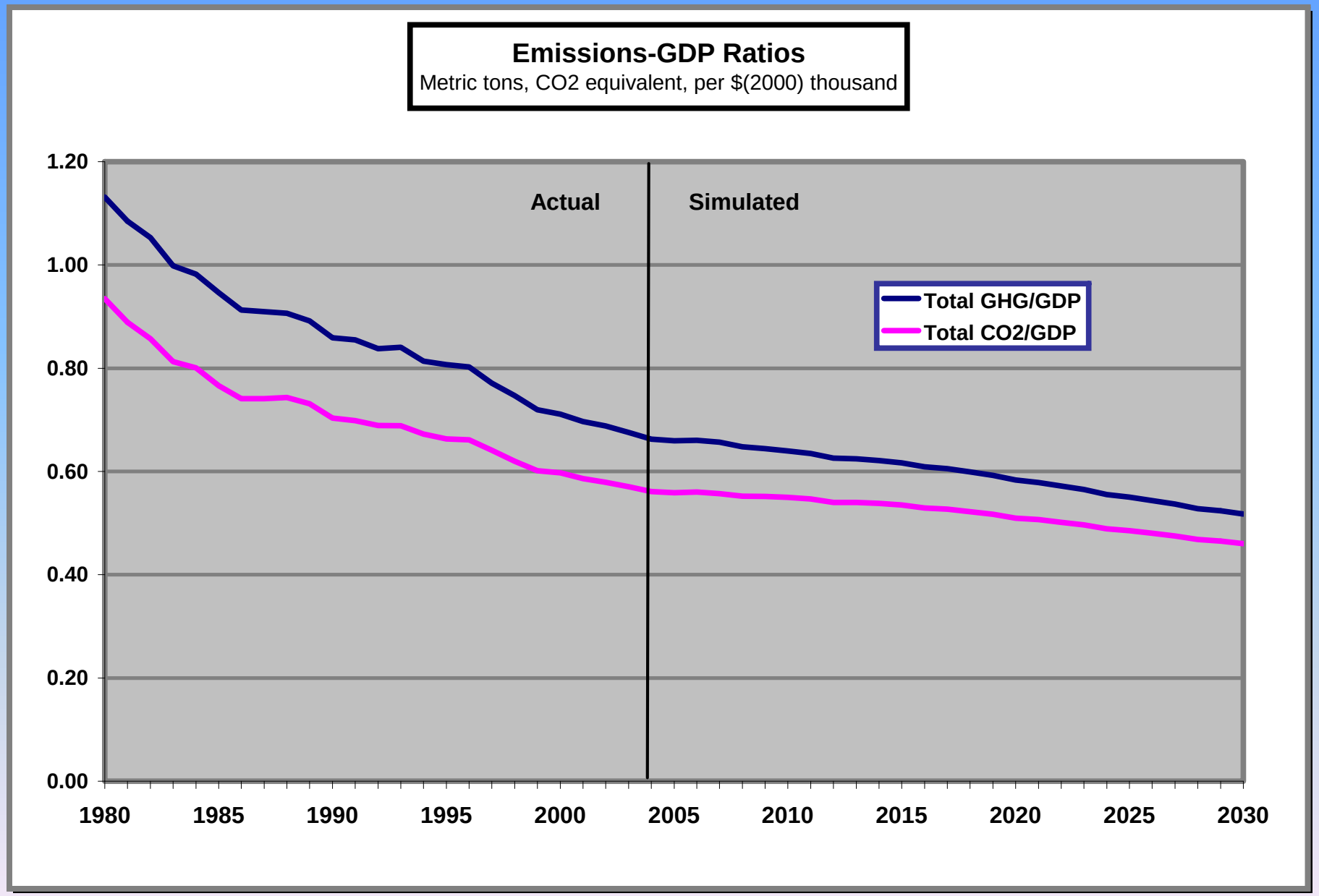
Fossil Fuel/ and Electricity/GDP Ratios

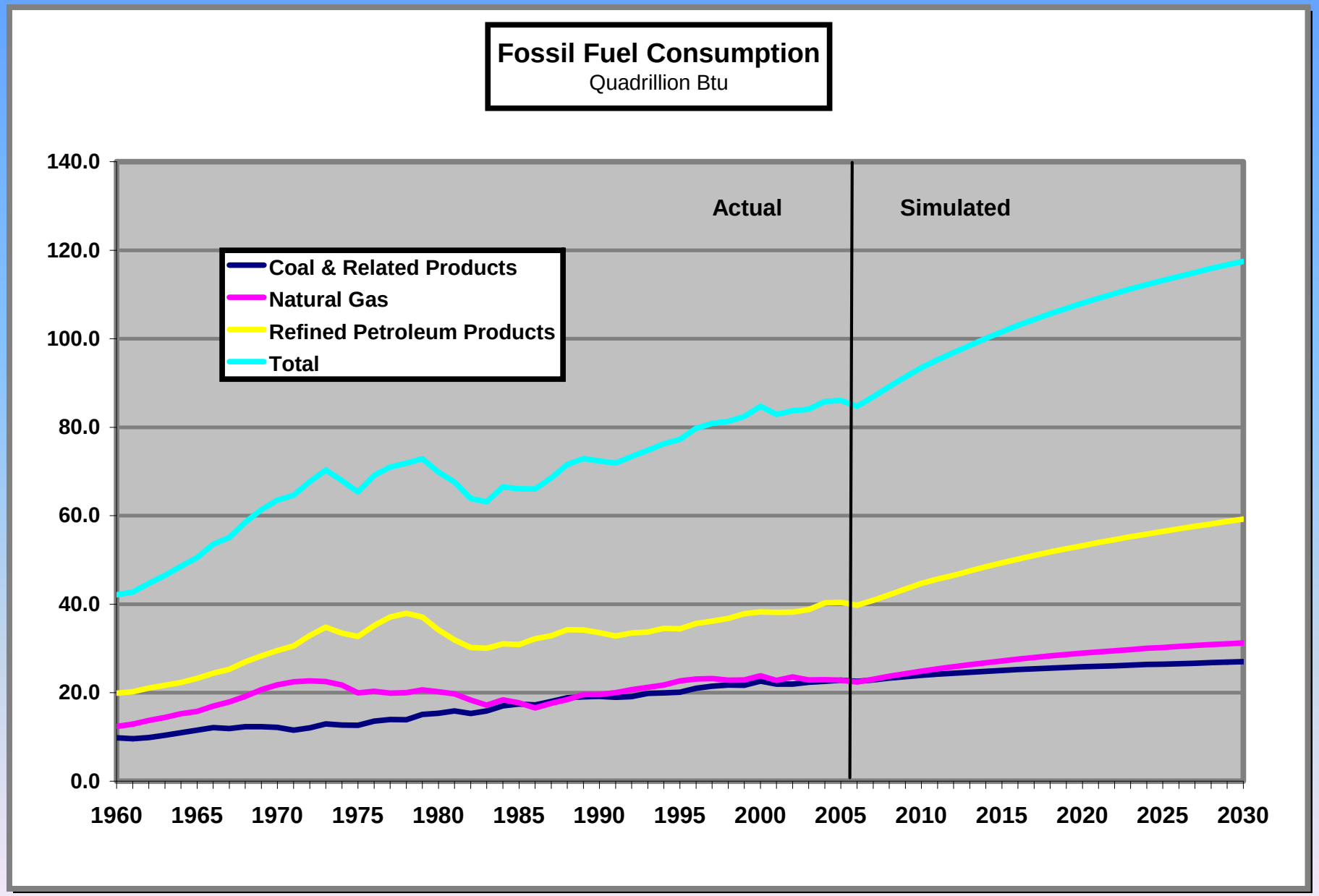
Foreign Dependency on Fossil Fuels

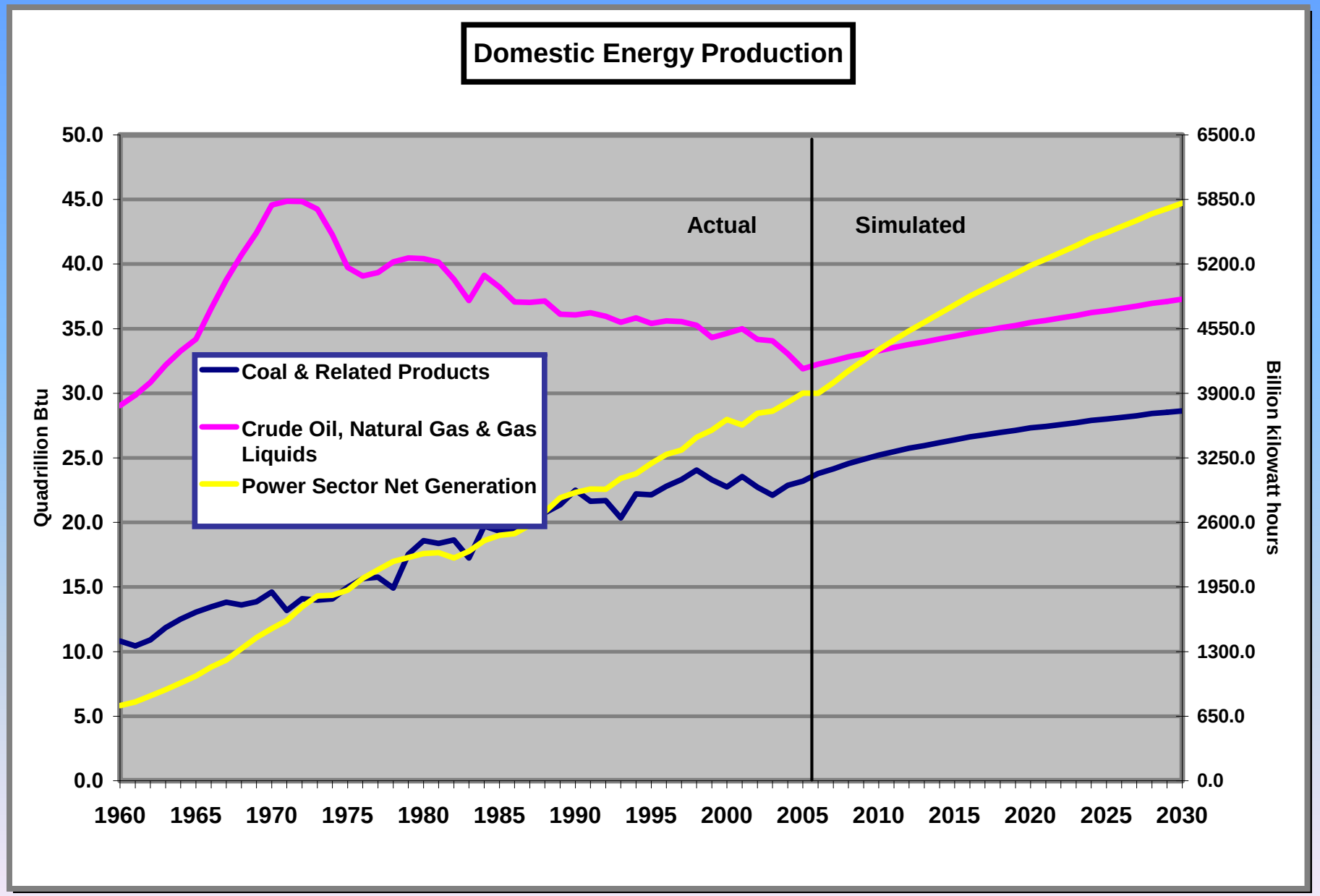
Net imports of coal, oil and gas as a percent of total domestic use

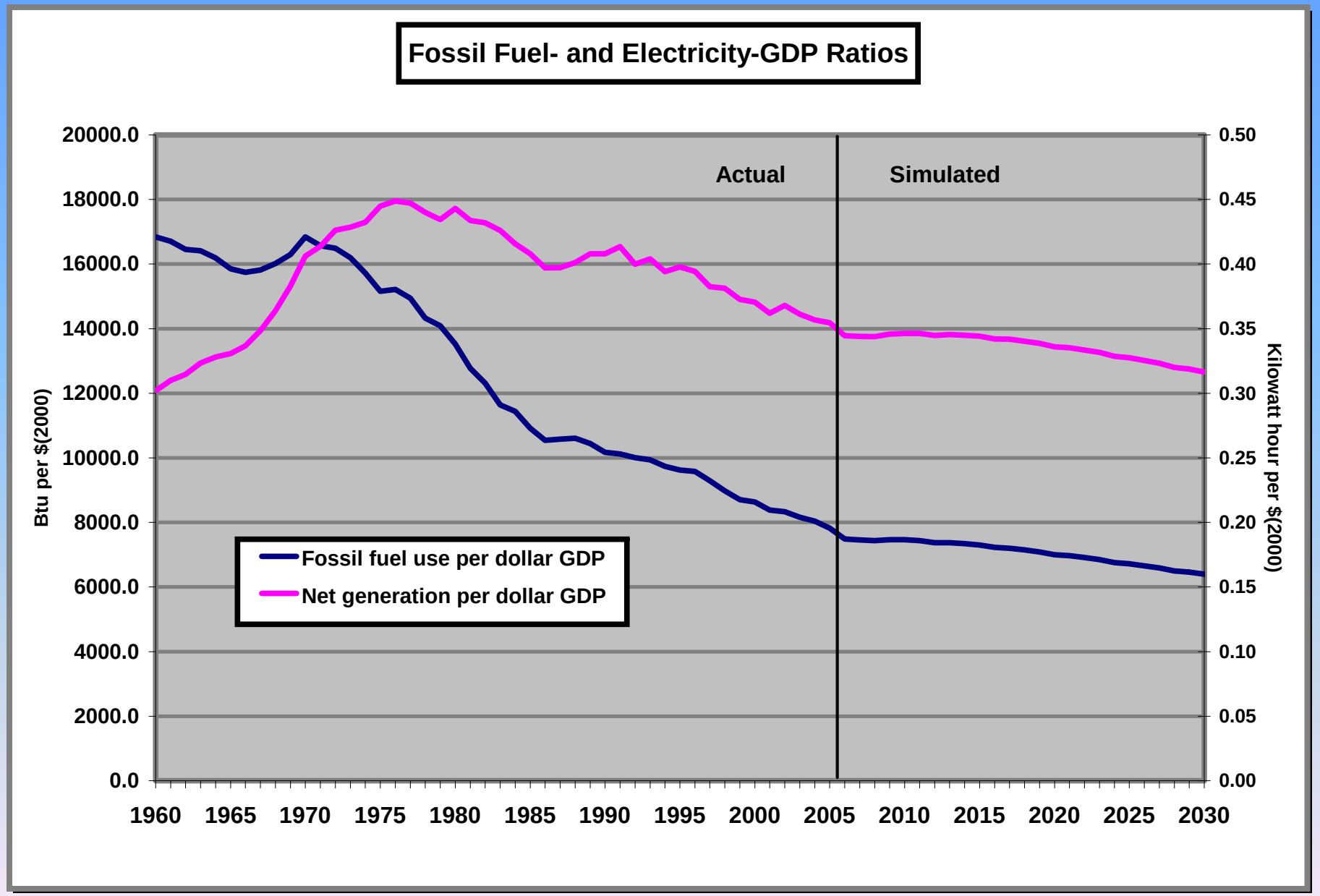



Greenhouse Gas and Carbon Dioxide Emissions
Million metric tons, CO2 equivalent
Total GHG
Total CO2
Actual
Simulated
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


Emissions-GDP Ratios
Metric tons, CO2 equivalent, per $(2000) thousand
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Actual
Simulated
Total GHG/GDP
Total CO2/GDP
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


Fossil Fuel Consumption
Quadrillion Btu
Actual
Simulated
Coal & Related Products
Natural Gas
Refined Petroleum Products
Total
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


Domestic Energy Production
Actual
Simulated
Coal & Related Products
Crude Oil, Natural Gas & Gas Liquids
Power Sector Net Generation
Quadrillion Btu
Billion kilowatt hours
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6500.0
5850.0
5200.0
4550.0
3900.0
3250.0
2600.0
1950.0
1300.0
650.0
0.0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


Fossil Fuel- and Electricity-GDP Ratios
Actual
Simulated
Fossil fuel use per dollar GDP
Net generation per dollar GDP
Btu per $(2000)
Kilowatt hour per $(2000)
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030

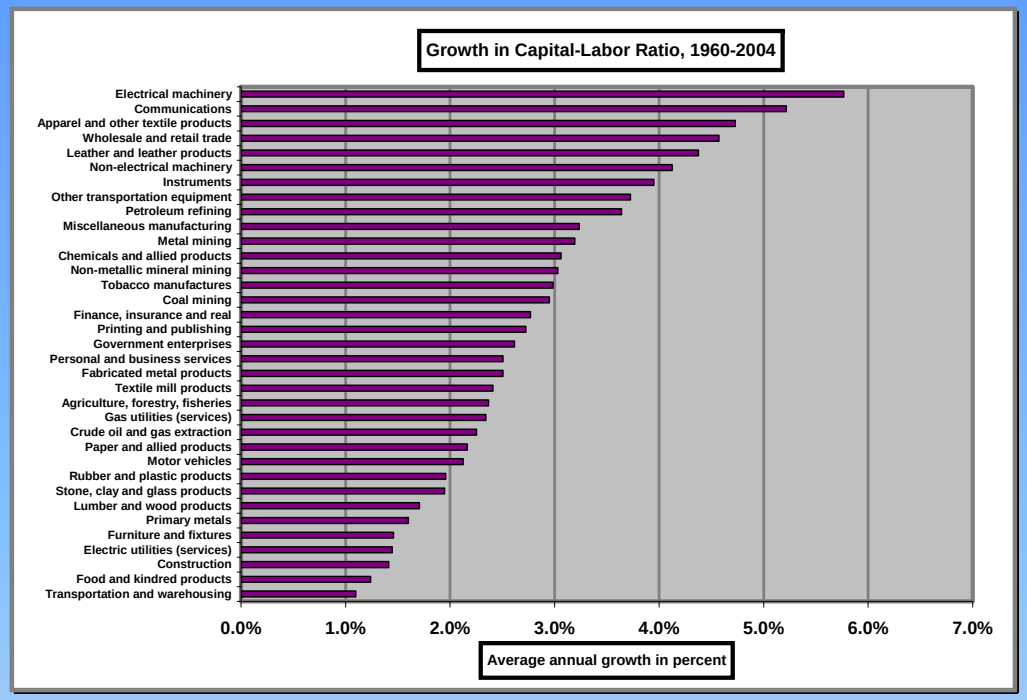
Summary and Conclusions

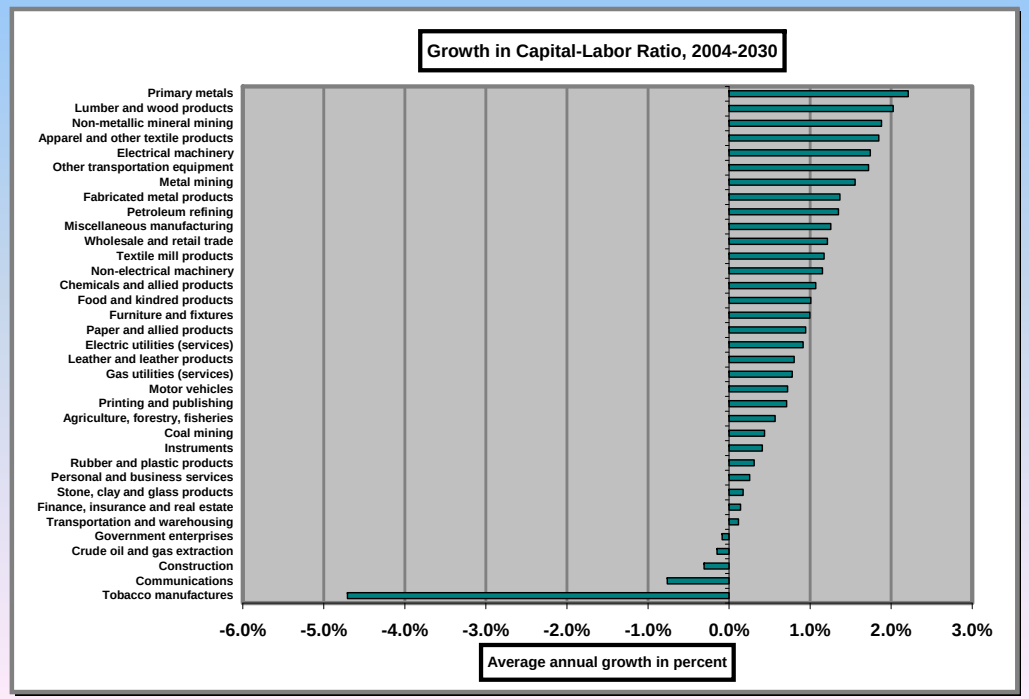
Potential Growth Will Be Slowing

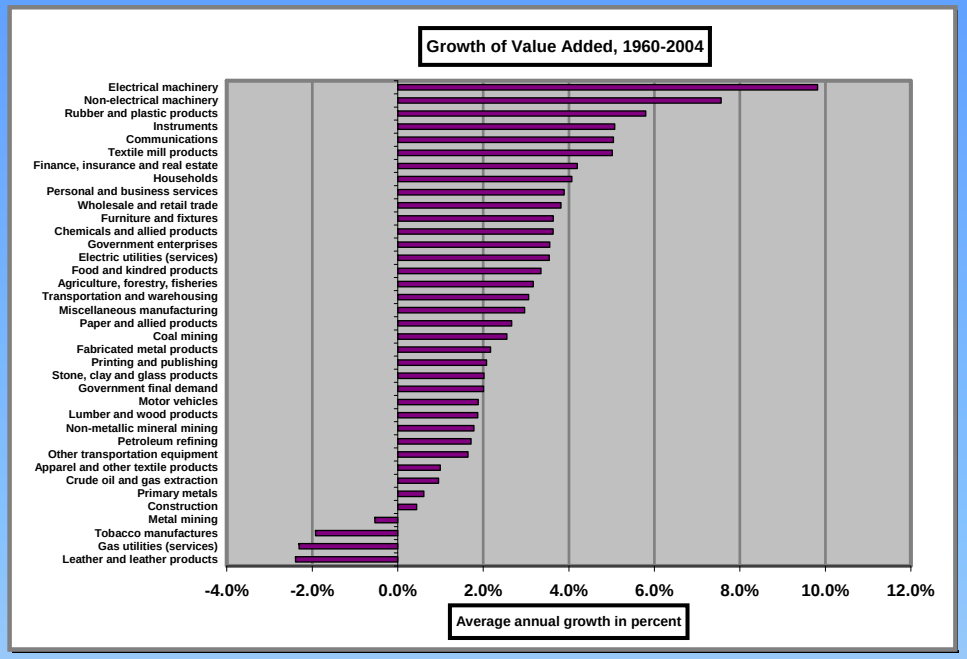
Productivity Growth Will Be Robust

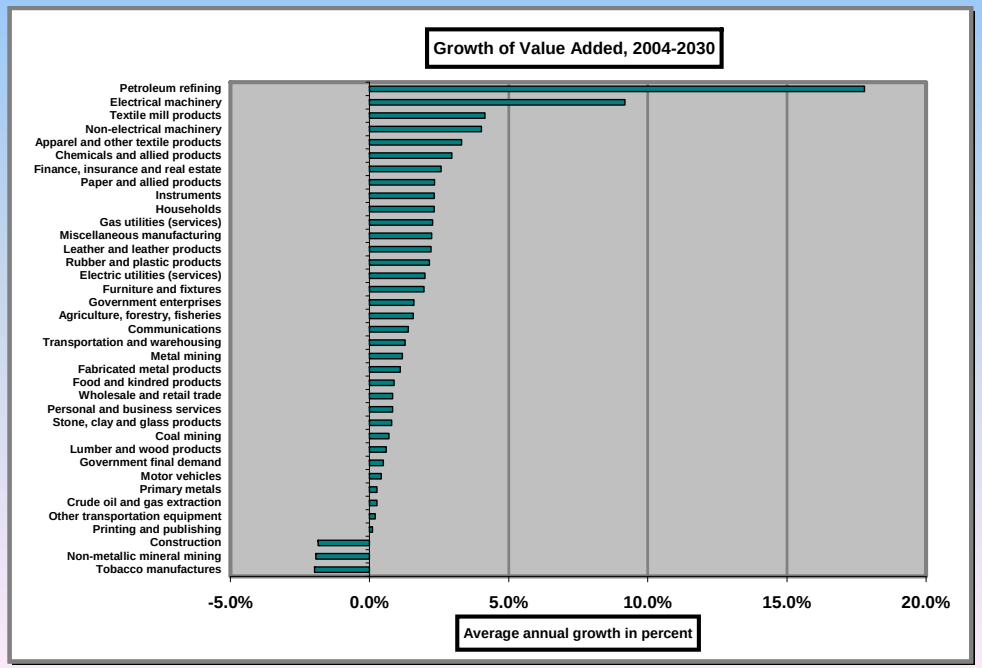
Energy/ and Emissions/GDP Ratios Will Decline

Foreign Dependency on Fossil Fuels Will Rise


Growth in Capital-Labor Ratio, 1960-2004
Electrical machinery
Communications
Apparel and other textile products
Wholesale and retail trade
Leather and leather products
Non-electrical machinery
Instruments
Other transportation equipment
Petroleum refining
Miscellaneous manufacturing
Metal mining
Chemicals and allied products
Non-metallic mineral mining
Tobacco manufactures
Coal mining
Finance, insurance and real
Printing and publishing
Government enterprises
Personal and business services
Fabricated metal products
Textile mill products
Agriculture, forestry, fisheries
Gas utilities (services)
Crude oil and gas extraction
Paper and allied products
Motor vehicles
Rubber and plastic products
Stone, clay and glass products
Lumber and wood products
Primary metals
Furniture and fixtures
Electric utilities (services)
Construction
Food and kindred products
Transportation and warehousing
0.0%
1.0%
2.0%
3.0%
4.0%
5.0%
6.0%
7.0%
Average annual growth in percent


Growth in Capital-Labor Ratio, 2004-2030
Primary metals
Lumber and wood products
Non-metallic mineral mining
Apparel and other textile products
Electrical machinery
Other transportation equipment
Metal mining
Fabricated metal products
Petroleum refining
Miscellaneous manufacturing
Wholesale and retail trade
Textile mill products
Non-electrical machinery
Chemicals and allied products
Food and kindred products
Furniture and fixtures
Paper and allied products
Electric utilities (services)
Leather and leather products
Gas utilities (services)
Motor vehicles
Printing and publishing
Agriculture, forestry, fisheries
Coal mining
Instruments
Rubber and plastic products
Personal and business services
Stone, clay and glass products
Finance, insurance and real estate
Transportation and warehousing
Government enterprises
Crude oil and gas extraction
Construction
Communications
Tobacco manufactures
-6.0%
-5.0%
-4.0%
-3.0%
-2.0%
-1.0%
0.0%
1.0%
2.0%
3.0%
Average annual growth in percent


Growth of Value Added, 1960-2004
Electrical machinery
Non-electrical machinery
Rubber and plastic products
Instruments
Communications
Textile mill products
Finance, insurance and real estate
Households
Personal and business services
Wholesale and retail trade
Furniture and fixtures
Chemicals and allied products
Government enterprises
Electric utilities (services)
Food and kindred products
Agriculture, forestry, fisheries
Transportation and warehousing
Miscellaneous manufacturing
Paper and allied products
Coal mining
Fabricated metal products
Printing and publishing
Stone, clay and glass products
Government final demand
Motor vehicles
Lumber and wood products
Non-metallic mineral mining
Petroleum refining
Other transportation equipment
Apparel and other textile products
Crude oil and gas extraction
Primary metals
Construction
Metal mining
Tobacco manufactures
Gas utilities (services)
Leather and leather products
-4.0%
-2.0%
0.0%
2.0%
4.0%
6.0%
8.0%
10.0%
12.0%
Average annual growth in percent


Growth of Value Added, 2004-2030
Petroleum refining
Electrical machinery
Textile mill products
Non-electrical machinery
Apparel and other textile products
Chemicals and allied products
Finance, insurance and real estate
Paper and allied products
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Fabricated metal products
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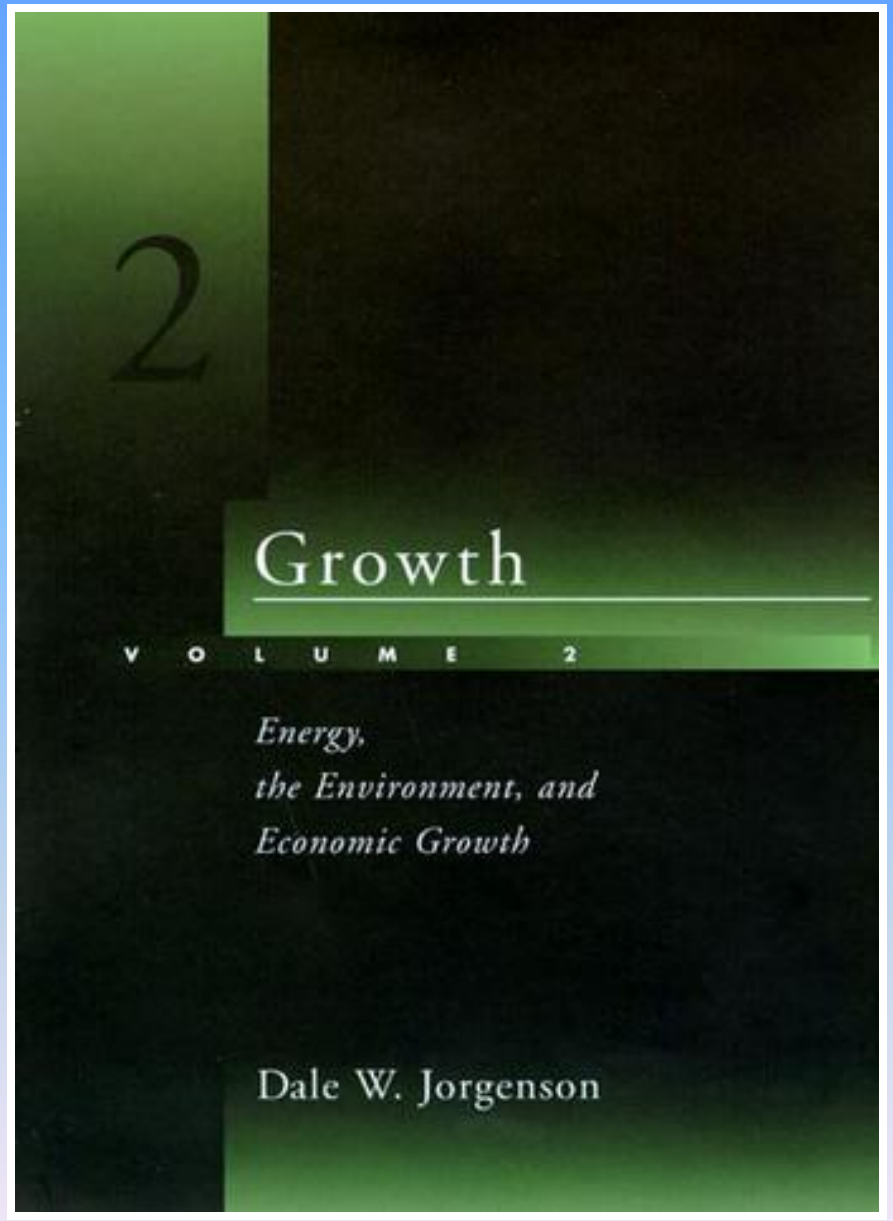
Wholesale and retail trade
Personal and business services
Stone, clay and glass products
Coal mining
Lumber and wood products
Government final demand
Motor vehicles
Primary metals
Crude oil and gas extraction
Other transportation equipment
Printing and publishing
Construction
Non-metallic mineral mining
Tobacco manufactures
-5.0%
0.0%
5.0%
10.0%
15.0%
20.0%
Average annual growth in percent


2
Growth
VOLUME 2
Energy,
the Environment, and
Economic Growth
Dale W. Jorgenson