U.S. Economic Outlook (Short and Long term)

Regional Modeling and Forecasting

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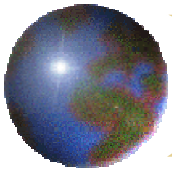
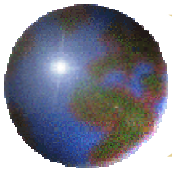


Inforum

- Founded by Clopper Almon in 1967, Inforum stands for Interindustry Forecasting at the University of Maryland. Research Center within the Department of Economics.
- Builds and uses structural economic models of U.S. and other economies. We pioneered the construction of dynamic, interindustry, macroeconomic models which portray the economy in a unique “bottom-up” fashion.
- Works with government and private sector organizations to investigate a variety of issues. Recent issues include energy, homeland security, immigration, and health care.
- Economic projections and analysis using Inforum econometric models distinguished by detail at industrial and product level.
- Inforum serves as a training crucible for University of Maryland graduate students. Students receive valuable training in empirical economics and find fertile ground for dissertation research.
- Inforum maintains active ties with a world-wide network of research associates, each of which uses Inforum modeling methods and software.



Inforum Interindustry-Macroeconomic (IM) Models

- Combine input-output structure with econometric equations in a dynamic and detailed framework.
- Like a CGE: Contains detailed industry structure and *bottom-up* accounting.
- Like an (macro) econometric or VAR model: Parameters estimated from actual data. Portray dynamic evolution of economies over actual time periods.
- Lift (Long-term interindustry forecasting tool) is 97 sector flagship model. Under continuous development and use for over 30 years.
- Iliad - detailed 360 sectors.
- International System: BTM bilateral trade model, IM models for all major trade partners including China.

LIFT*: Inforum's Model of the U.S. Economy*

LIFT stands for **L**ong-term **I**nterindustry **F**orecasting **T**ool.

LIFT is an interindustry-macro (IM) model.

- **Sectoral detail** for production, prices jobs, consumer spending, foreign trade and factor income (wages, profits, depreciation, etc).

- **Macrovariables**. Many, such as GDP, net exports, the unemployment rate, and the aggregate price level are aggregates of the underlying industry forecasts. Other macrovariables such as the savings rate and interest rates, complete the model.

LIFT is particularly useful in addressing questions involving interactions between industries, as well as the interplay between industry and macroeconomic relationships.

The LIFT Philosophy

Bottom-up

Aggregates are summations of detailed industry results.

Consistent

The NIPA and IO frameworks ensure consistency. The patterns of expenditures by industry affect employment by industry. Prices reflect unit costs of materials, labor and other factor income (profits, depreciation, indirect taxes, etc.)

Econometric Relationships

LIFT is based on empirically estimated relationships, using detailed historical data, based on long time-series.

Dynamic

LIFT models economy year by year. The time path of response is important. Many equations use distributed lags, so effects of shocks build up and decay over time. Input-output coefficients change over time, in response to estimated trends or exogenous assumptions.

Recent Studies Using LIFT/ILIAD

Economic Impact of Energy Policies – Securing America's Future Energy (SAFE)
Sustainability of Long-term Projections - Centers for Medicare and Medicaid Services
Impact of Port Closures – Applied Physics Lab, JHU
Immigration Impacts on U.S. Economy– U.S. Department of Commerce
Impact of U.S. Port Closures on U.S. and Asian Economies – Booz-Allen Hamiliton
Industrial, Regional & Occupational Impacts of Defense - Department of Defense
Impact of High Oil and Natural Gas Prices – Department of Commerce (ESA)
Enhanced Medical Insurance Coverage – MITRE Corporation
Impact of Container Trade Interruptions - CBO
Impact of Currency Fluctuations – Department of Commerce (ITA)
Static & Dynamic Effects of Trade Liberalization – Manufacturers Alliance
The Digital Economy 2000/2005 - Department of Commerce (ESA)
Impact of Asian Crisis on the U.S. Industries - Manufacturers Alliance
Local Impacts of Electricity Deregulation – NRECA
China in the WTO - U.S. Government
Clean Energy and Jobs - Center for a Sustainable Economy

Economic Outlook

- Short-term recession risks are very high:
  - Subprime financial crisis leads to very serious credit rationing.
  - Large fall in housing prices, equity values hit consumer spending.
  - Credit crunch, high energy prices, housing contraction, falling home prices, contributes to slow year, perhaps a recession.
  - Inflations ticks upward (energy, food, dollar).
  - Capital outflow?
  - Exports remain buoyant.

- Long term trends will be shaped with new realities:
  - Lower labor force growth slows potential growth.
  - Growth is underpinned by strong productivity growth.
  - After near-term improvement, federal deficit increases by 2020.

- Does short-term problems signal a fundamental change in trends?
  - Weaker dollar, rising savings rate changes economic structure toward exports and away from consumption.

The Short Run Overview

2008 will be another year of slow (1.5%) growth:

- Subprime lending mess is not resolved.
- Residential investment will contract again (by a lot).
- House prices are falling underming consumer net worth. Equity prices could also take a big hit.
- A large number ARMs resets, lending standards are higher.

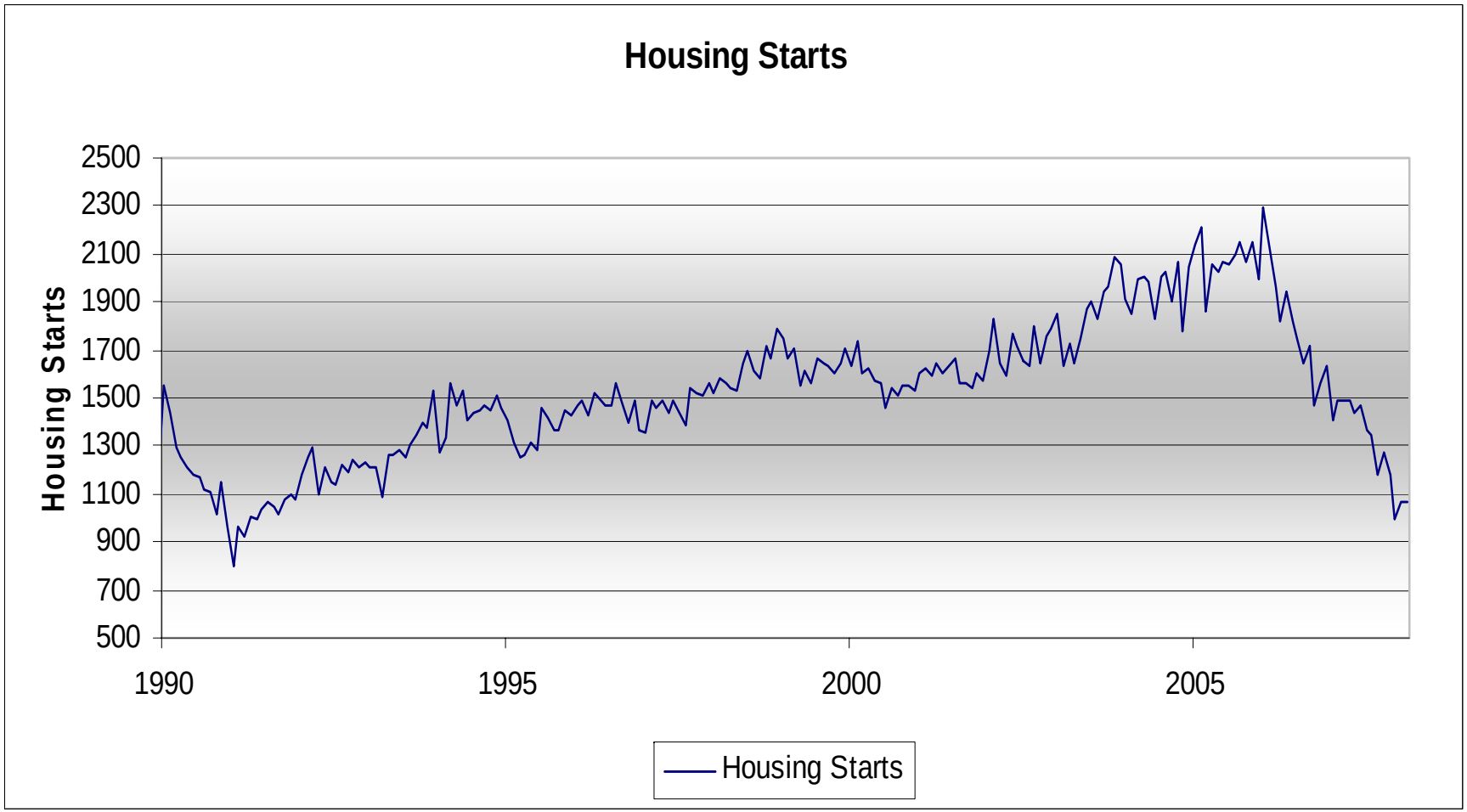
Inflation pressures:

- Oil and food prices remain high, threaten to go higher.
- Dollar is falling.

Favorable factors:

- Exports bouyant, rapid growth abroad (see packet).
- Profits remain high, despite finance sector problems.
- Employment growth continues (albeit a little more slowly)

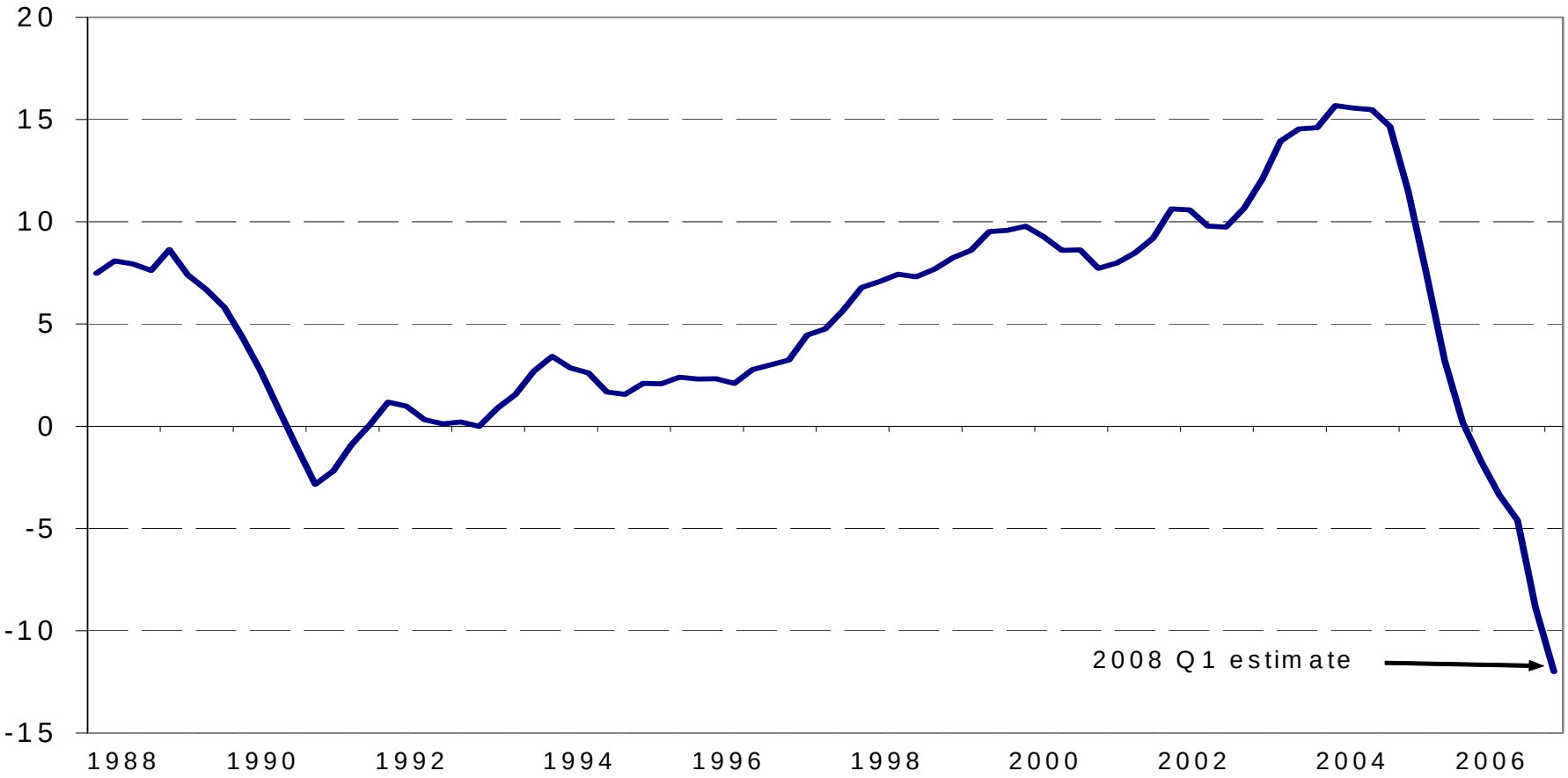
Housing recession continues



Home Prices Fall

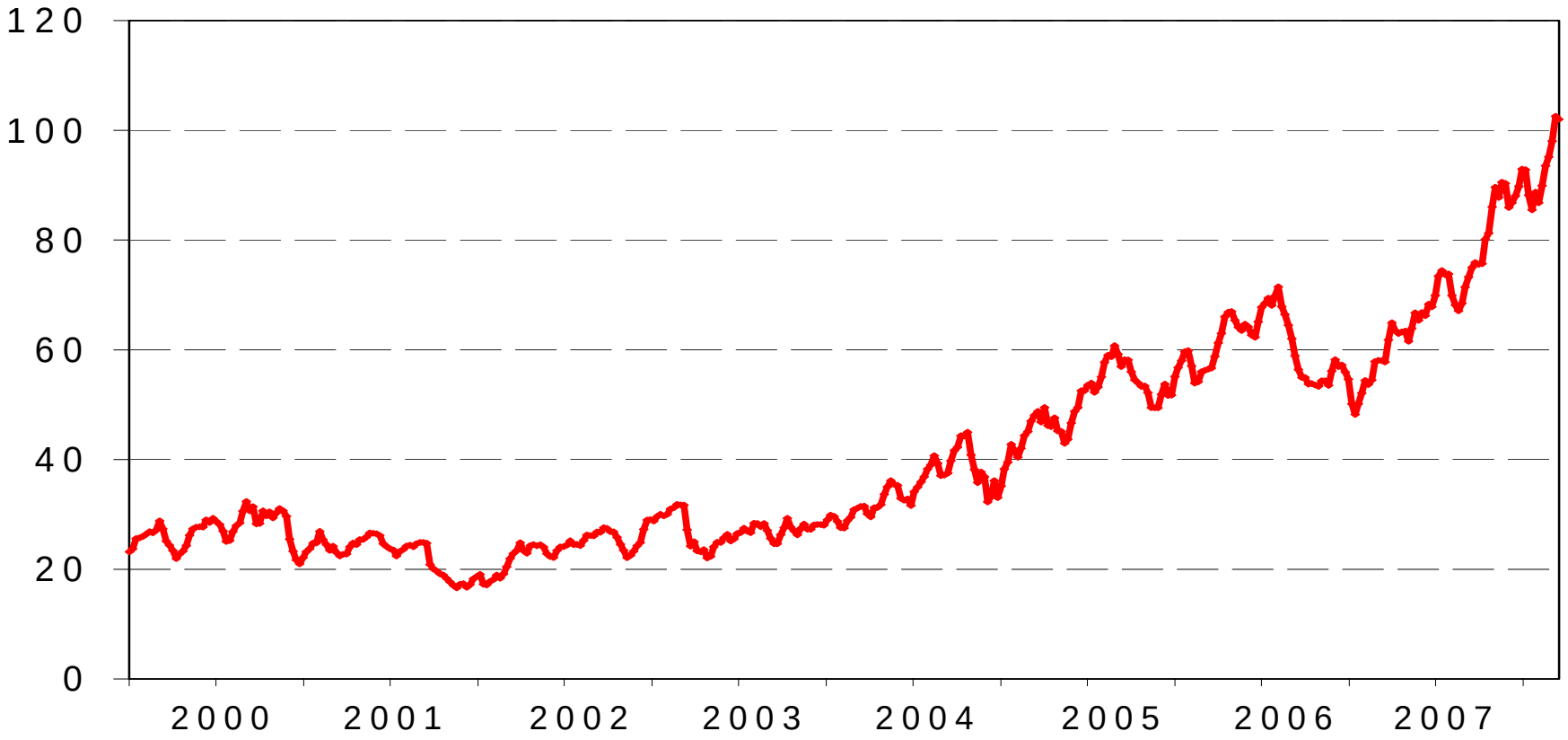
S&P/Case-Shiller Home Price, percentage change from year ago

National prices almost 14% off peak (July 2006)



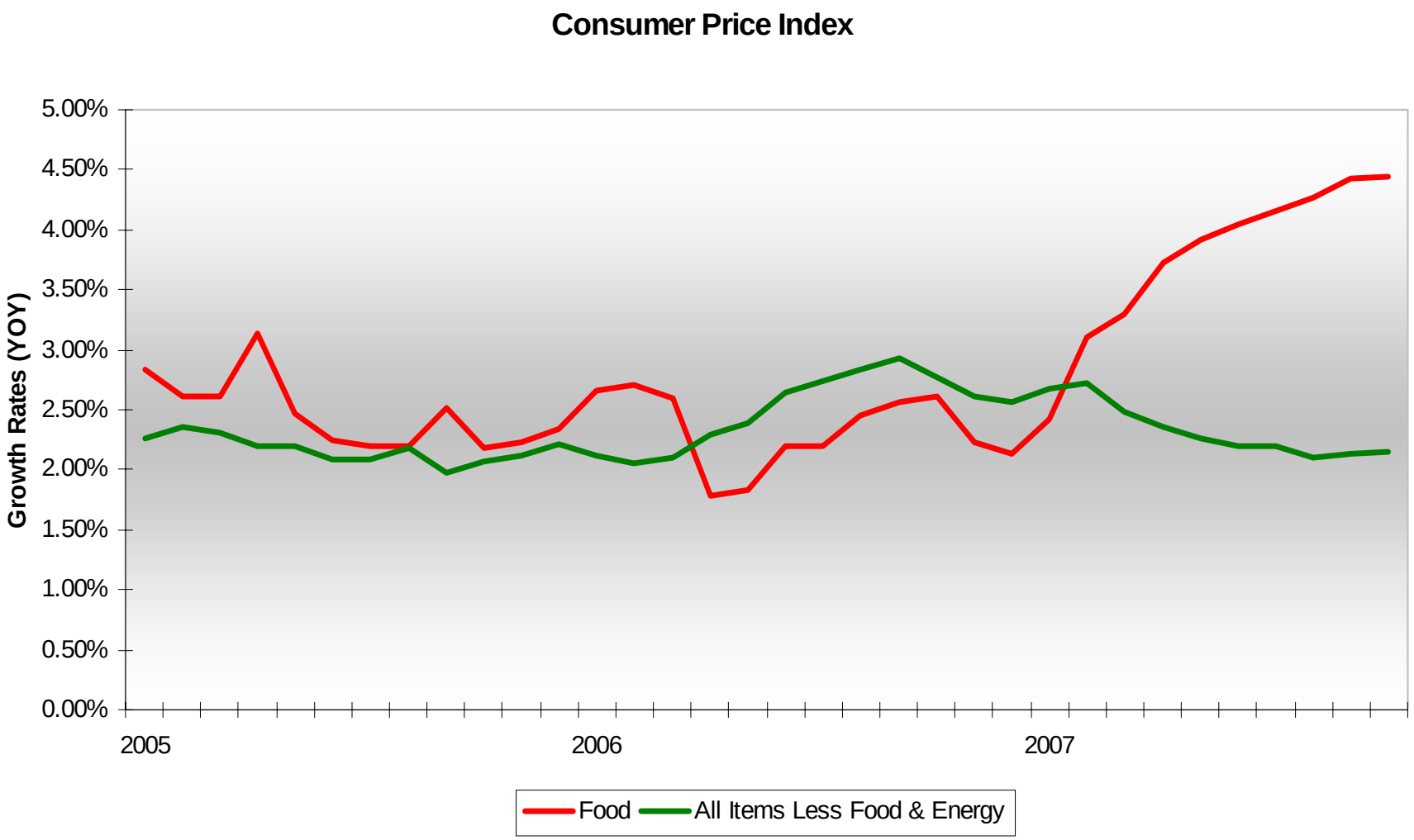
Oil Price: Won't fall by much soon

All Countries Spot Price FOB Weighted by Estimated Export Volume
(Dollars per Barrel)



Source: EIA

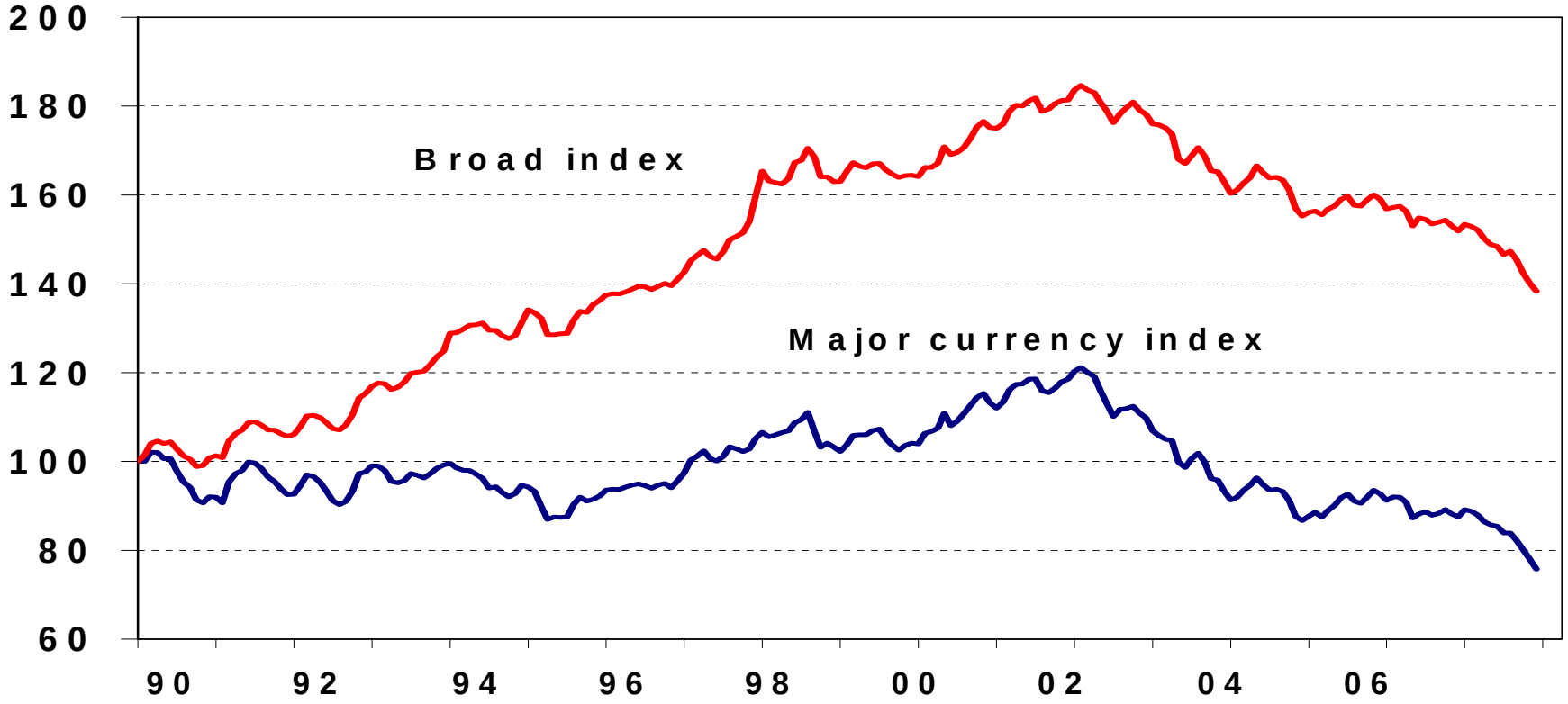
Consumer inflation: Food is also getting expensive.



Dollar slide gathers momentum

FRB nominal currency indices, Jan 1990 = 100

From Feb. 2002 peak, dollar is down 35.6% on major currencies and 24.1% on broad currencies



Short-term Overview

Percentage rate of change, NIPA real quantities and prices

	00-04	04-05	05-06	**06-07**	**07-08**	08-09	09-10
Gross domestic product	2.1	3.1	2.9	**2.2**	**1.5**	2.6	2.5
Personal consumption	2.9	3.2	3.1	**2.9**	**1.5**	**2.5**	**2.4**
Nonresidential structure	-5.8	0.5	8.4	**12.9**	**7.5**	5.0	3.1
Equipment investment	-0.4	9.6	5.9	**1.3**	**2.4**	4.6	2.4
Residential investment	5.8	6.6	-4.6	**-17.0**	**-20.0**	**0.6**	**2.9**
Exports	0.7	6.9	8.4	**8.1**	**8.4**	4.2	4.4
Imports	3.9	5.9	5.9	**1.9**	**2.1**	3.4	2.9
Government	3.2	0.9	1.7	**2.0**	**2.0**	2.0	2.0
GDP deflator	2.3	3.2	3.2	**2.7**	**2.4**	2.1	1.9
Consumption deflator	2.0	2.9	2.8	**2.5**	**3.3**	2.0	1.8
	2001-04	2005	2006	**2007**	**2008**	2009	2010
Unemployment rate (%)	5.5	5.1	4.6	**4.6**	**5.3**	5.5	5.2
Treasury bills, 3-mo (%)	1.9	3.1	4.7	**4.6**	**2.3**	3.0	4.7
Treasury bonds, 10-yr (%	4.5	4.3	4.8	**4.7**	**5.1**	5.5	5.5
Federal net borrow (bil $)	-271	-372	-277	**-282**	**-360**	-293	-322
Current acct balance (bil	-484	-731	-777	**-810**	**-750**	-700	-700

Recession risks: Threats to U.S. confidence and economic growth could become much larger

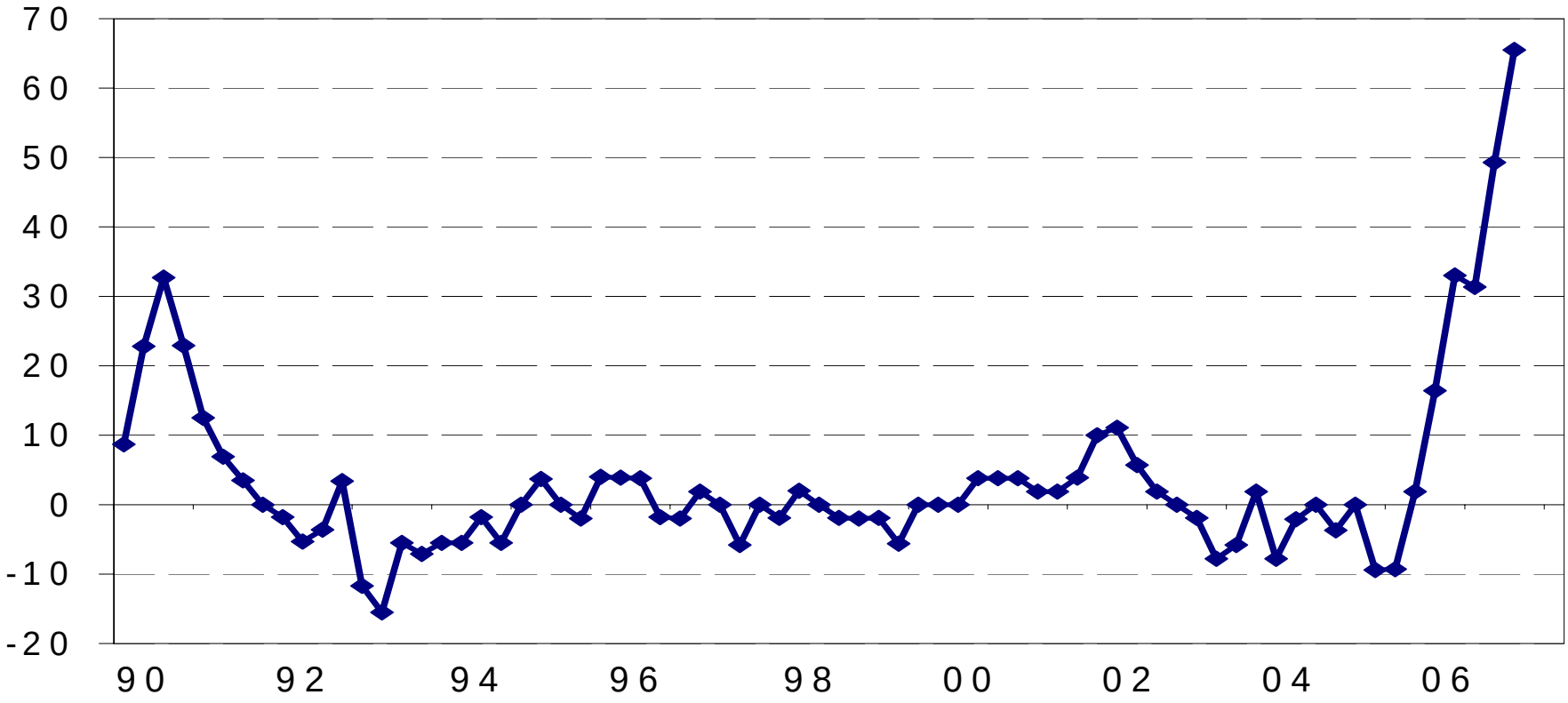
- Subprime mortgage crisis spreads across financial sector, restricts availability of credit to commercial and industrial sector.
- Falling home and equity prices hits consumer net worth hard.
- Rising energy and food prices undermine purchasing power.
- Dollar rout pushes up inflation and long term interest rates.
- Costly war drags on.

Symptoms that these problems could snow ball into recession:

- Credit crunch continues. Uncertainty in financial sector impedes monetary policy effectiveness.
- Commerical lending standards ticking upward.
- Equity market volatility.
- Slower employment growth.
- Declining consumer sentiment.

Not surprisingly, subprime crisis produces clampdown on mortgage standards

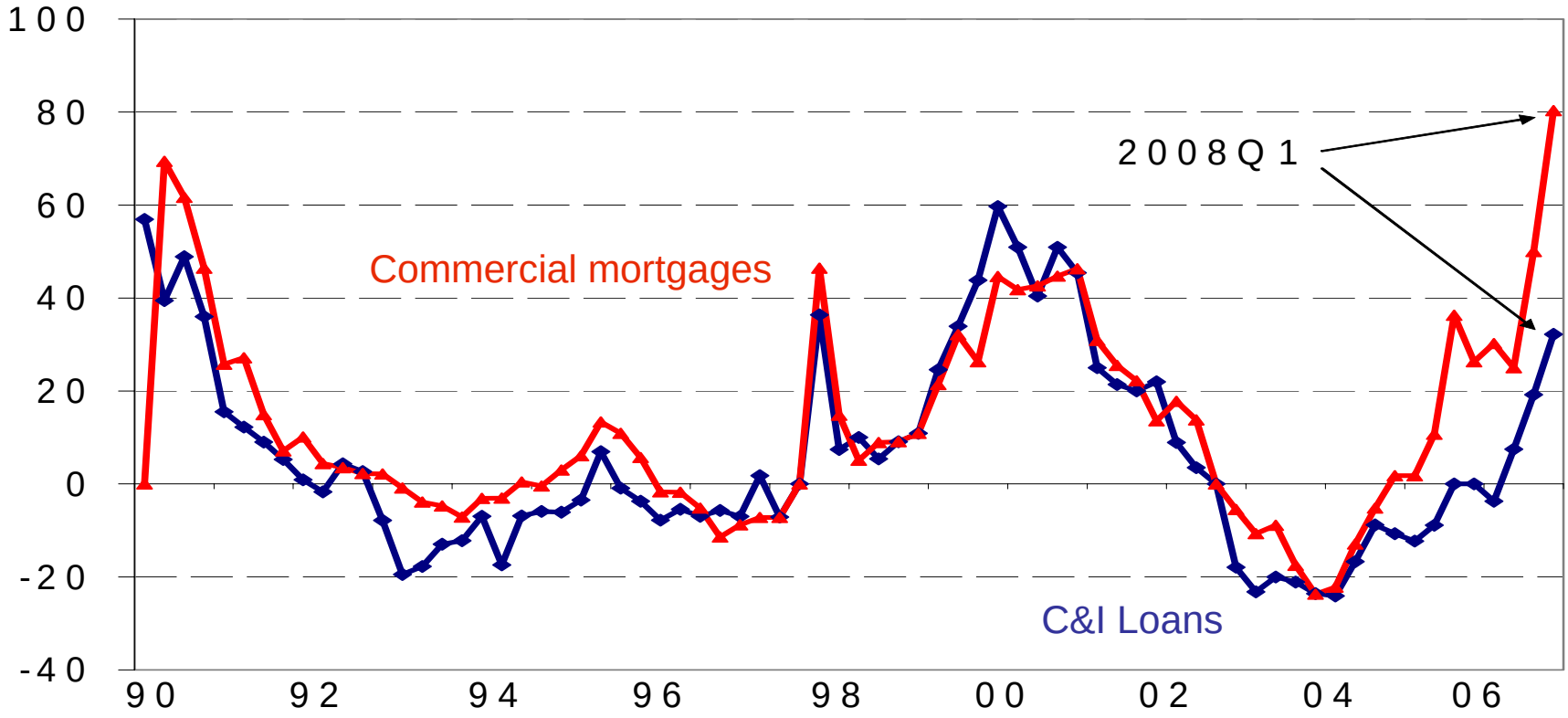
FRB Survey of Sr. Loan Officers:
Net Percentage of Respondents Tightening Standards for Residential Mortgage Loans



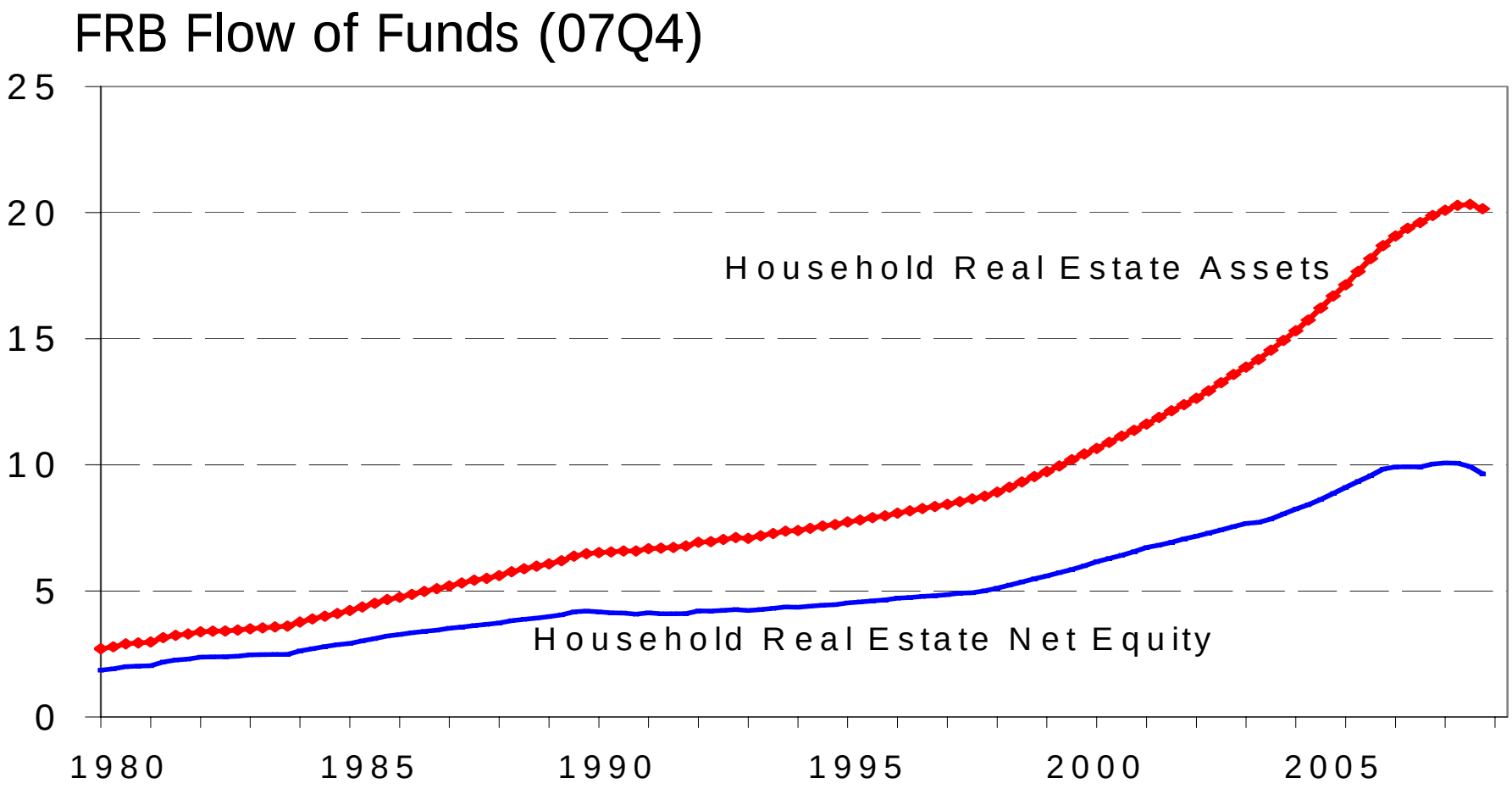
But what is the impact for lending in other sectors? "intermediaries in a defensive posture" (Kohn)

FRB Survey of Sr. Loan Officers:

Net Percentage of Domestic Respondents Tightening Standards for Commerical and Industrial Loans and Commerical Mortgages



Can falling housing prices substantially dent wealth? (Forecasts call for a housing price fall of 15-30%)



What are the relative magnitudes?

Assume:

MPC out of housing wealth = .05

Housing wealth = $21 trillion

House prices fall by 10% ($2.1 trillion)

.05 x $2.1 trillion = $100 billion, or 1.0% of PCE

What if MPC is closer to .1?

What if prices fall by 15%, 20%?

What if, at same time, S&P 500 falls by 20%? (Another $1 - $2 trillion wealth hit.)

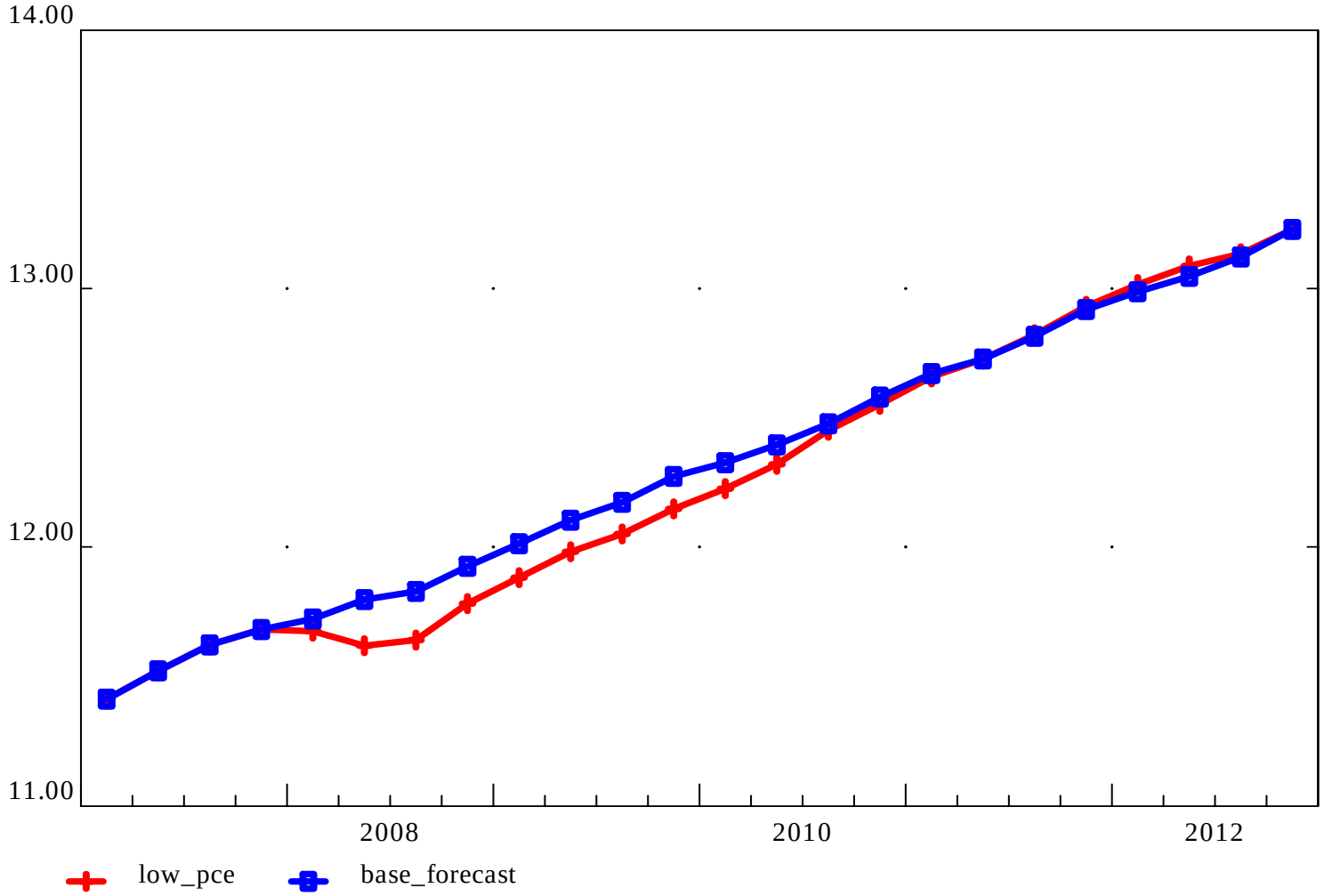
Hit on PCE could be closer to $200-400 billion, but what is the timing?

Given other pressures, losing 2 percent of PCE could cause a recession

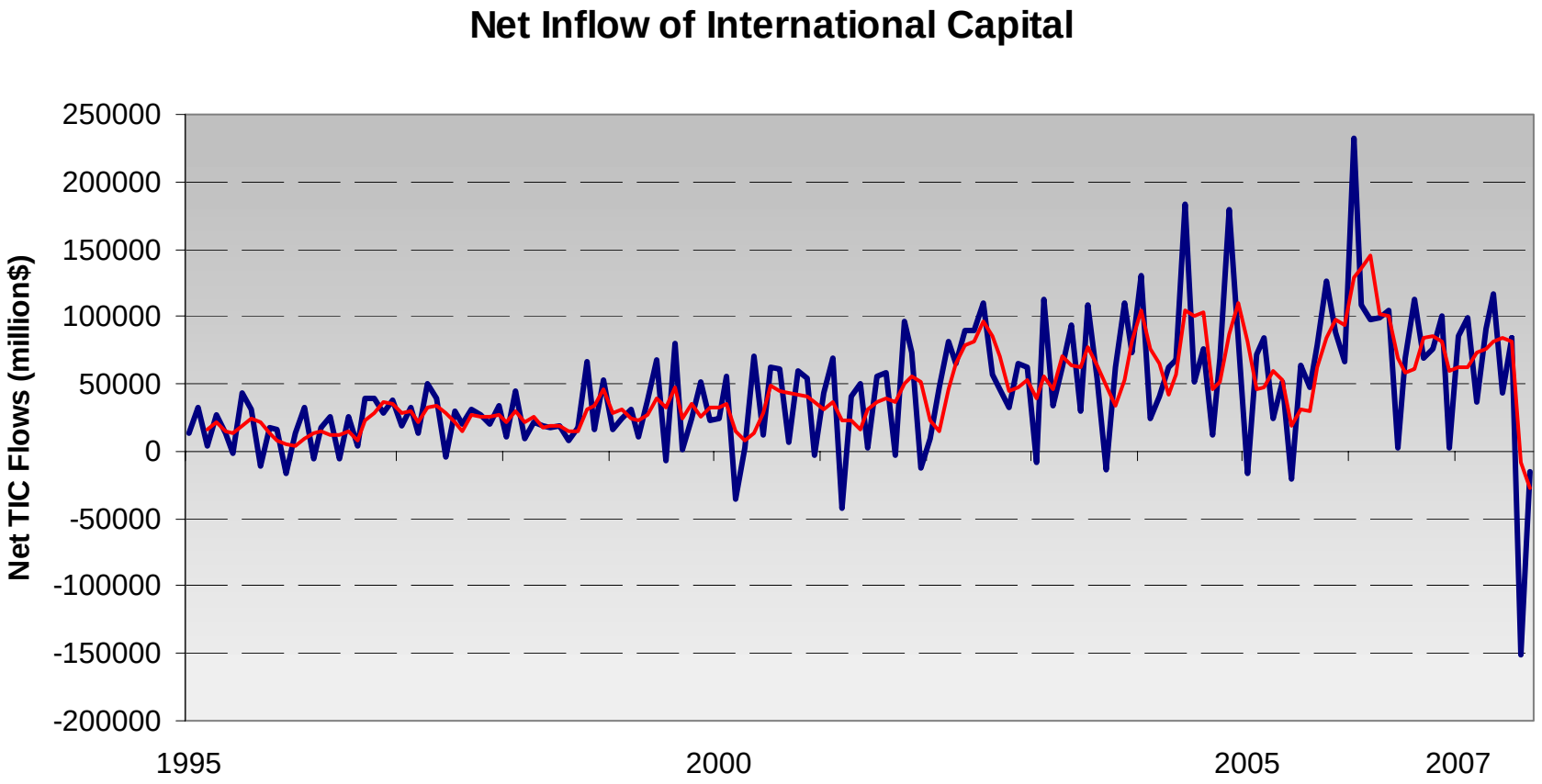
REAL GDP by FINAL DEMAND CATEGORY (Billions of chained 2000 dollars

	2008	2009	2010	2011	2012
PCE growth, baseline	2.3	2.5	2.4	2.3	2.2
alternate	0.3	3.0	3.2	2.7	2.4
GDP growth, baseline	2.2	2.6	2.5	2.5	2.7
alternate	1.1	2.7	3.0	3.0	2.9
Low consumption scenario, deviation from base forecast in percent.					
Gross Domestic Product	-1.1	-1.0	-0.5	0.0	0.2
Personal Consumption Expen	-1.9	-1.5	-0.7	-0.3	-0.1
Gross Private Fixed Investment					
Nonresidential Structures	-0.6	-2.6	-2.2	-0.7	1.3
Equipment Investment	-0.7	-2.6	-1.6	0.8	1.8
Residential Investment	-0.5	-0.2	0.1	0.9	0.2
Exports	0.0	-0.1	-0.1	-0.2	-0.1
Imports	-1.5	-1.6	-0.8	0.1	0.5
Total Employment	-1.1	-1.2	-0.7	0.2	0.1

This alternate assumes rapid snapback of demand



A final risk: Capital Outflow



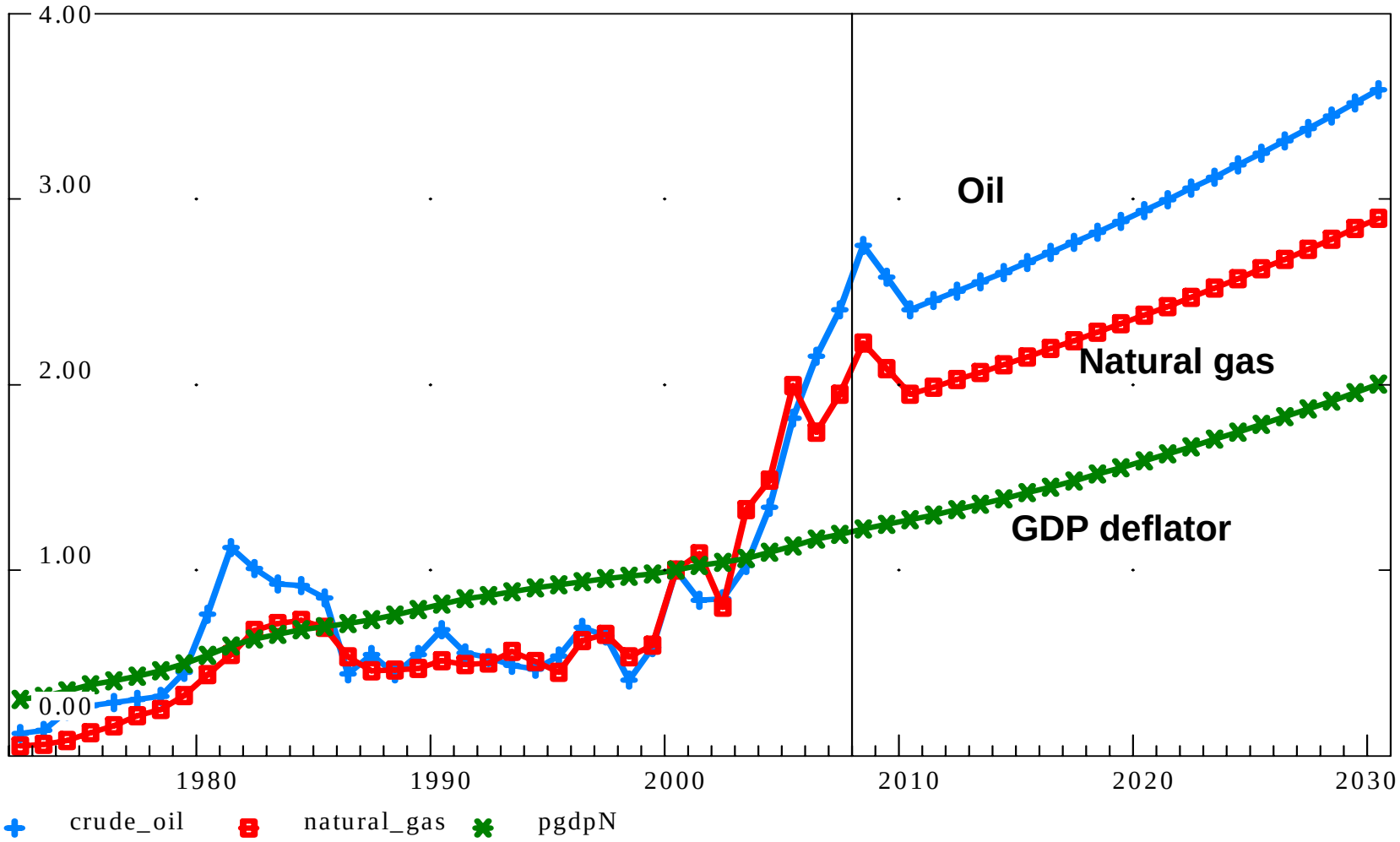
Source: U.S. Treasury

Longer term:

- Fundamental problem is an overhang of debt has global credit markets very nervous.
- Some moderation from current highs, but energy prices fall little in real terms.
- Lower labor force growth slows potential growth.
- Potential GDP growth between about 2.0 – 2.5%.
- To lower current account deficit, personal saving will have to rise.
- To pay for entitlements, tax rates will have to rise.
- Are Short-Run difficulties signalling a fundamental change in trends? Weaker dollar, rising savings rate changes economic structure toward exports and away from consumption.

Oil/natural gas prices peak in 2008, stay high

Nominal Price indices: 2000 = 1



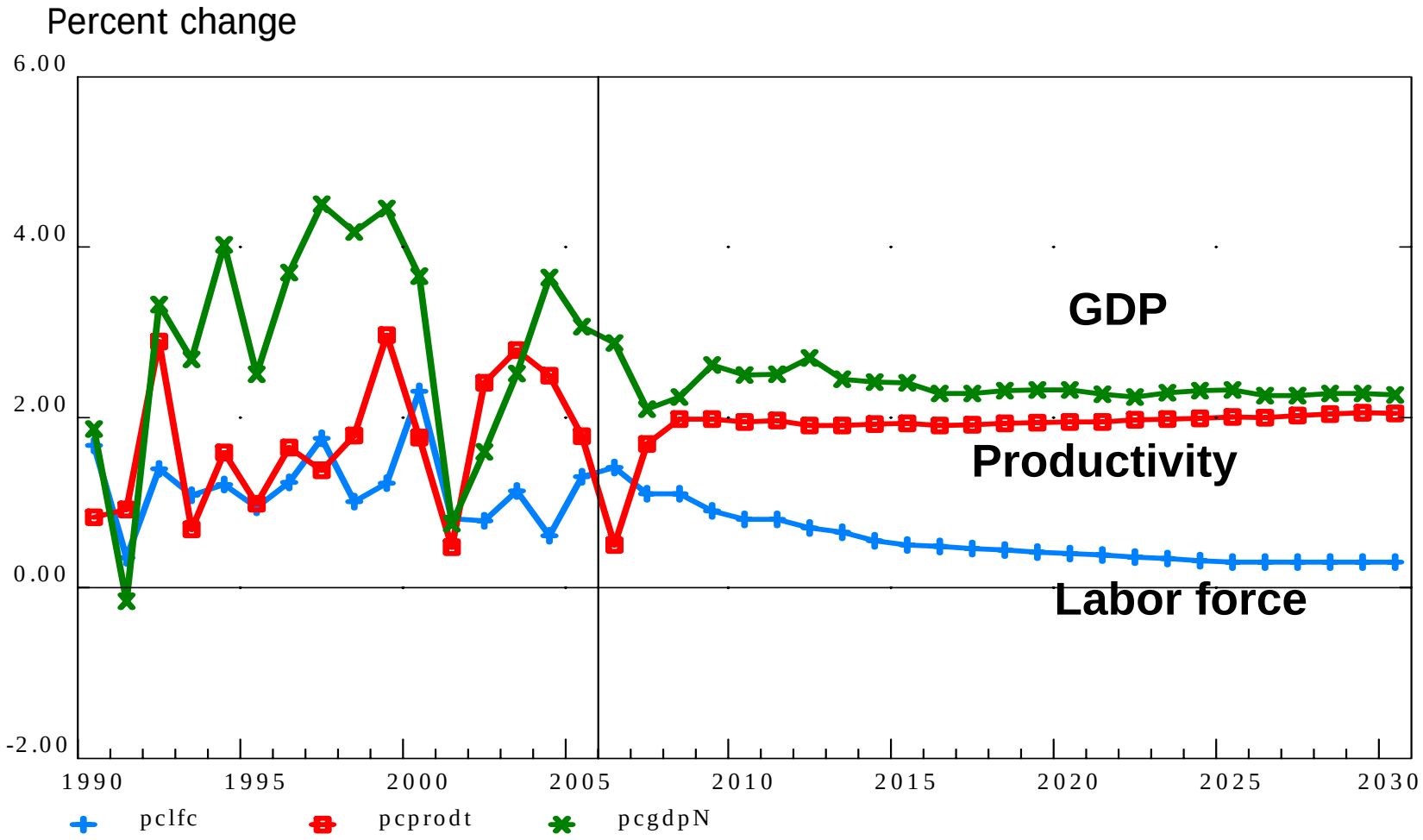
Long Term Overview: One View

	10-15	15-20	20-30
Gross domestic product	2.5	2.3	2.3
Personal consumption	2.2	2.0	1.8
Nonresidential structures	2.4	2.1	1.9
Equipment investment	3.4	3.2	2.6
Residential investment	5.1	3.2	3.0
Exports	4.3	4.6	4.8
Imports	2.9	2.9	2.6
Government	2.0	2.0	2.0
GDP deflator	2.2	2.3	2.3
Consumption deflator	2.1	2.2	2.1
Population	0.8	0.8	0.8
Labor force	0.6	0.4	0.3
Employment	0.6	0.5	0.3
Labor productivity	1.8	1.8	1.9
Potential GDP	2.7	2.4	2.4

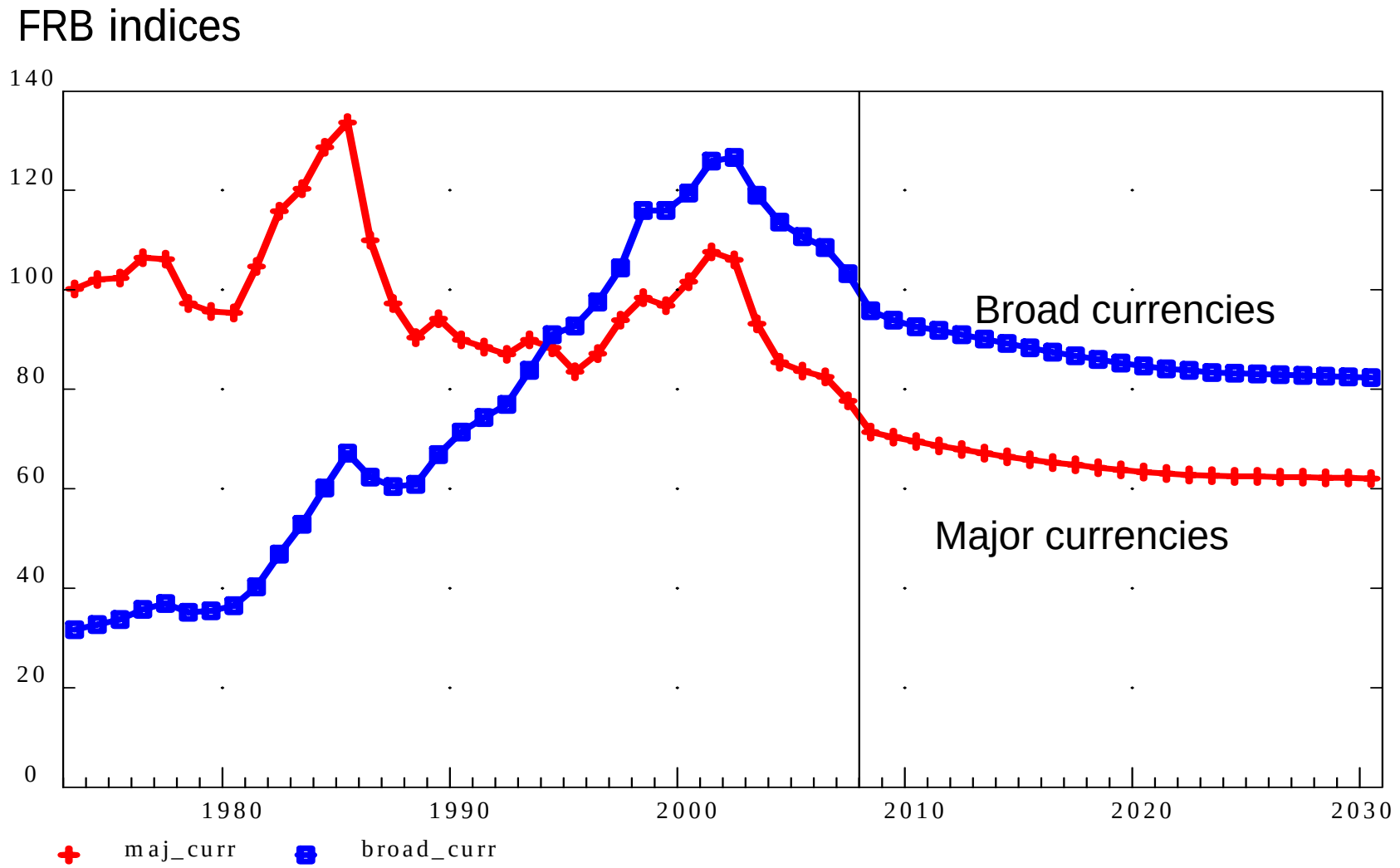
Nominal Quantities, Billions of Dollars

	2015	2020	2030
Current account	-993.9	-1057.4	-554.6
(% of GDP)	-5.0	-4.2	-1.4
Federal deficit	-176.3	-227.8	-78.6
(% of GDP)	-0.9	-0.9	-0.2

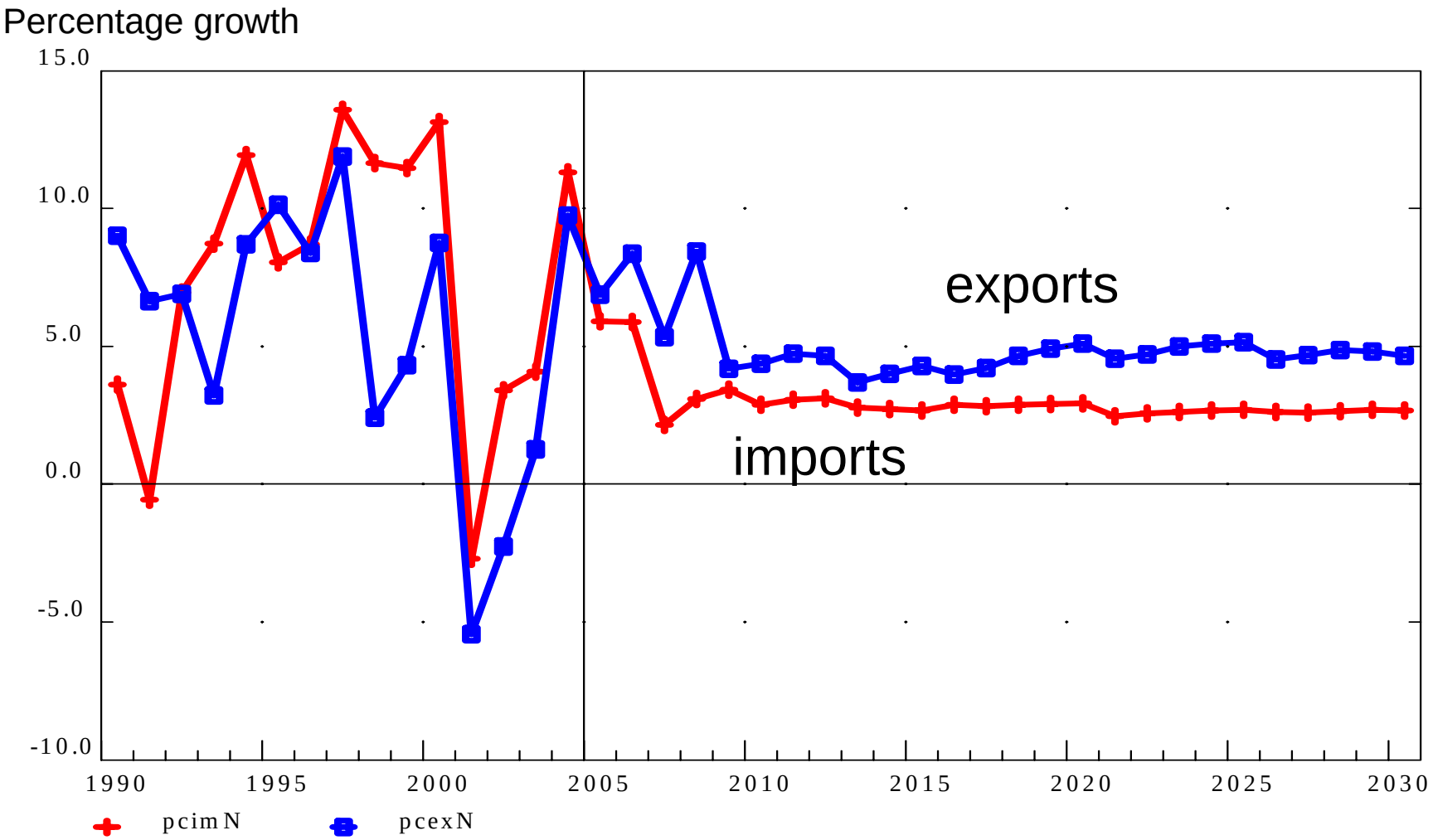
Long term potential growth: strong productivity growth, low labor force growth



Exchange rate index: Gradual but steady depreciation

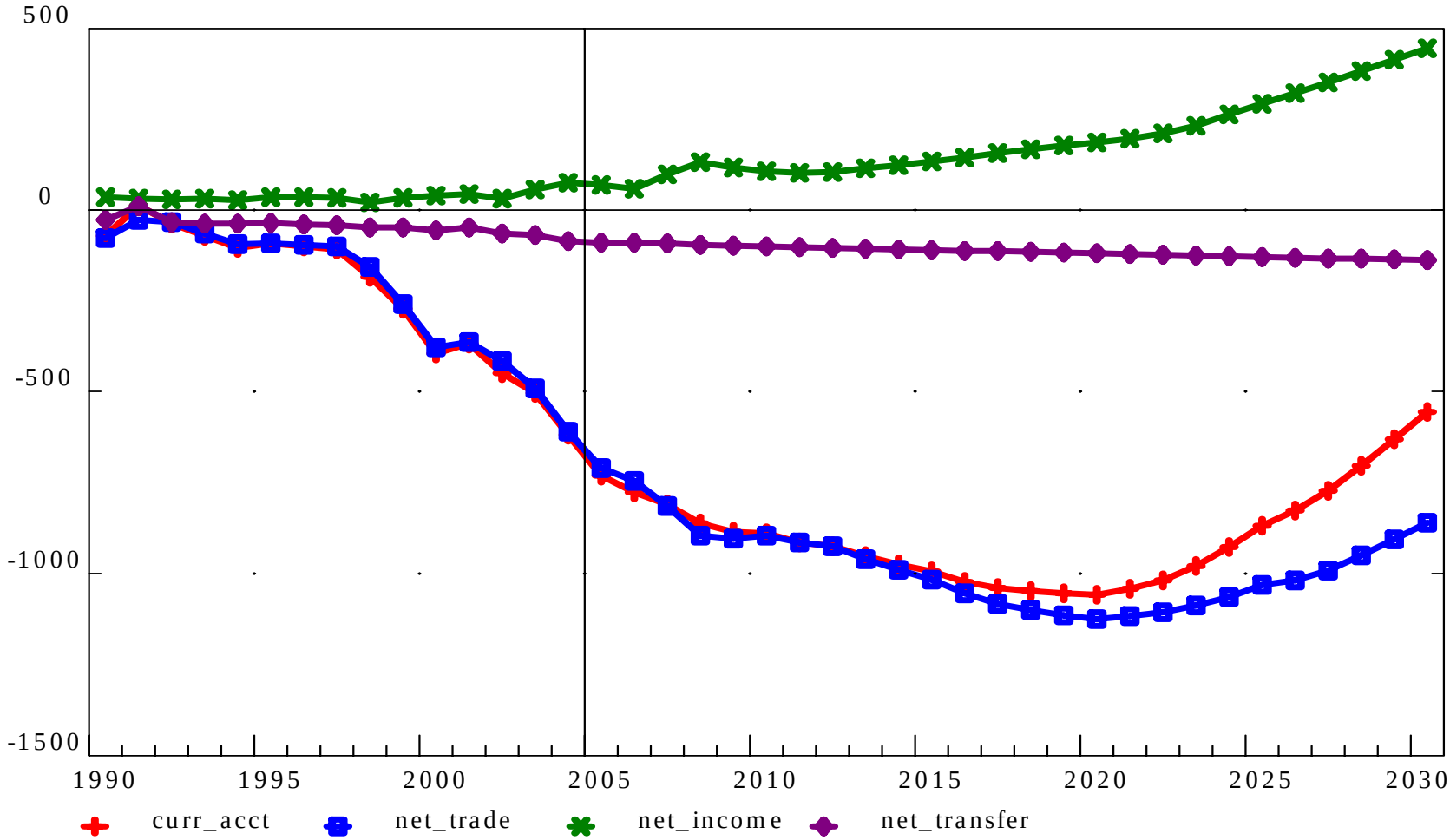


Real import and export growth

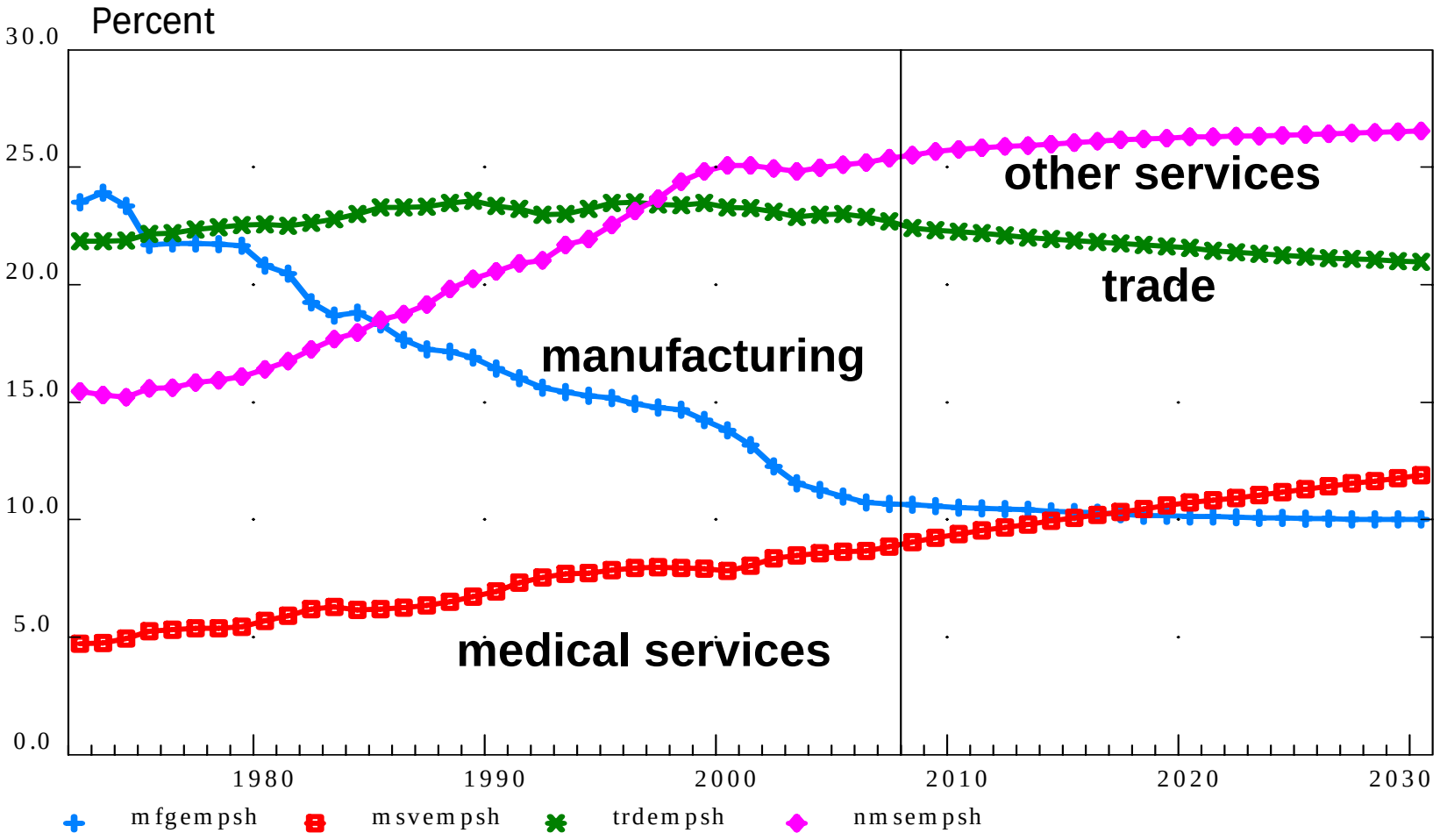


Current account deficit: soft landing?

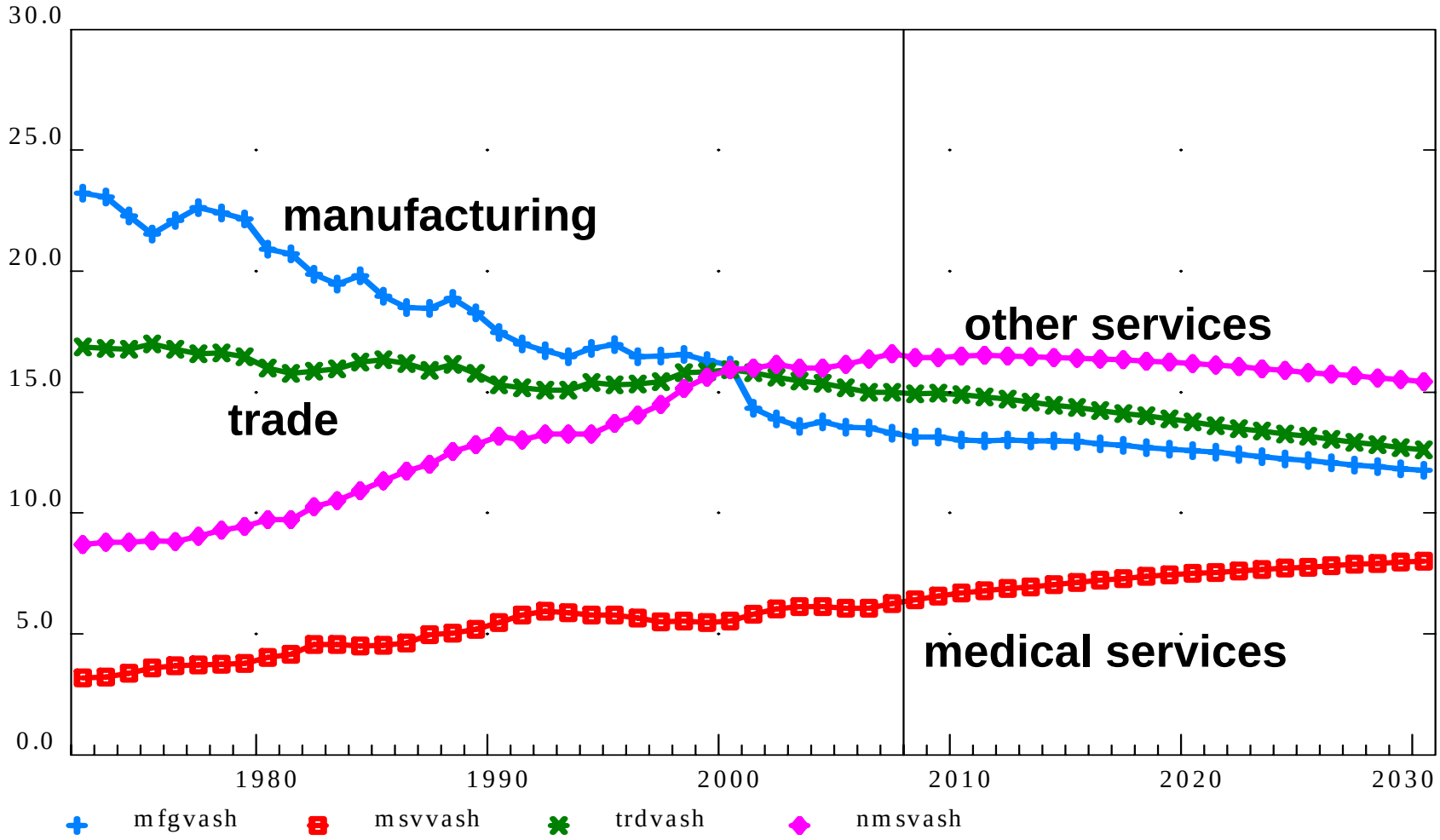
Billions of dollars



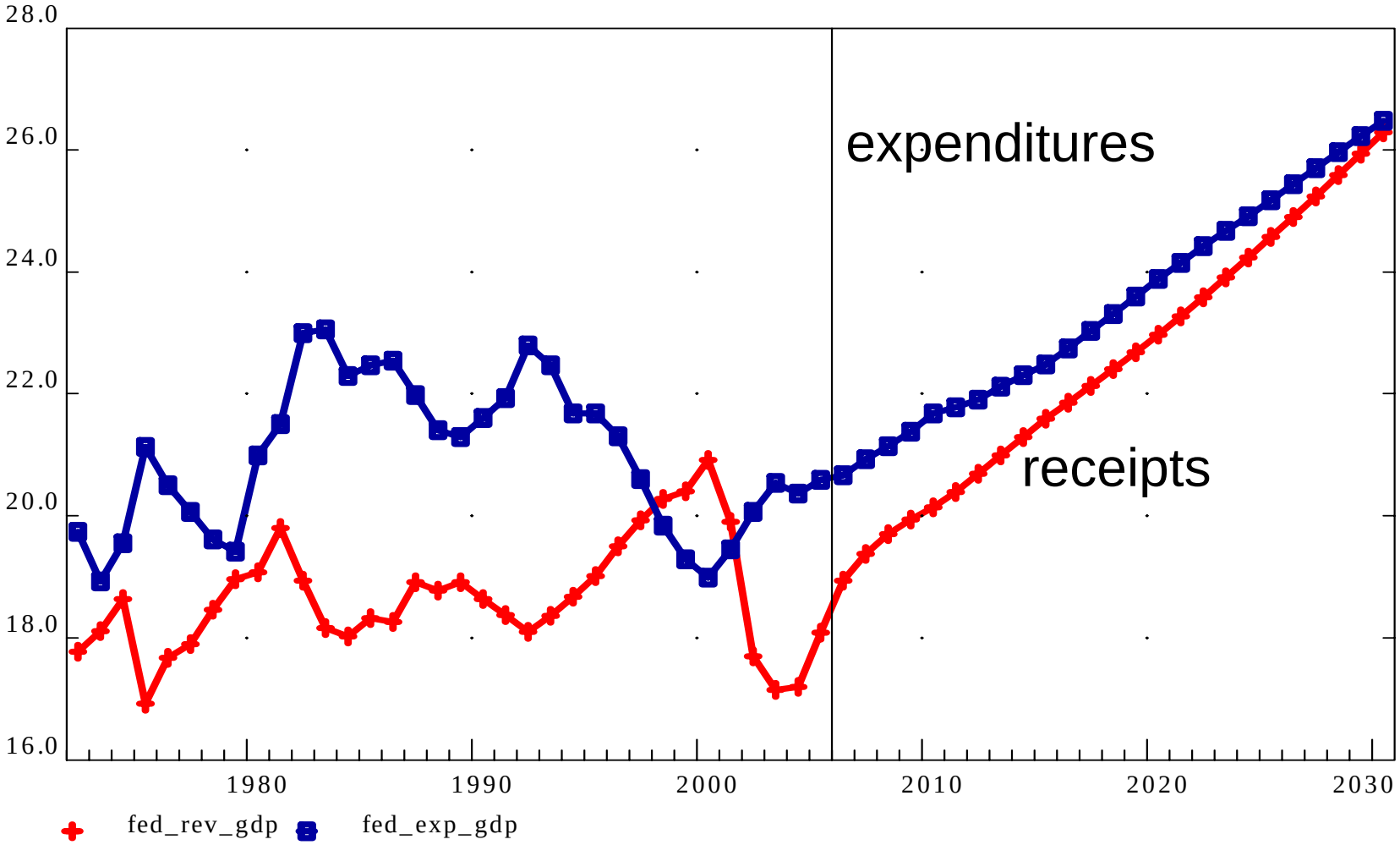
Industry employment shares:
Productivity growth must come from all sectors



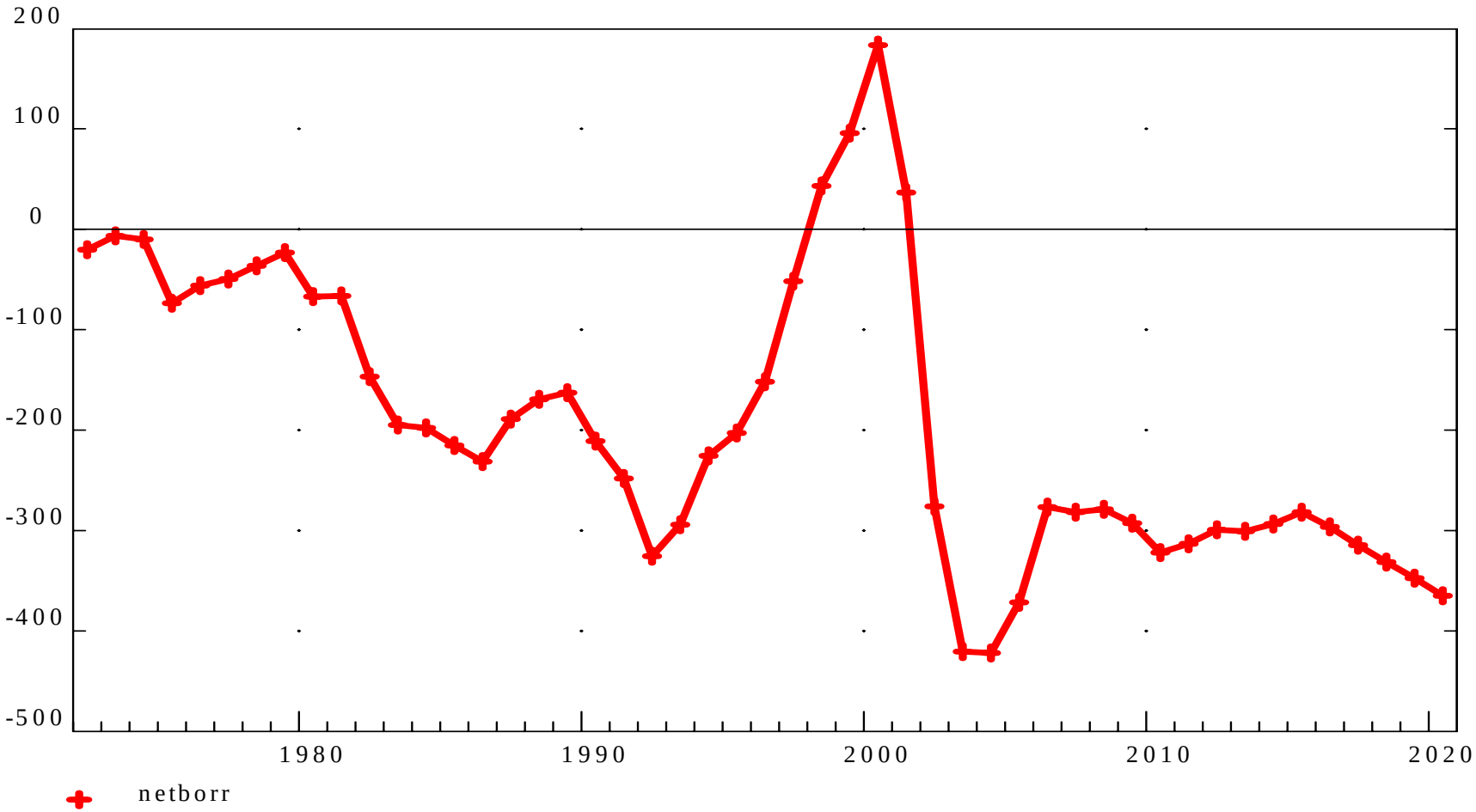
Industry value added shares

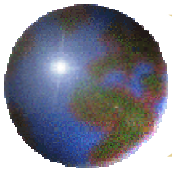


Federal receipts and expenditures as percent of GDP



Federal deficit: higher taxes stabilize.





Inforum assets and regional modeling experience

- LIFT: U.S. Interindustry Macroeconomic Model
- STEMS: State Income and Employment Model
- Maryland model: Collaboration with Mahlon Strazheim
- DEPPS: Defense expenditures impact and income model
- CHIOMS: Chinese provincial models (MUDAN)
- MEDEA: Andalucian regional model
- Software tools: G and Interdyme

State Employment Modeling System (STEMS)

- Makes use of the following state databases:
  - Gross State Product (GSP) – Value added by state by industry.
  - State Personal Income (SPI) – Population, personal income, disposable income, categories of income by state.
  - Regional Economic Information System (REIS) – Employment data by state by industry.
- STEMS is linked to LIFT, Inforum's model of the U.S.
- The model produces forecasts of output, employment, earnings and profits by industry, and forecasts total personal income and disposable income by state.

Applications of STEMS

- To determine effects on states of national-level changes in effective demand. These changes may be the result of:
  - Federal tax policy
  - Trade policy
  - Changes in federal or state government spending
  - Changes in the macroeconomic environment
- To determine local and national multipliers of expenditures in a given state, such as infrastructure (highways) or stadium development.
- To model inter-state migration, based on state economic opportunities and other factors.
- To project tax revenue available in a given state.
- To determine state impacts of changes in Federal grants-in-aid programs, such as Medicaid.

Defense Impacts by State (DEPPS)

- DEPPS is a system used by Department of Defense (DoD) to analyze industry, state and occupational employment impacts of defense spending.
- Contract awards data from DoD are used to determine state level defense spending impacts by industry.
- STEMS is used to determine total output by state by industry. The defense spending by state is one of the inputs into STEMS in this system.
- The effects by state are disaggregated by major defense spending category: Military personnel (mostly pay), Operations and maintenance, Procurement, Military construction and family housing, and Research and development.

Applications of DEPPS

- To determine state/industry impacts due to the currently planned defense budget. This budget, known as the *Future Years' Defense Plan (FYDP)*, currently extends to 2013.
- To determine impacts on a state economy of specific *changes* in planned defense spending.
- To analyze the effect on a state economy of base closures, or of shifting the location of army, navy or air force capabilities within the U.S.
- To locate bottlenecks in production (by industry and locality) in the case of a major military conflict.

District of Columbia Summary
Millions of 2008 dollars

	2007	2008	2009	2010	2011	2012	2013
AGGREGATE MEASURES							
Total Direct Expenditures (Purchases and Pay)	8253	7230	7501	7435	7368	7221	7360
Indirect Defense Purchases Resulting from Direct Purchases	3662	3214	3353	3318	3312	3260	3339
Indirect Defense Purchases Resulting from Pay	561	532	539	536	537	538	539
Total Nondefense Expenditures	111478	115397	118222	122067	126254	130401	134044
Total Output	123972	126389	129631	133371	137487	141436	145297
Government Industry Compensation	1473	1408	1432	1432	1439	1444	1451
LARGEST PURCHASES BY INDUSTRIAL SECTORS							
Total Direct Expenditures (Purchases and Pay)							
85 Professional, scientific and technical services	1856	1574	1637	1633	1600	1543	1583
86 Computer systems design and related services	792	690	721	711	705	690	722
94 Hospitals	601	553	593	584	562	550	567
92 Offices of physicians, dentists, and other health practioner:	523	449	473	466	458	454	475
34 Fabricated metal products	479	408	428	450	453	443	433
Indirect Defense Purchases Resulting from Direct Purchases							
80 Real estate	1194	1049	1088	1084	1078	1066	1101
85 Professional, scientific and technical services	561	472	496	492	493	483	502
88 Administrative and support services	440	388	405	405	401	390	397
84 Legal services	415	369	391	394	396	392	405
10 Electric utilities	141	134	126	92	96	99	90

Source: Department of Defense, Defense Employment and Purchases Projection System (DEPPS)

Maryland Summary
Millions of 2008 dollars

	2007	2008	2009	2010	2011	2012	2013
AGGREGATE MEASURES							
Total Direct Expenditures (Purchases and Pay)	20832	18615	19344	19392	19207	18754	19006
Indirect Defense Purchases Resulting from Direct Purchases	7314	6408	6731	6747	6689	6523	6633
Indirect Defense Purchases Resulting from Pay	2259	2145	2169	2158	2162	2165	2170
Total Nondefense Expenditures	436823	450897	462380	476893	493265	509441	523692
Total Output	467230	478072	490632	505201	521336	536895	551515
Government Industry Compensation	4736	4589	4648	4640	4647	4647	4654
LARGEST PURCHASES BY INDUSTRIAL SECTORS							
Total Direct Expenditures (Purchases and Pay)							
85 Professional, scientific and technical services	5637	4966	5247	5375	5277	5092	5160
66 Truck transportation	1216	1072	1069	1018	975	941	939
75 Telecommunications	799	711	734	726	718	702	724
88 Administrative and support services	899	678	695	682	674	655	687
86 Computer systems design and related services	739	646	682	676	667	646	669
Indirect Defense Purchases Resulting from Direct Purchases							
85 Professional, scientific and technical services	1704	1489	1591	1619	1625	1592	1635
88 Administrative and support services	1282	1121	1170	1165	1147	1109	1129
80 Real estate	744	648	666	659	656	653	679
76 Information and data processing	405	357	366	357	340	315	312
84 Legal services	248	222	232	236	230	222	218

Source: Department of Defense, Defense Employment and Purchases Projection System (DEPPS)

Virginia Summary
Millions of 2008 dollars

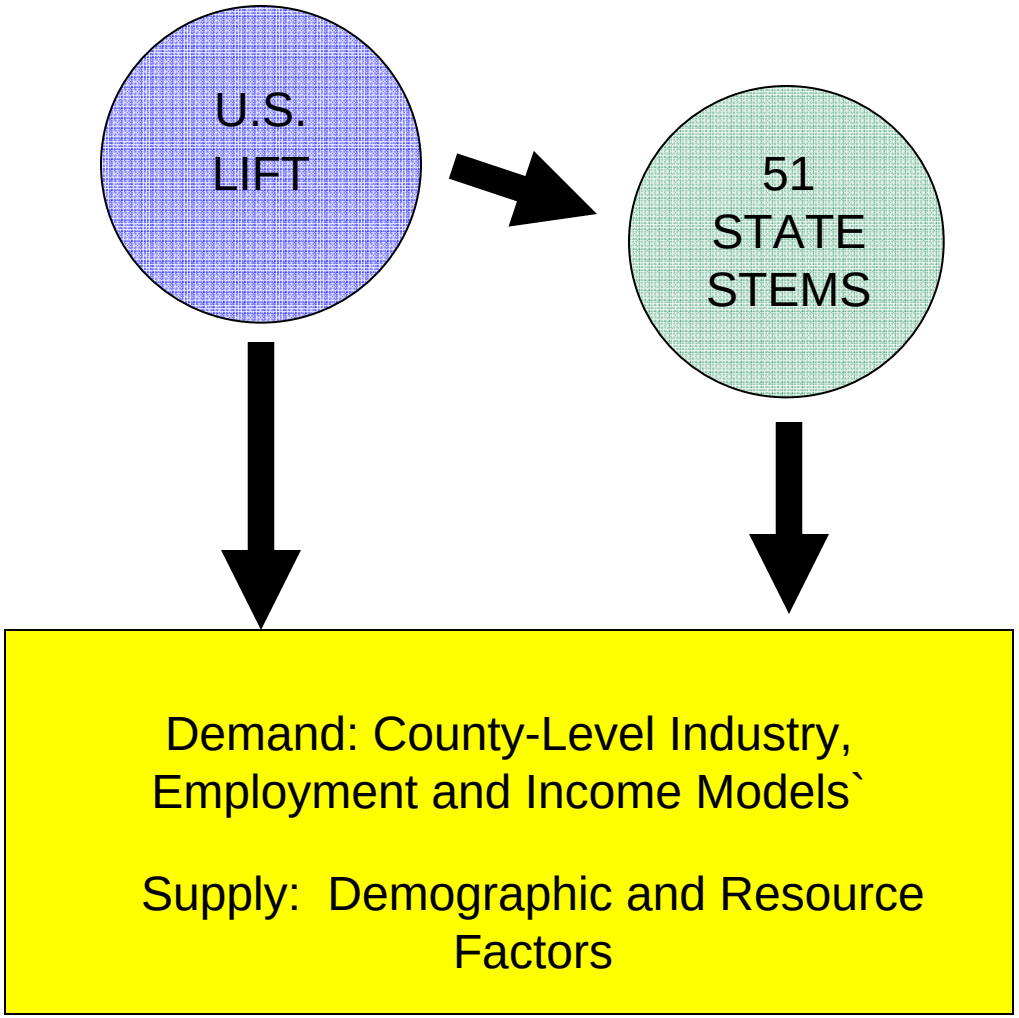
	2007	2008	2009	2010	2011	2012	2013
AGGREGATE MEASURES							
Total Direct Expenditures (Purchases and Pay)	62224	56087	58515	58487	57996	57121	58004
Indirect Defense Purchases Resulting from Direct Purchases	15524	13845	14802	15031	14965	14544	14641
Indirect Defense Purchases Resulting from Pay	6336	6015	6082	6048	6055	6062	6073
Total Nondefense Expenditures	576490	600889	616463	637917	662640	687536	708396
Total Output	660633	676911	695940	717566	741739	765344	787193
Government Industry Compensation	13702	13244	13520	13574	13668	13727	13751
LARGEST PURCHASES BY INDUSTRIAL SECTORS							
Total Direct Expenditures (Purchases and Pay)							
85 Professional, scientific and technical services	12514	10916	11465	11617	11371	10943	11080
86 Computer systems design and related services	6905	6024	6322	6246	6182	6023	6273
75 Telecommunications	4988	4429	4570	4514	4483	4406	4572
63 Air transportation	3824	3277	3365	3303	3251	3150	3291
13 New construction	2000	1933	2306	2537	2520	2327	2165
Indirect Defense Purchases Resulting from Direct Purchases							
85 Professional, scientific and technical services	3783	3272	3476	3499	3501	3422	3512
88 Administrative and support services	1749	1578	1672	1699	1692	1661	1679
80 Real estate	1314	1308	1535	1660	1648	1521	1425
84 Legal services	1385	1253	1317	1333	1315	1275	1269
86 Computer systems design and related services	1244	1109	1176	1193	1195	1177	1203

Source: Department of Defense, Defense Employment and Purchases Projection System (DEPPS)

Econometric Model for Washington Metro Area

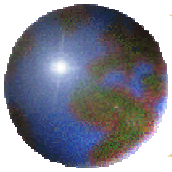
- Data center – assemble all data in one place for easy access.
  - Regional Accounts, BEA (State GDP by industry)
  - Income by state, county, type
  - Census data
  - State and county-sourced data
- Analytical framwork – examine relationships and trends among data concepts.
- Forecasting ability: Assess implications of assumptions and study alternatives.
- Impact/simulation analysis.
- Three dimensions
  - Structure: Industrial/locational/income structure
  - Time: short term vs. long term
  - Properties: Simulation vs. forecasting

A Model for Washington Metro Area



National "Macro" Variables

- Population (immigration, age profile, etc.)
- Labor Force (participation)
- Energy Prices (oil, gas, coal, import and domestic)
- Savings Rate (consumer)
- Government Spending (Federal defense and nondefense, S&L educ, health and other)
- Government Transfers Payments (Social Security, Medicare and Medicaid, Other)
- Tax rates (various: income, sales, social security, etc.)
- Energy prices (oil and natural gas)
- Technology/Productivity
- Key Expenditure Items (Health, Education, Energy, Autos)
- International Activity (export market demand, import prices)
- Exchange Rates



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