

Public Affairs 854
**Macroeconomic Policy and
International Financial Regulation**
1/28/13: Definitions & Accounting

Prof. Menzie Chinn
La Follette School of Public Affairs
Spring 2012

Concepts/Definitions

- GDP
- Real versus nominal
- Price level, inflation
- Money
- Interest rates

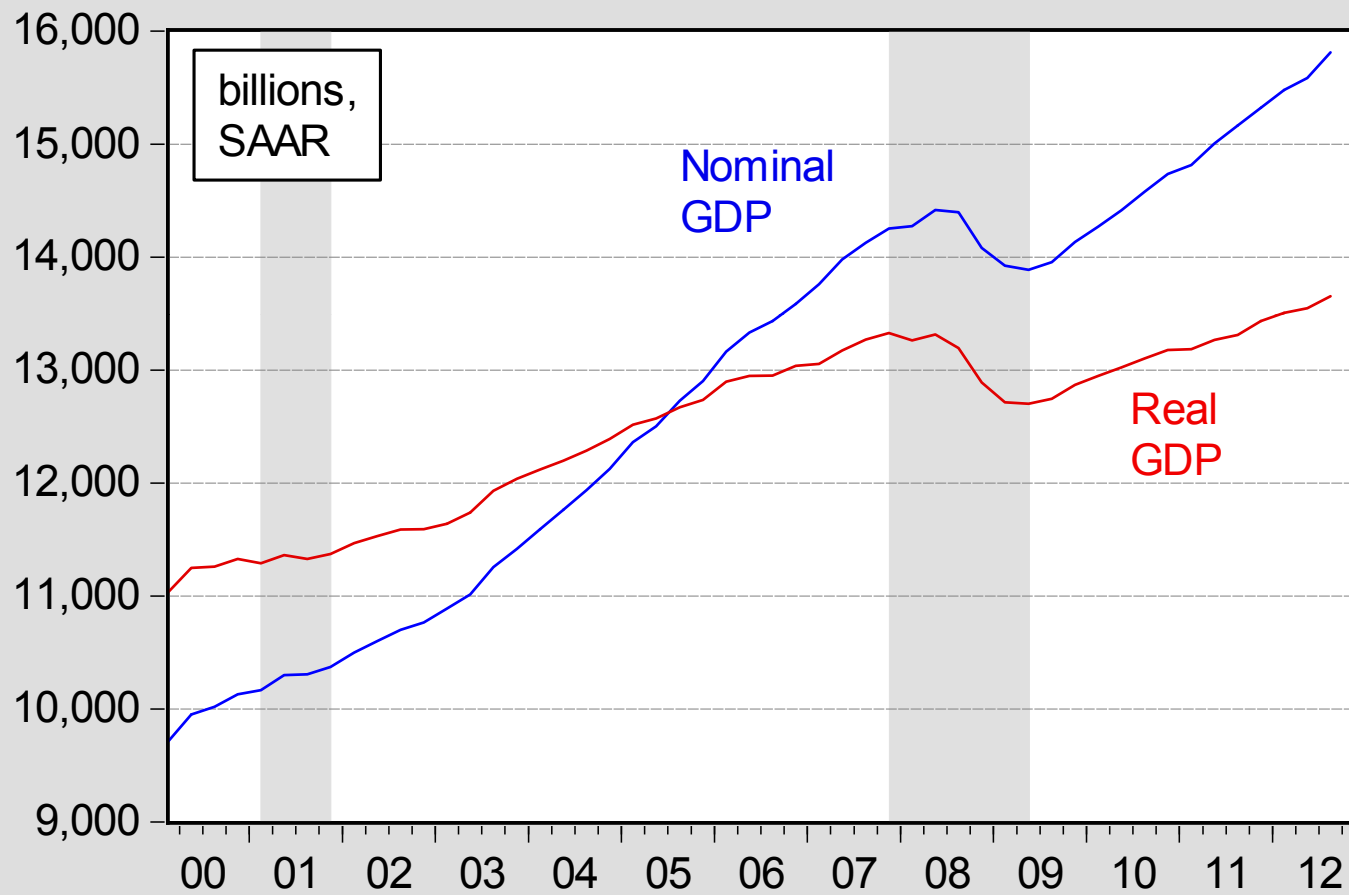
GDP

- Sum of value of all goods and services produced within a given time period (usually a year or a quarter)
- If quarterly, usually adjusted up to yearly rates
- $GDP = C + I + G + (Ex - Im)$
- All these are “final” goods and services

Real vs. Nominal

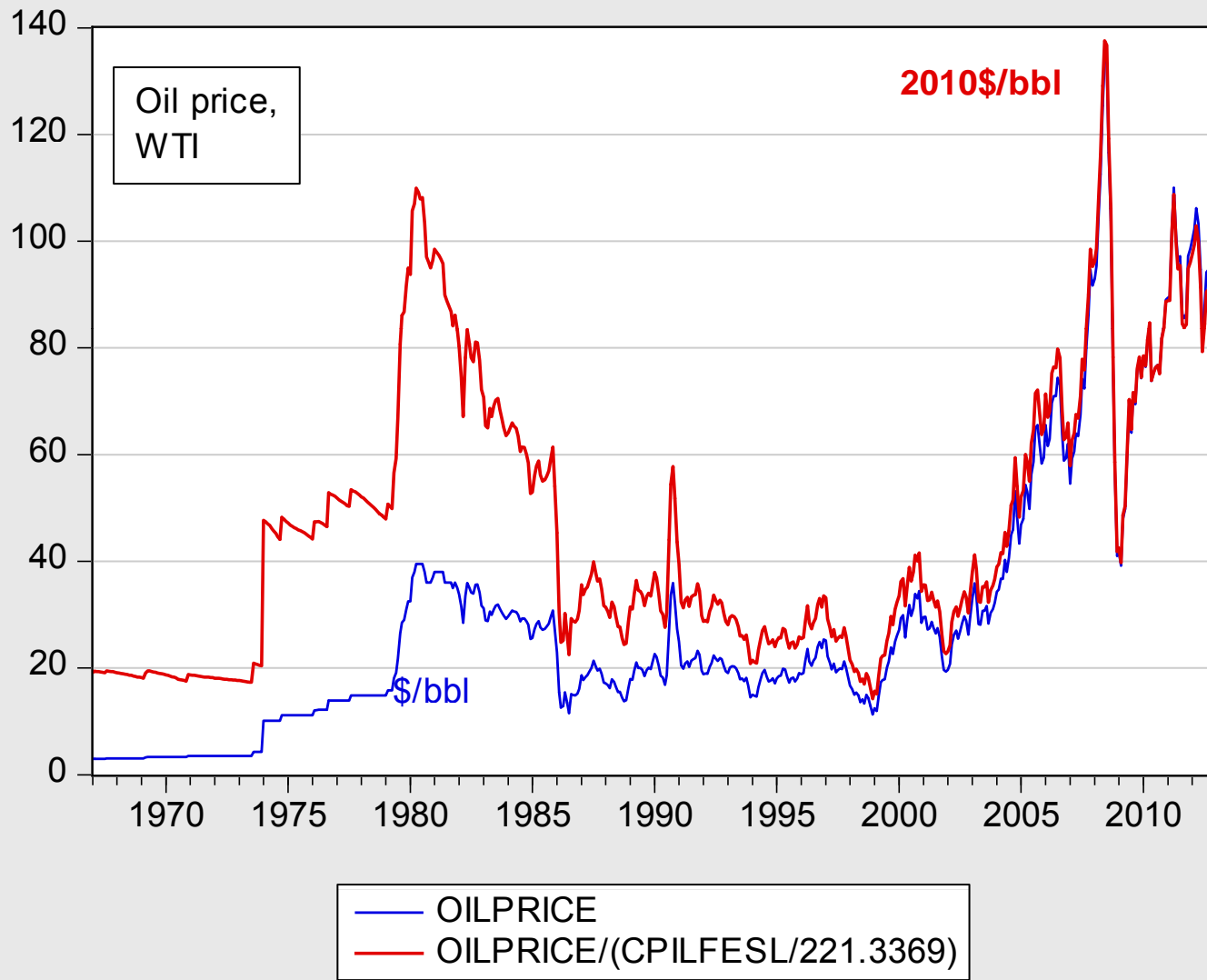
- Nominal values are expressed at values recorded. GDP is just all the values of items spent on, added up.
- Real values control for the general price level, to get in principle “quantities”.
- $\text{Nominal Value/Price index} = \text{Real Quantity}$
- $\text{Nominal Price/Price index} = \text{Relative Price}$

Nominal vs. Real



— GDP — GDP05

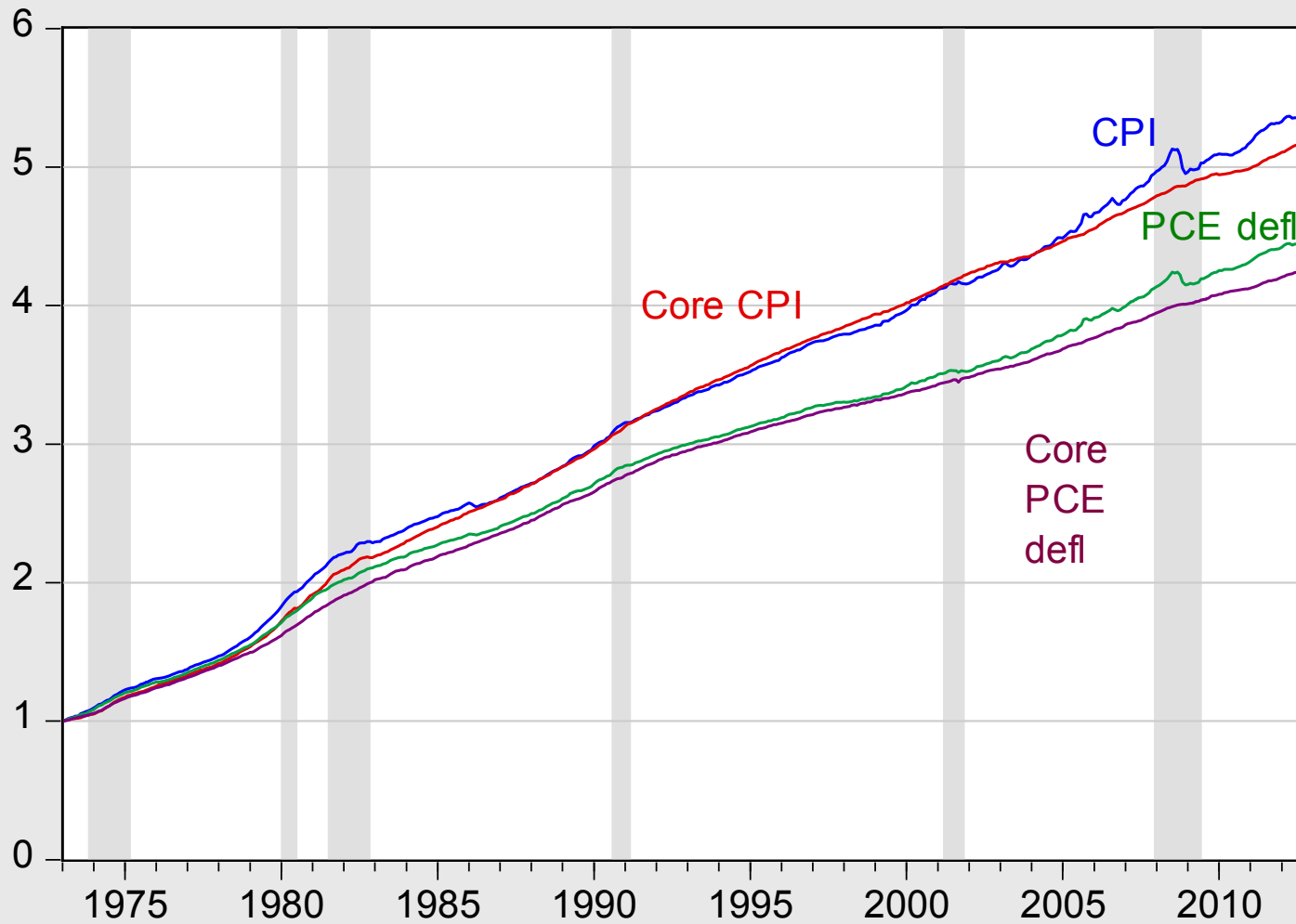
Relative Price (of Oil)



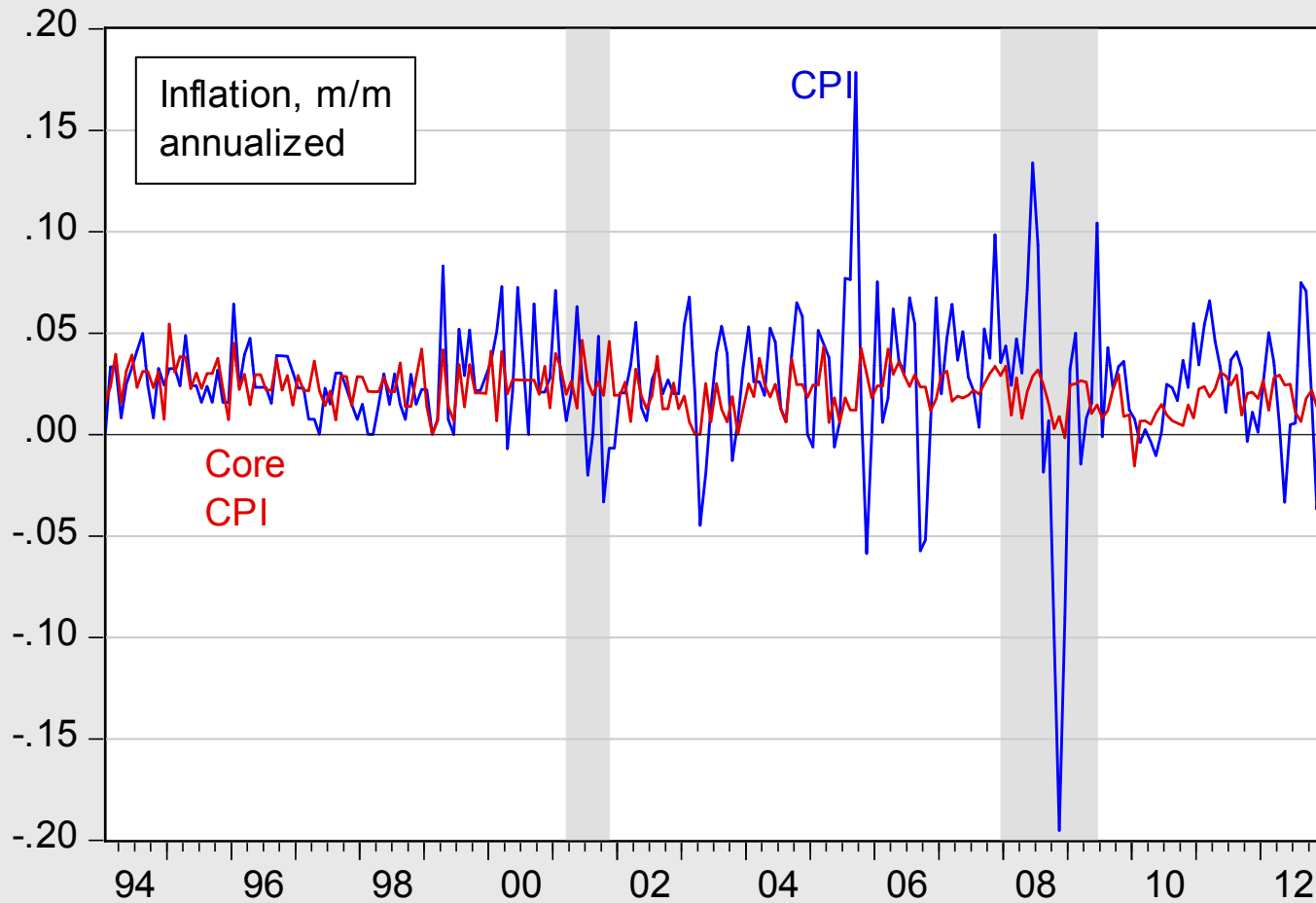
Price Level vs. Inflation

- Let P = price level
- Inflation = *percent* rate of change of price level
- Standard definition: $\pi_t = (P_t - P_{t-1})/P_{t-1}$ (on annual basis)
- Sometimes, a continuously compounded definition is used:
- $\pi_t = \ln(P_t) - \ln(P_{t-1})$
- Standard variables: CPI, core CPI, PCE

Price Levels



Inflation: Total vs. Core



Inflation, m/m
annualized

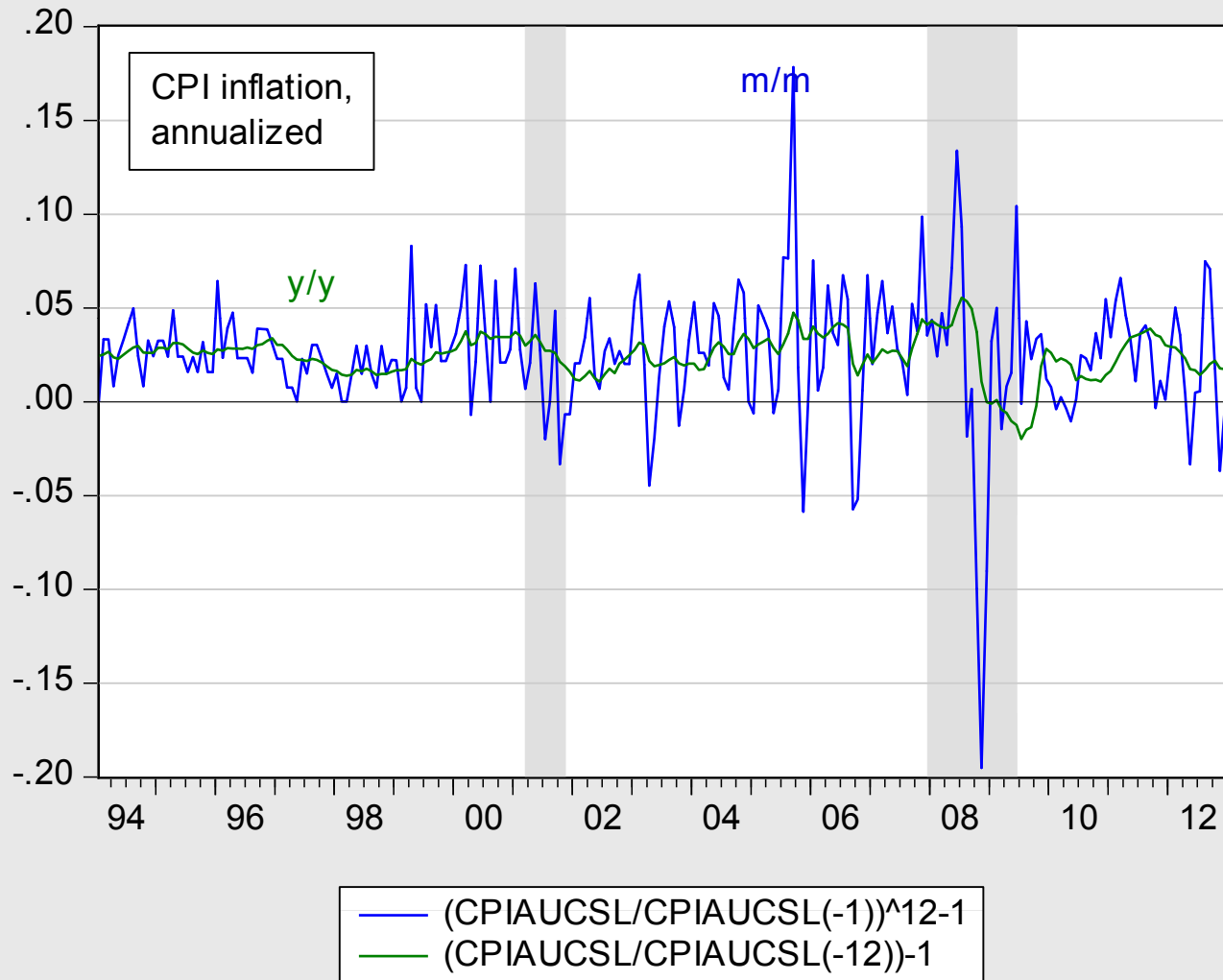
CPI

Core
CPI

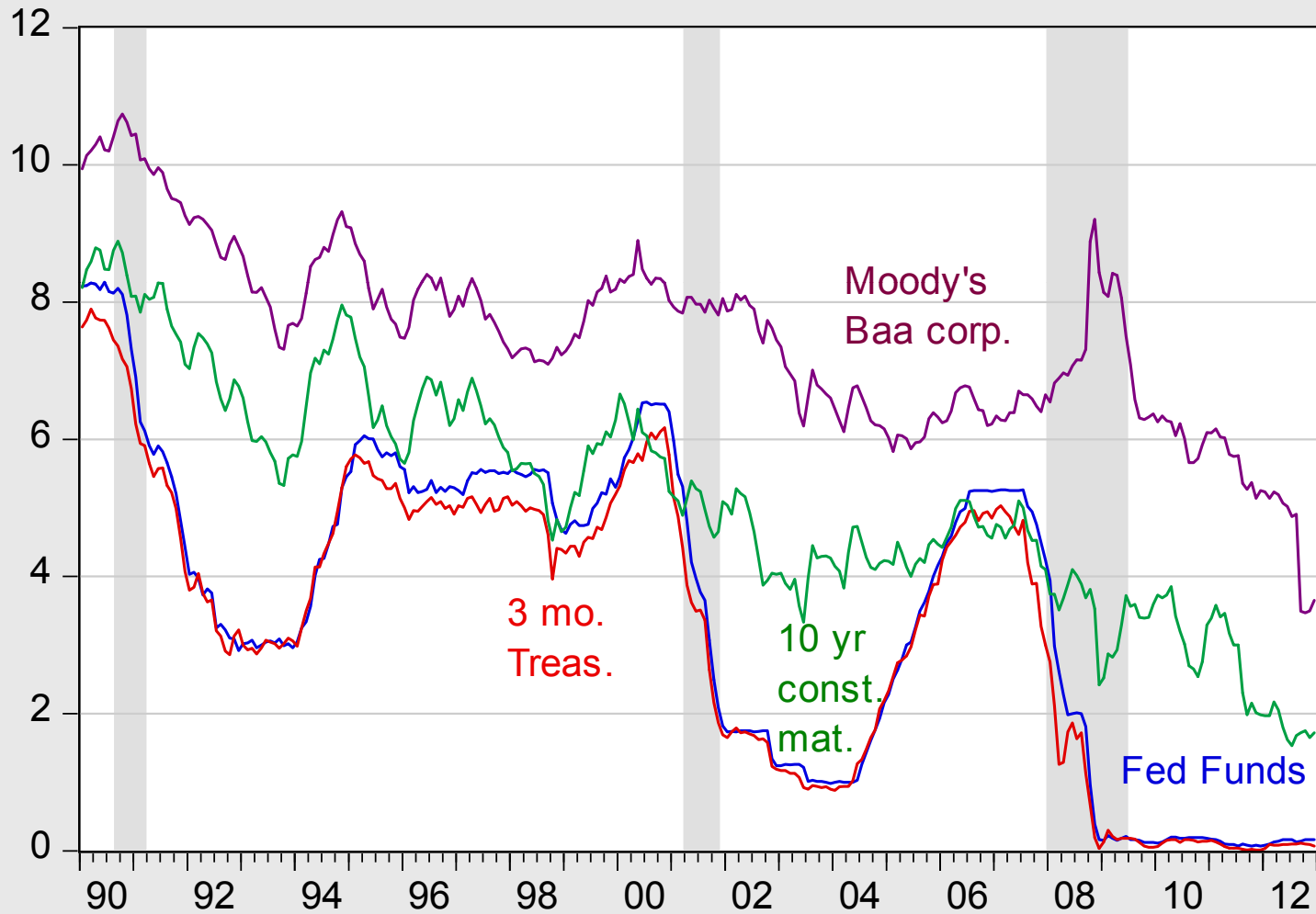
— (CPIAUCSL/CPIAUCSL(-1))^12-1
— (CPILFESL/CPILFESL(-1))^12-1

Inflation: M/M vs. Y/Y

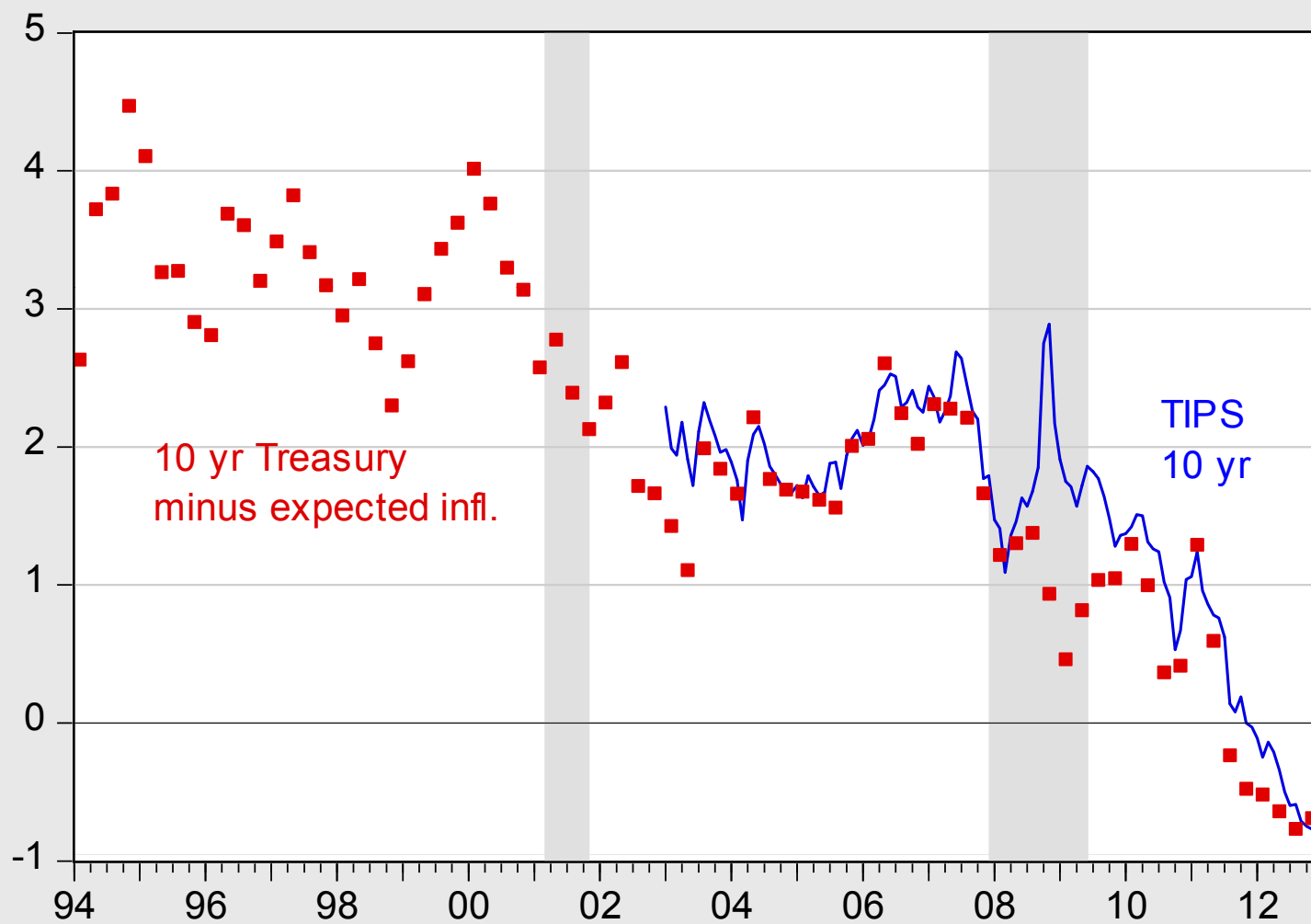
(corrected 1/29)



Nominal Interest Rates



Real Interest Rates



Accounting, Exchange Rates

- Balance of payments accounting
- Exchange rates
- Foreign exchange markets

Balance of Payments Accounting

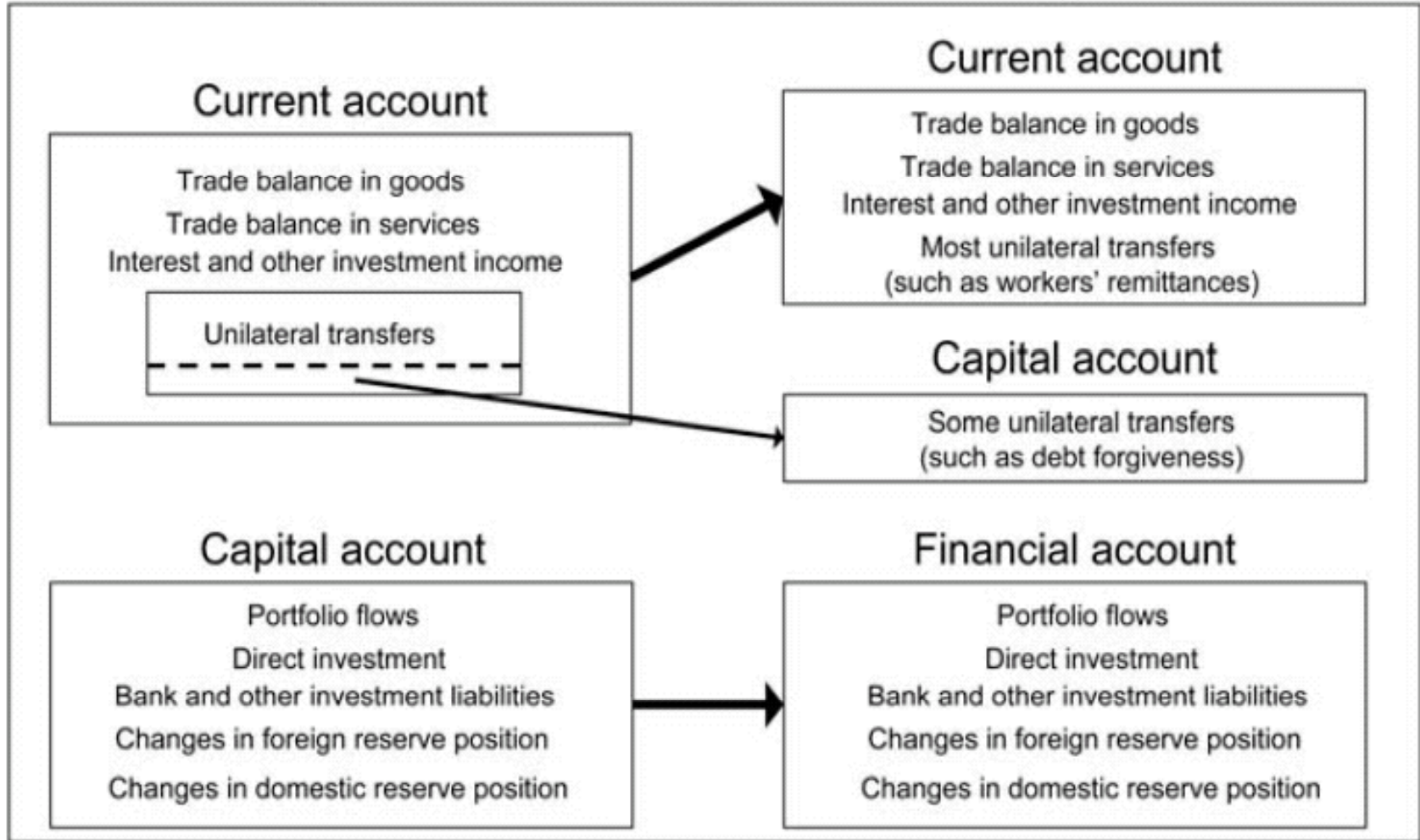
$$\begin{array}{ccccccc} \text{CA} & + & \text{KA} & + & \text{ORT} & & \equiv 0 \\ \text{"current a/c"} & & \text{"private financial a/c"} & & \text{"official financial a/c"} & & \end{array}$$

$$\text{CA} \equiv \text{TB} + \text{transfers} + \text{net income}$$

$$\text{TB} \equiv \text{EX} - \text{IM}$$

ORT is changes in holdings of central banks, monetary authorities

Chart 14-1 Changes to the Balance of Payments Terminology in 1999



Source: CEA, ERP 2004.

U.S. Current Account

[Millions of dollars; quarterly data seasonally adjusted. Credits (+), debits (-)]

Period	Goods ¹			Services			Balance on goods and services	Income receipts and payments			Unilateral current transfers, net ³	Balance on current account
	Exports	Imports	Balance on goods	Net military transactions ²	Net travel and transportation	Other services, net		Receipts	Payments	Balance on income		
2002	697,439	-1,171,930	-474,491	-12,719	-4,465	74,242	-417,432	282,701	-257,526	25,175	-64,990	-457,248
2003	729,816	-1,270,225	-540,409	-17,060	-12,451	78,934	-490,984	322,411	-278,721	43,691	-71,796	-519,089
2004	821,986	-1,485,492	-663,507	-17,359	-16,225	91,734	-605,356	415,793	-350,712	65,081	-88,243	-628,519
2005	911,686	-1,692,416	-780,730	-15,594	-14,549	102,249	-708,624	537,339	-468,748	68,591	-105,741	-745,774
2006	1,039,406	-1,875,095	-835,689	-11,743	-11,276	105,420	-753,288	684,620	-640,438	44,182	-91,515	-800,621
2007	1,163,957	-1,982,843	-818,886	-10,826	2,599	130,386	-696,728	833,834	-732,349	101,485	-115,061	-710,303
2008	1,307,499	-2,137,608	-830,109	-13,600	16,365	129,006	-698,338	813,903	-666,814	147,089	-125,885	-677,135
2009	1,069,733	-1,575,491	-505,758	-14,461	14,527	126,538	-379,154	601,609	-481,891	119,717	-122,459	-381,896
2010	1,288,882	-1,934,006	-645,124	-15,639	21,257	144,769	-494,737	676,282	-492,423	183,859	-131,074	-441,951
2011	1,497,406	-2,235,819	-738,413	-11,564	31,339	158,758	-559,880	744,621	-517,614	227,007	-133,053	-465,926
2010: I	304,032	-456,570	-152,538	-4,120	5,206	33,501	-117,952	161,964	-120,325	41,639	-34,681	-110,994
II	315,478	-480,118	-164,640	-3,799	5,543	35,209	-127,687	166,292	-118,607	47,685	-31,710	-111,713
III	325,198	-492,068	-166,871	-3,711	4,644	36,801	-129,137	171,310	-123,532	47,778	-33,216	-114,574
IV	344,175	-505,250	-161,075	-4,009	5,863	39,258	-119,962	176,716	-129,958	46,758	-31,466	-104,671
2011: I	360,917	-542,276	-181,358	-3,448	6,063	41,518	-137,225	180,781	-128,330	52,451	-35,223	-119,997
II	372,160	-559,344	-187,184	-3,000	8,038	40,598	-141,549	189,499	-133,290	56,209	-33,777	-119,117
III	382,161	-562,778	-180,617	-2,679	9,431	39,044	-134,822	187,449	-128,971	58,478	-31,815	-108,158
IV	382,167	-571,421	-189,254	-2,437	7,805	37,600	-146,286	186,891	-127,022	59,869	-32,240	-118,656
2012: I	388,523	-582,821	-194,298	-2,432	7,617	40,749	-148,364	184,708	-137,277	47,431	-32,692	-133,624
II ^r	394,114	-579,850	-185,736	-2,459	9,403	41,370	-137,423	184,002	-131,949	52,054	-32,743	-118,112
III ^p	393,395	-567,294	-173,899	-1,864	10,306	40,970	-124,488	184,416	-133,596	50,820	-33,839	-107,507

¹ Adjusted from Census data to align with concepts and definitions used to prepare the international and national economic accounts. The adjustments are necessary to supplement coverage of Census data, to eliminate duplication of transactions recorded elsewhere in the international accounts, to value transactions according to a standard definition, and for earlier years, to record transactions in the appropriate period.

² Transfers under U.S. military agency sales contracts (exports) minus direct defense expenditures (imports).

³ Includes transfers of goods and services under U.S. military grant programs.

See p. 37 for continuation of table.

Source: *Economic Indicators*, Dec. 2012

Financial Account

[Millions of dollars; quarterly data seasonally adjusted. Credits (+), debits (-)]

Period	Capital account transactions, net	Financial account							Statistical discrepancy		U.S. official reserve assets, net (unadjusted, end of period) ⁴	
		U.S.-owned assets abroad, excluding financial derivatives [increase/financial outflow (-)]				Foreign-owned assets in the U.S., excluding financial derivatives [increase/financial inflow (+)]			Financial derivatives, net	Total (sum of the items with sign reversed)		Of which: Seasonal adjustment discrepancy
		Total	U.S. official reserve assets ⁴	Other U.S. Government assets	U.S. Private assets	Total	Foreign official assets	Other foreign assets				
2002	-141	-294,646	-3,681	345	-291,310	795,161	115,945	679,216	.....	-43,126	.....	79,006
2003	-1,821	-325,424	1,523	537	-327,484	858,303	278,069	580,234	.....	-11,969	.....	85,938
2004	3,049	-1,000,870	2,805	1,710	-1,005,385	1,533,201	397,755	1,135,446	.....	93,138	.....	86,824
2005	13,116	-546,631	14,096	5,539	-566,266	1,247,347	259,268	988,079	.....	31,942	.....	65,127
2006	-1,788	-1,285,729	2,374	5,346	-1,293,449	2,065,169	487,939	1,577,230	29,710	-6,742	.....	65,895
2007	384	-1,453,604	-122	-22,273	-1,431,209	2,064,642	481,043	1,583,599	6,222	92,660	.....	70,565
2008	6,010	332,109	-4,848	-529,615	866,571	431,406	554,634	-123,228	-32,947	-59,443	.....	77,648
2009	-140	-119,535	-52,256	541,342	-608,622	314,390	480,286	-165,896	44,816	142,365	.....	130,760
2010	-157	-939,484	-1,834	7,540	-945,189	1,308,279	398,188	910,091	14,076	59,237	.....	132,433
2011	-1,212	-483,653	-15,877	-103,666	-364,110	1,000,990	211,826	789,164	39,010	-89,208	.....	147,953
2010: I	-3	-269,433	-773	9,433	-278,092	311,935	89,961	221,974	16,152	52,342	16,062	127,521
2010: II	-2	-154,408	-165	-2,441	-151,802	170,919	65,838	105,081	9,980	85,224	-8,819	124,514
2010: III	-146	-294,523	-1,096	788	-294,215	512,515	168,611	343,904	-11,893	-91,379	-22,075	133,099
2010: IV	-7	-221,120	200	-240	-221,080	312,910	73,778	239,132	-163	13,051	14,832	132,433
2011: I	-29	-372,944	-3,619	-547	-368,778	578,972	72,974	505,998	2,927	-88,930	17,684	139,315
2011: II	-829	7,418	-6,267	-1,358	15,042	98,554	121,822	-23,268	7,419	6,555	-11,134	147,660
2011: III	-300	-91,896	-4,079	-1,137	-86,679	266,397	19,889	246,508	-3,949	-62,094	-26,771	148,487
2011: IV	-55	-26,231	-1,912	-100,624	76,305	57,067	-2,859	59,926	32,613	55,263	20,223	147,953
2012: I	-1	106,549	-1,233	51,076	56,706	59,564	69,711	-10,147	-1,396	-31,092	19,501	149,078
2012: II ^r	-291	248,186	-3,289	16,650	234,826	-143,607	79,772	-223,379	464	13,360	-11,580	149,830
2012: III ^p	.....	-229,774	-833	14,151	-243,092	281,960	130,281	151,679	-6,406	61,727	-27,070	153,075

⁴ Consists of gold, special drawing rights (SDRs), foreign currencies, and the U.S. reserve position in the International Monetary Fund (IMF).

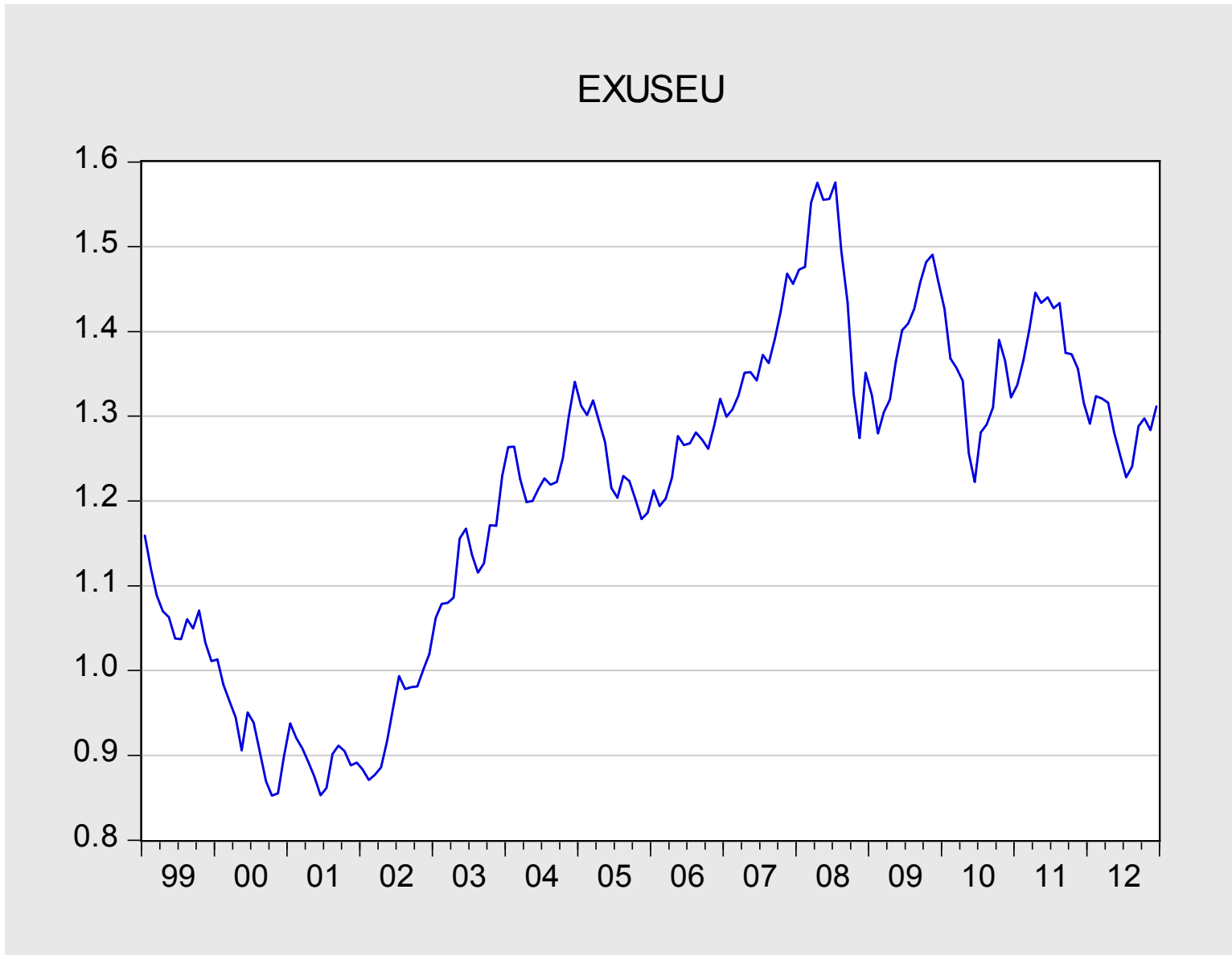
Sources: Department of Commerce (Bureau of Economic Analysis) and Department of the Treasury.

Source: *Economic Indicators*, Dec. 2012

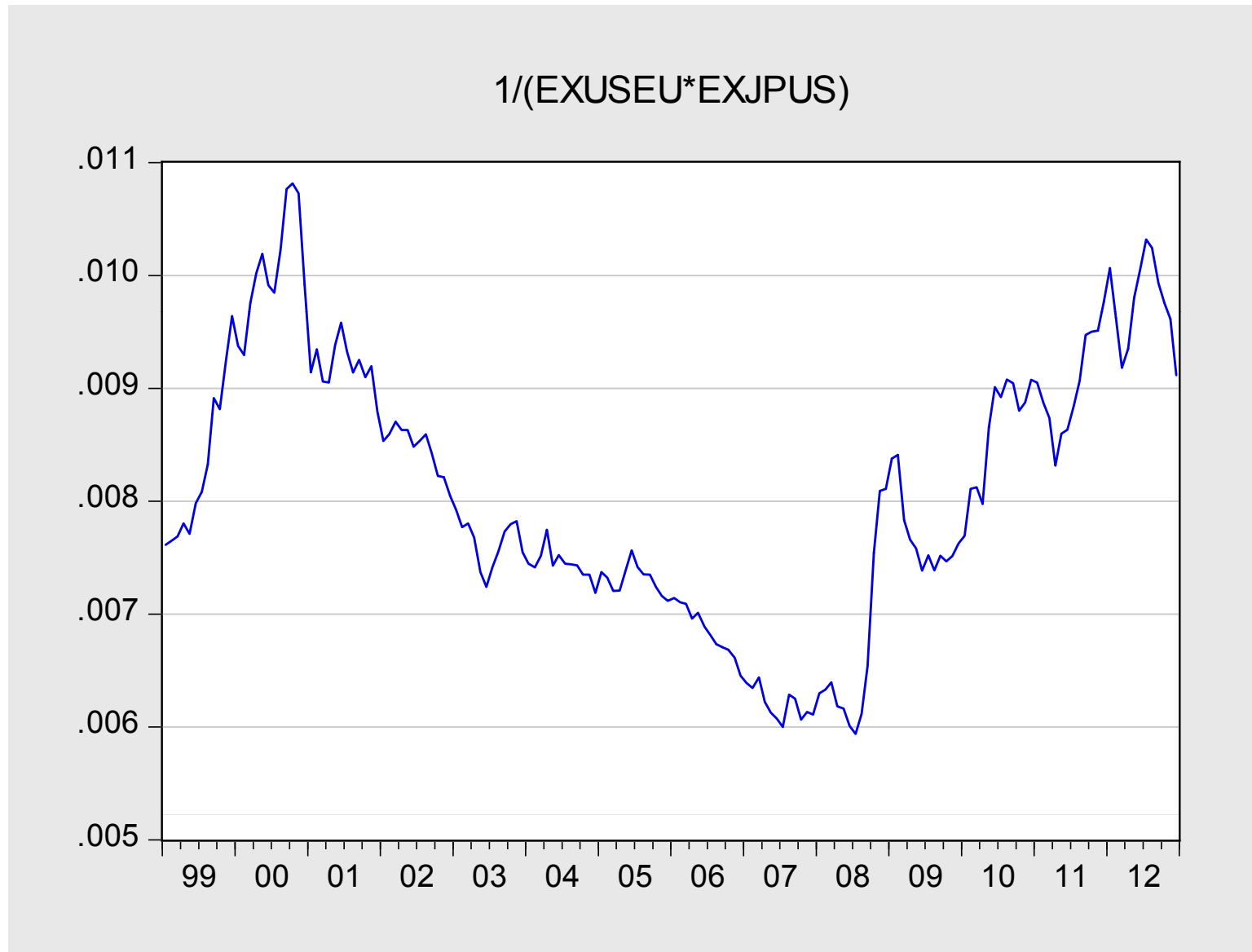
Definitions

- Exchange rates: number of home currency units required to purchase one unit of foreign currency; also price of foreign currency.
- E.g., from EU resident perspective: $\text{€}/\text{\$}$, $\text{€}/\text{¥}$
- E.g., from Chinese resident perspective: $\text{¥}/\text{\$}$

Example: \$/€

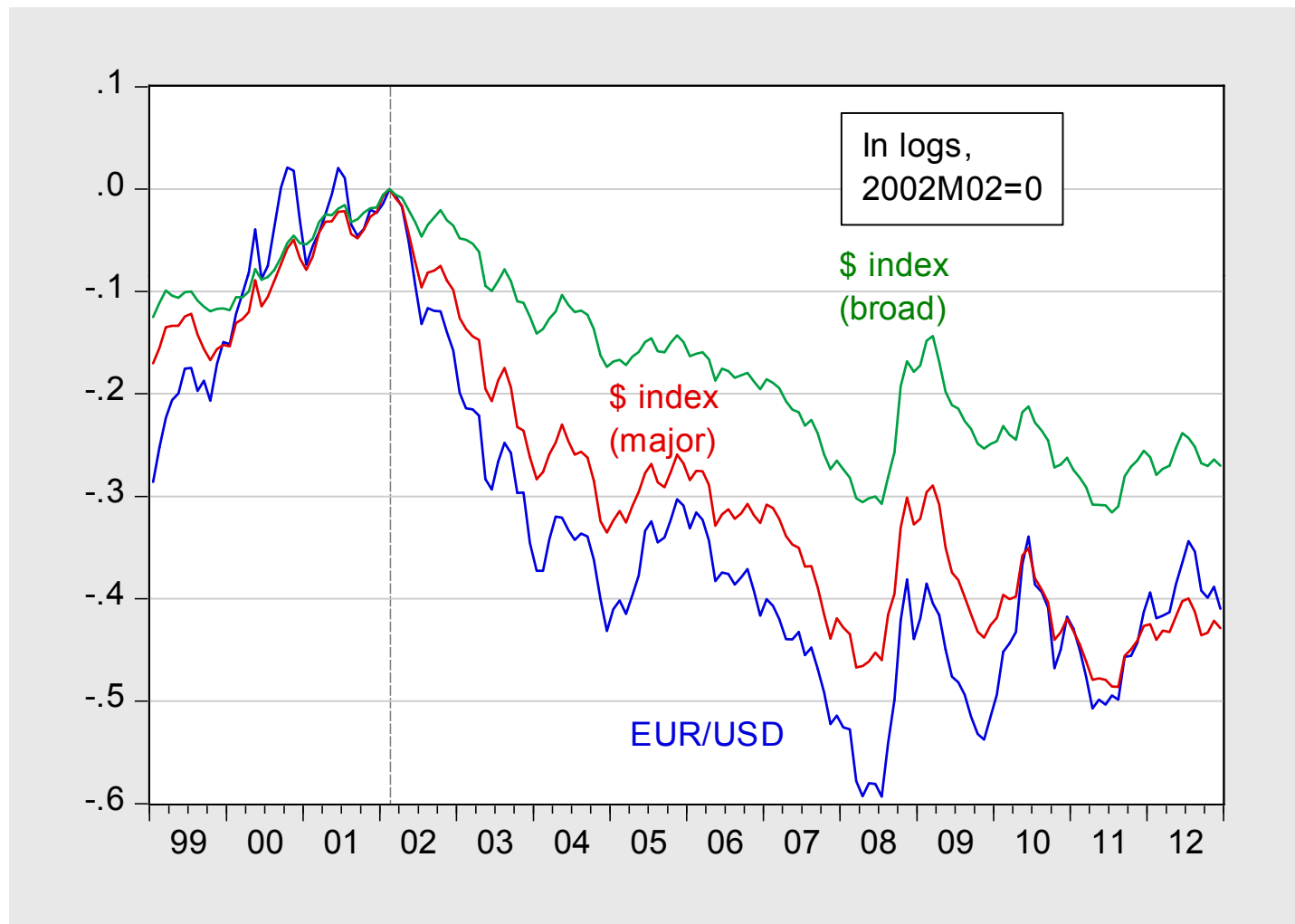


Example: €/¥



The *Value* of the Dollar

(vs. Euro, Trade Weighted basket [major, broad])



Source: Federal Reserve Board via FRED

The institutional features of the forex market

- Average turnover in April 2010 = USD4 trillion per day (vs. 3.3 trillion in 2007)
- Most trading volume between dealers, next most with financial institutions, next most with non-financials.
- USD, EUR, JPY, GBP, SFR most important in turnover.
- AUD moving up quickly.

Trends in FX Turnover

Global foreign exchange market turnover¹					
Daily averages in April, in billions of US dollars					
Instrument/maturity	1998	2001	2004	2007	2010
Foreign exchange instruments	1,527	1,239	1,934	3,324	3,981
Spot transactions ²	568	386	631	1,005	1,490
Outright forwards ²	128	130	209	362	475
Up to 7 days	65	51	92	154	219
Over 7 days	62	80	116	208	256
Foreign exchange swaps ²	734	656	954	1,714	1,765
Up to 7 days	528	451	700	1,329	1,304
Over 7 days	202	204	252	382	459
Currency swaps	10	7	21	31	43
Options and other products ³	87	60	119	212	207
<i>Memo:</i>					
<i>Turnover at April 2010 exchange rates⁴</i>	<i>1,705</i>	<i>1,505</i>	<i>2,040</i>	<i>3,370</i>	<i>3,981</i>
<i>Estimated gaps in reporting</i>	<i>49</i>	<i>30</i>	<i>116</i>	<i>152</i>	<i>144</i>
<i>Exchange-traded derivatives⁵</i>	<i>11</i>	<i>12</i>	<i>26</i>	<i>80</i>	<i>168</i>

¹ Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). ² Previously classified as part of the so-called "Traditional FX market". ³ The category "other FX products" covers highly leveraged transactions and/or trades whose notional amount is variable and where a decomposition into individual plain vanilla components was impractical or impossible. ⁴ Non-US dollar legs of foreign currency transactions were converted into original currency amounts at average exchange rates for April of each survey year and then reconverted into US dollar amounts at average April 2010 exchange rates. ⁵ Sources: FOW TRADEdata; Futures Industry Association; various futures and options exchanges. Reported monthly data were converted into daily averages of 20.5 days in 1998, 19.5 days in 2001, 20.5 in 2004, 20 in 2007 and 20 in 2010.

Table B.1

Source: BIS, *Triennial Central Bank Survey: Report on global foreign exchange market activity in 2010* (Nov. 2010).

Definitions of Terms

Spot transaction: single outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery.

Outright forward: transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery at some time in the future

Foreign exchange swap: transaction which involves the actual exchange of two currencies (principal amount only) on a specific date at a rate agreed at the time of the conclusion of the contract, and a reverse exchange of the same two currencies at a date further in the future at a rate agreed at the time of the contract.

Definition of Terms (cont'd)

Currency swap: contract which commits two counterparties to exchange streams of interest payments in different currencies for an agreed period of time and to exchange principal amounts in different currencies at a previously agreed exchange rate at maturity.

Currency option: Option contract that gives the right to buy or sell a currency with another currency at a specified exchange rate during a specified period.

Forward rate agreement (FRA): interest rate forward contract in which the rate to be paid or received on a specific obligation for a set period of time, beginning at some time in the future, is determined at contract initiation.

Definition of Terms (cont'd)

Interest rate swap: agreement to exchange periodic payments related to interest rates on a single currency.

Interest rate option: option contract that gives the right to pay or receive a specific interest rate on a predetermined principal for a set period of time.

FX Turnover

Global foreign exchange market turnover by currency pair¹

Daily averages in April, in billions of US dollars and percentages

Currency pair	2001		2004		2007		2010	
	Amount	%	Amount	%	Amount	%	Amount	%
US dollar/euro	372	30	541	28	892	27	1,101	28
US dollar/yen	250	20	328	17	438	13	568	14
US dollar/sterling	129	10	259	13	384	12	360	9
US dollar/Australian dollar	51	4	107	6	185	6	249	6
US dollar/Swiss franc	59	5	83	4	151	5	168	4
US dollar/Canadian dollar	54	4	77	4	126	4	182	5
US dollar/Swedish krona	6	0	7	0	57	2	45	1
US dollar/other	193	16	300	16	612	18	705	18
Euro/yen	36	3	61	3	86	3	111	3
Euro/sterling	27	2	47	2	69	2	109	3
Euro/Swiss franc	13	1	30	2	62	2	72	2
Euro/other	22	2	44	2	123	4	162	4
Other currency pairs	28	2	50	3	139	4	149	4
All currency pairs	1,239	100	1,934	100	3,324	100	3,981	100

¹ Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis).

Table B.6

Source: BIS, *Triennial Central Bank Survey: Report on global foreign exchange market activity in 2010* (Nov. 2010).

FX Trading Centers

Geographical distribution of global foreign exchange market turnover¹

Daily averages in April, in billions of US dollars and per cent

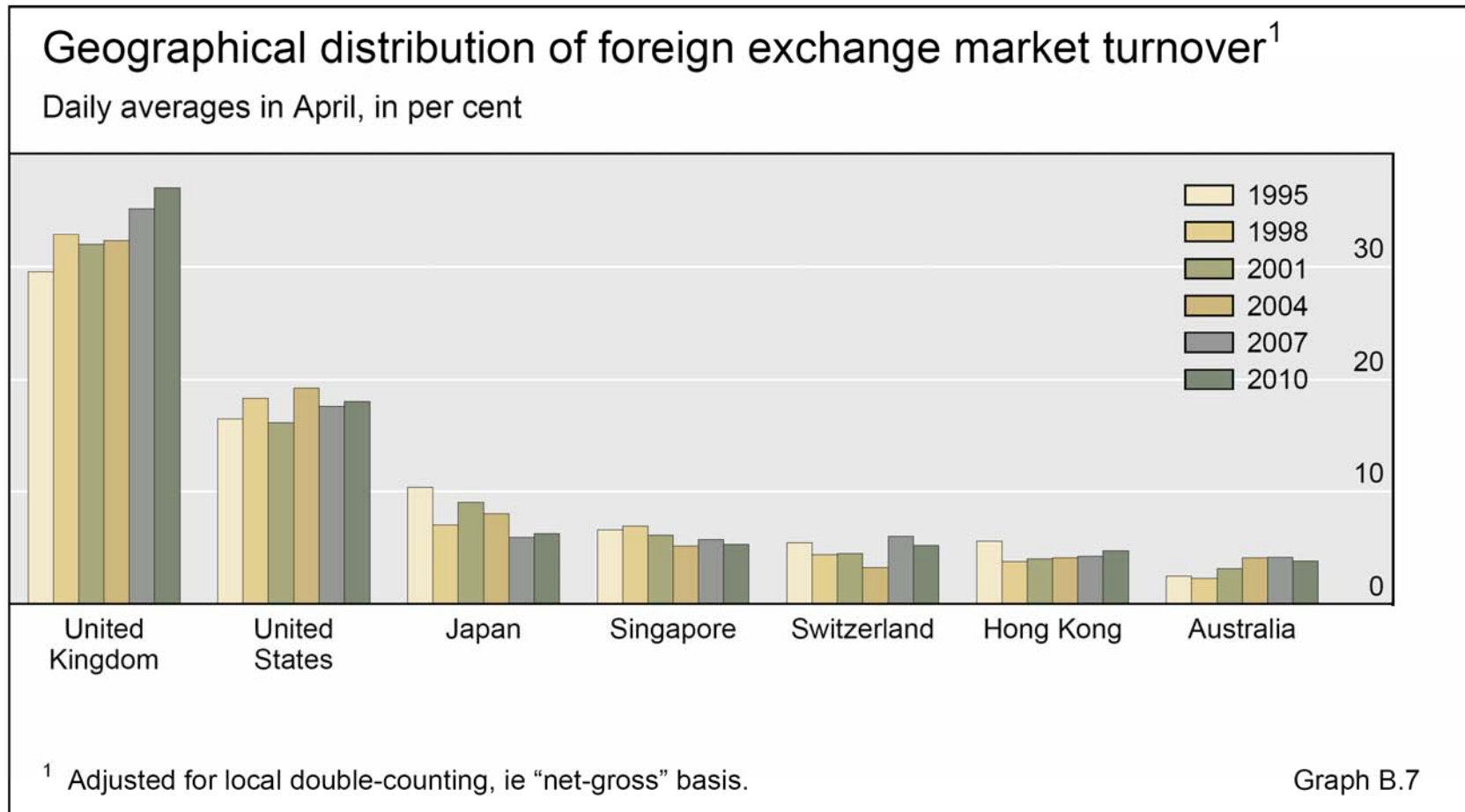
Country	1998		2001		2004		2007		2010	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Argentina	2	0	...	...	1	0	1	0	2	0
Australia	48	2	54	3	107	4	176	4	192	4
Austria	12	1	8	0	15	1	19	0	20	0
Bahrain	3	0	3	0	3	0	3	0	5	0
Belgium	27	1	10	1	21	1	50	1	33	1
Brazil ²	5	0	6	0	4	0	6	0	14	0
Bulgaria	...	...	...	...	...	...	1	0	1	0
Canada	38	2	44	3	59	2	64	1	62	1
Chile	1	0	2	0	2	0	4	0	6	0
China ³	0	0	...	...	1	0	9	0	20	0
Chinese Taipei	5	0	5	0	9	0	16	0	18	0
Colombia	...	...	0	0	1	0	2	0	3	0
Czech Republic	5	0	2	0	2	0	5	0	5	0
Denmark	28	1	24	1	42	2	88	2	120	2
Estonia	...	...	...	...	0	0	1	0	1	0
Finland	4	0	2	0	2	0	8	0	31	1
France	77	4	50	3	67	3	127	3	152	3
Germany	100	5	91	5	120	5	101	2	109	2
Greece	7	0	5	0	4	0	5	0	5	0
Hong Kong SAR	80	4	68	4	106	4	181	4	238	5

Hungary	1	0	1	0	3	0	7	0	4	0
India	2	0	3	0	7	0	38	1	27	1
Indonesia	2	0	4	0	2	0	3	0	3	0
Ireland	11	1	9	1	8	0	11	0	15	0
Israel	...	...	1	0	5	0	8	0	10	0
Italy	29	1	18	1	23	1	38	1	29	1
Japan	146	7	153	9	207	8	250	6	312	6
Korea	4	0	10	1	21	1	35	1	44	1
Latvia	...	...	...	...	2	0	3	0	2	0
Lithuania	...	...	...	...	1	0	1	0	1	0
Luxembourg	23	1	13	1	15	1	44	1	33	1
Malaysia	1	0	1	0	2	0	3	0	7	0
Mexico	9	0	9	1	15	1	15	0	17	0
Netherlands	43	2	31	2	52	2	25	1	18	0
New Zealand	7	0	4	0	7	0	13	0	9	0
Norway	9	0	13	1	14	1	32	1	22	0
Peru	...	...	0	0	0	0	1	0	1	0
Philippines	1	0	1	0	1	0	2	0	5	0
Poland	3	0	5	0	7	0	9	0	8	0
Portugal	4	0	2	0	2	0	4	0	4	0
Romania	...	...	...	...	...	...	3	0	3	0
Russia	7	0	10	1	30	1	50	1	42	1
Saudi Arabia	2	0	2	0	2	0	4	0	5	0
Singapore	145	7	104	6	134	5	242	6	266	5
Slovakia	...	...	1	0	2	0	3	0	0	0
Slovenia	...	...	0	0	0	0	0	0	...	...
South Africa	9	0	10	1	10	0	14	0	14	0
Spain	20	1	8	0	14	1	17	0	29	1
Sweden	16	1	25	1	32	1	44	1	45	1
Switzerland	92	4	76	4	85	3	254	6	263	5
Thailand	3	0	2	0	3	0	6	0	7	0
Turkey	...	...	1	0	3	0	4	0	17	0
United Kingdom	685	33	542	32	835	32	1,483	35	1,854	37
United States	383	18	273	16	499	19	745	17	904	18
Total⁴	2,099	100	1,705	100	2,608	100	4,281	100	5,056	100

¹ Adjusted for local inter-dealer double-counting (ie "net-gross" basis). ² Data for 1998 only cover spot transactions. ³ Data from 1998 to 2004 only cover spot transactions. ⁴ Estimated coverage of the FX market ranged between 90% and 100% in most countries.

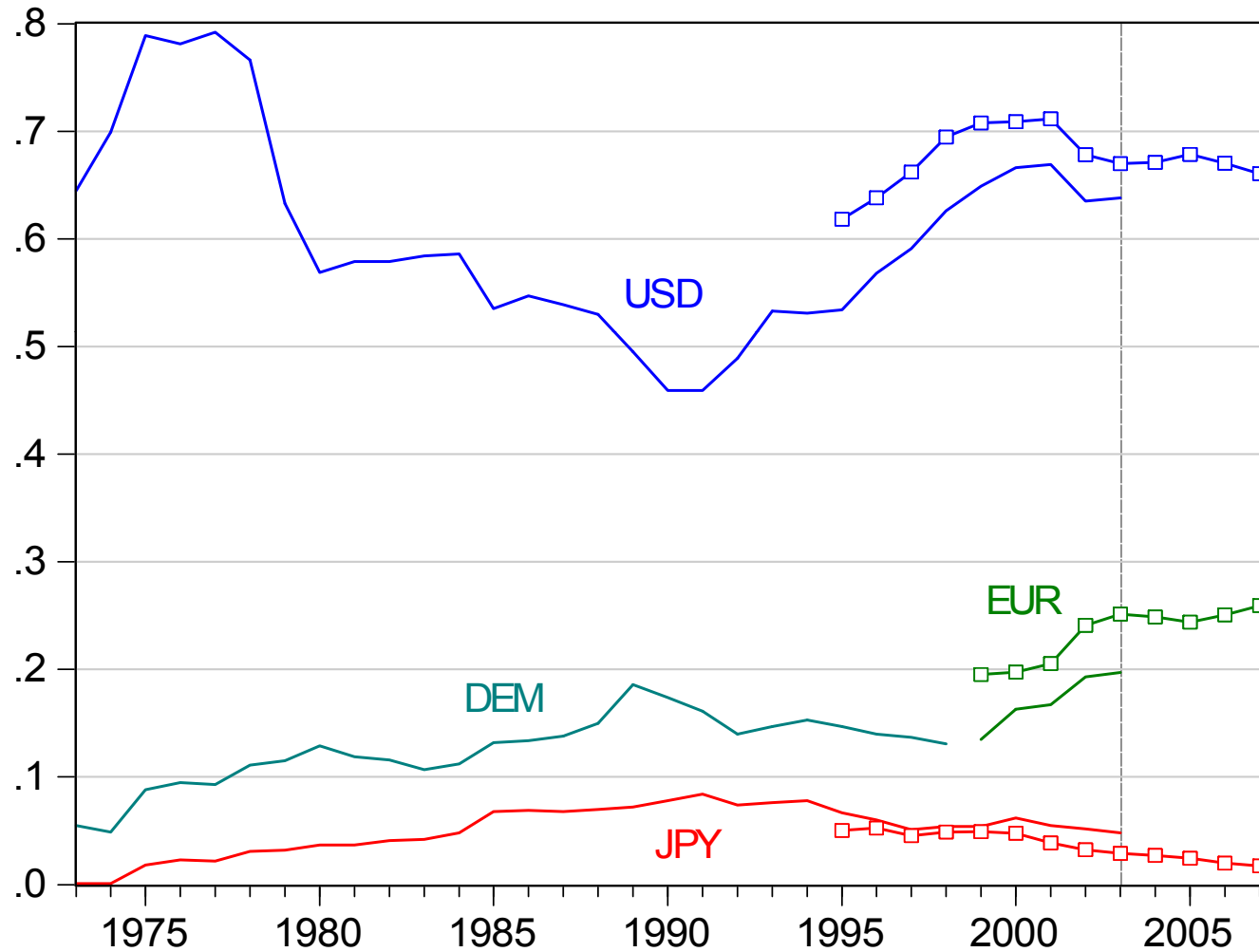
Table B.8

Time series: geographical dist'n



Source: BIS, *Triennial Central Bank Survey: Report on global foreign exchange market activity in 2010* (Nov. 2010).

Central bank holdings of reserve currencies



Source: Chinn and Frankel, in *International Finance* (2008)