Topics in FX Futures

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Outline

- Market Development
- Fostering Market Liquidity
- Fundamental FX Analysis
- Classical Exchange Rate Theories
- The Carry Trade
- Commodity Countries
- Cross-Border Capital Flows
- Technical Factors

Market Development

Historical developments …

- Birth of Financial Futures
  - Currency futures invented when Bretton Woods broke down in 1972
  - 1st interest rate futures (CBOT GNMA CDRs) in 1975 … followed by T-bond futures (1977), T-bill futures (1977), Eurodollar futures (1981), etc.
  - Stock index futures introduced in 1982
- Fed Chairman Volcker and the fight against inflation
  - Restricted money supply growth, resulted in interest rate volatility
  - Impetus shifted from commodity to financial futures
  - OTC derivatives including interest rate swaps (IRS) on parallel path with futures
  - Options on futures introduced in 1982
- Market trends enhanced interest in derivatives
  - Basle Accord of 1988 created demand for government securities
  - Credit incidents, *e.g.,* Asian financial crisis, LTCM, dot-com bubble, subprime mortgage crisis … provided impetus for growth of OTC credit derivatives

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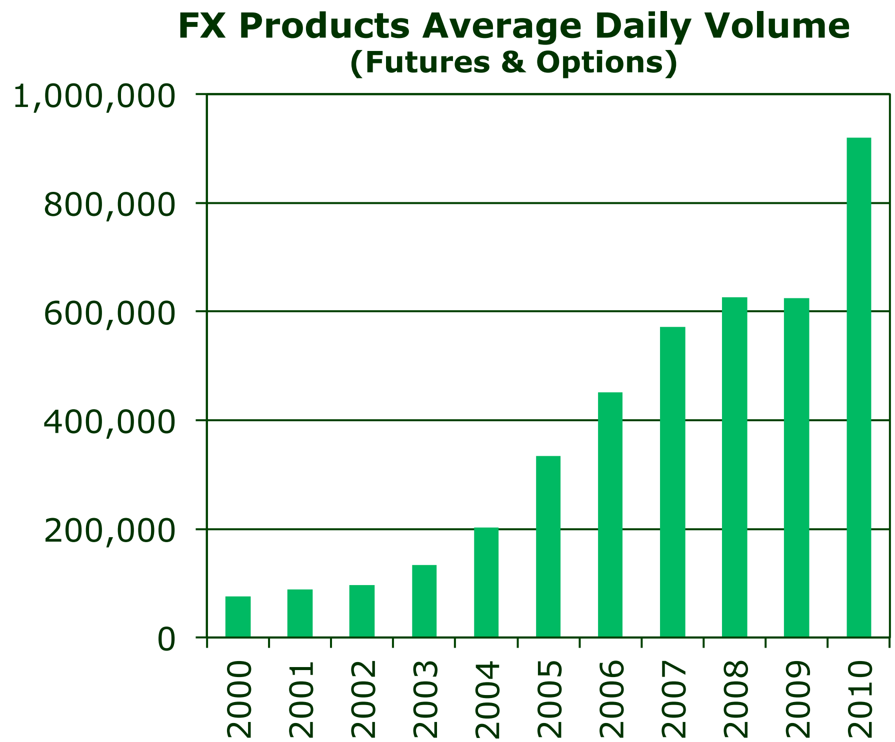
Market Development

FX futures & options …

- **Available for many FX pairs … EUR/USD, JPY/USD, GBP/USD, CHF/USD, AUD/USD, CAD/USD, BRL/USD, MXN/USD, etc.**
- **Also "cross-rate" pairings … EUR/GBP, EUR/JPY, EUR/CHF, GBP/CHF, GBP/JPY, etc.**
- **Some contracts call for physical delivery … others are cash-settled or "NDF-style"**



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Market Development

Trends contributing to growth ……

- Recognition of FX as legitimate asset class
  - Low rates, poor equity returns prompt "search for alpha" over benchmark return … shift from passive to active strategies … see hedge fund growth
- CME Globex® fosters liquidity … low transaction costs in transparent, competitive electronic trading venue
  - "Open access" policy offers direct access to Globex on global basis
  - Handles > 1 billion orders monthly with average response < 20 milliseconds
- Financial sureties offered by CME Clearing House
  - Counterparty credit risk is significant … particularly after subprime crisis
  - Centralized counterparty (CCP) clearing = financial confidence & capital efficiency

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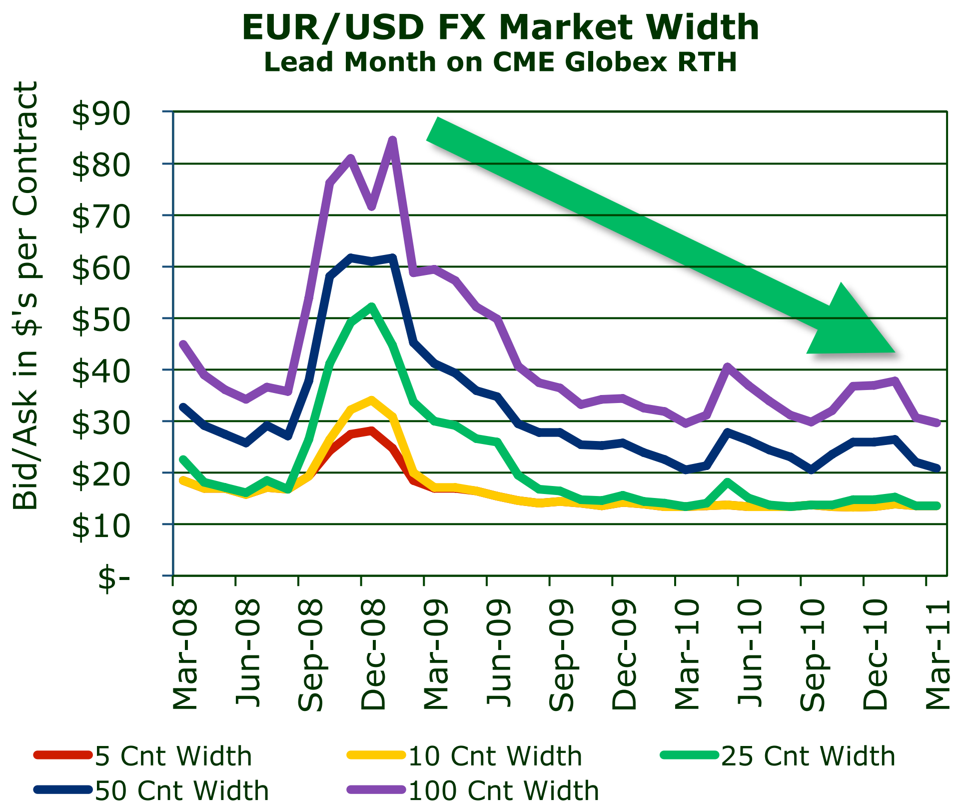
Fostering Market Liquidity

Market width …

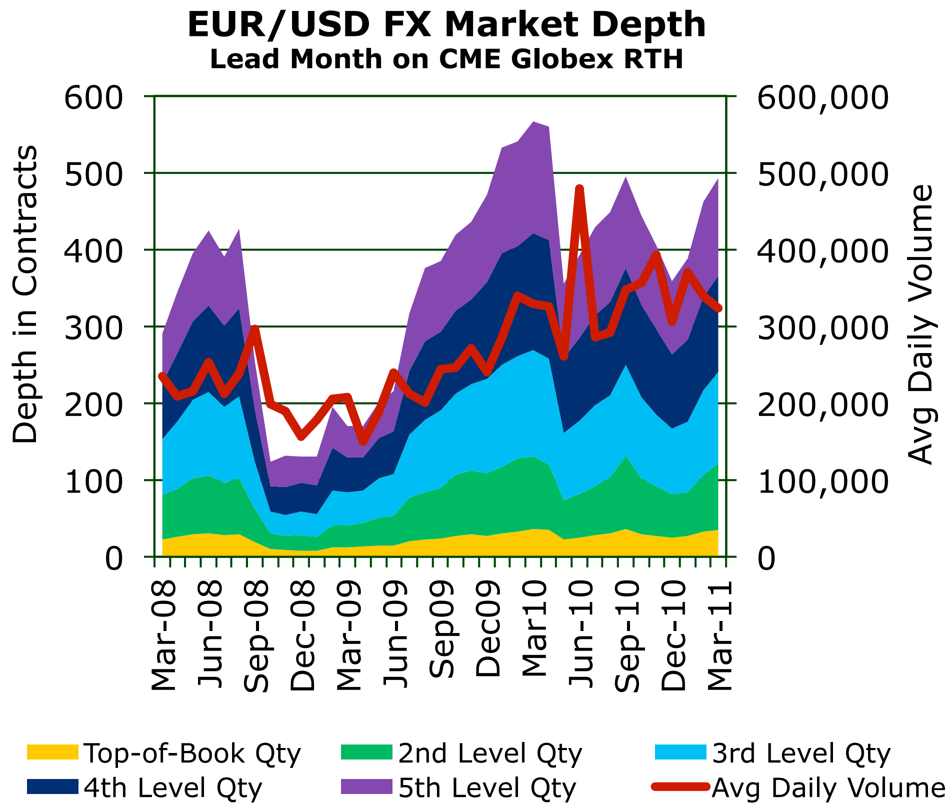
- **Bid-ask spread in EUR/USD futures for 25-lot order averaged $13.53 in Mar-11**
  - **Tick size = $12.50**



Fostering Market Liquidity

Market depth …

- **Some 35 contracts shown at top-of-book for EUR/USD futures in Mar-11**



Fostering Market Liquidity

Algorithmic trading

- Growing activity from automated or "algo" traders
- Measured by volume or message traffic
- Our studies show that algo trading enhanced liquidity and tempers volatility

1st Quarter 2011 "Algo" Activity

	Total	Algo	%
10-year T-note futures			
Electronic Volume	161,142,402	66,941,722	41.54%
Message Traffic	739,549,339	423,432,810	57.26%
Eurodollar futures (5th month)			
Electronic Volume	153,295,430	70,395,774	45.92%
Message Traffic	919,695,495	481,855,868	52.39%
E-mini S&P 500 futures			
Electronic Volume	135,198,497	63,333,831	46.85%
Message Traffic	250,264,280	138,157,421	55.20%
Euro FX futures			
Electronic Volume	21,676,260	10,819,567	49.91%
Message Traffic	259,604,788	169,716,535	65.37%

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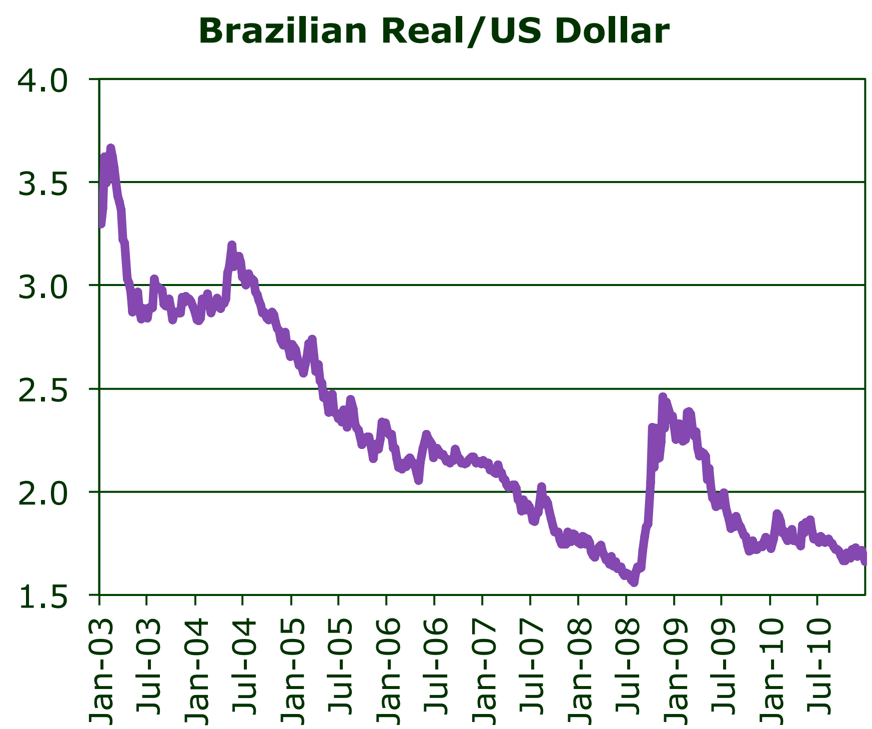
Fundamental FX Analysis

FX analysts focus on …

- Economic growth & inflation outlooks, monetary policy, fiscal policies, current account balances
- *E.g.,* Brazilian real vs. U.S. dollar



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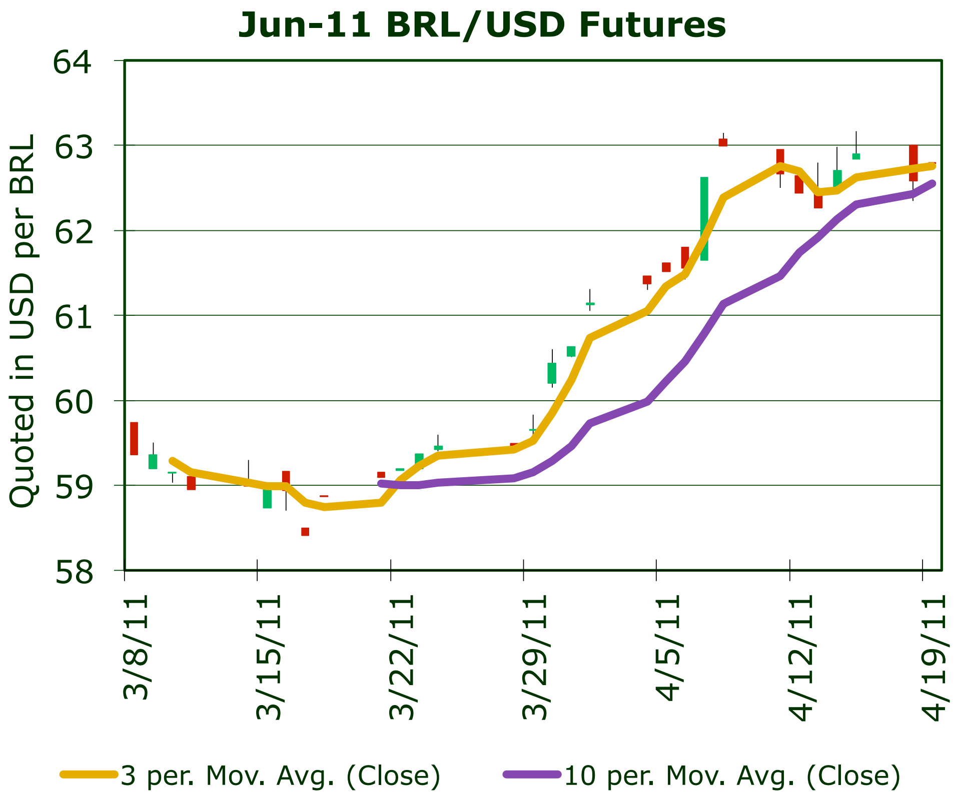
Fundamental FX Analysis

CME BRL/USD futures…

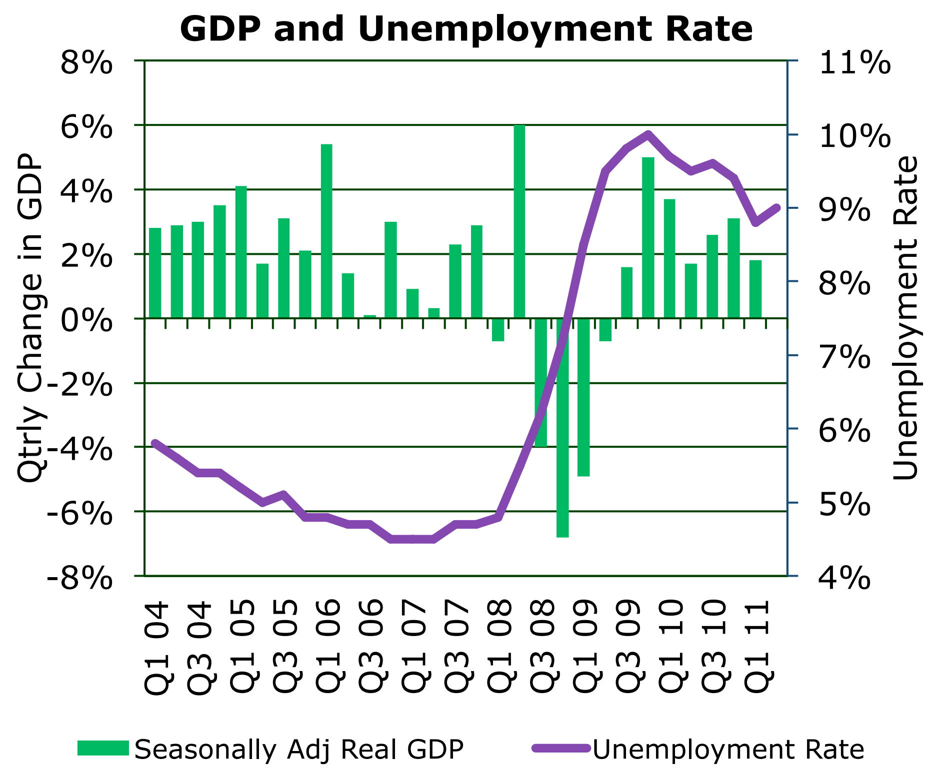
- **Based on 100,000 BRL**
- **Cash settled to Central Bank of Brazil PTAX rate on last day of month prior to contract month**
- **Listed 10 years into future**
- **Quoted in USD per BRL, *e.g.*, 0.6250 (= 1.6 BRL per USD)**
- **Tick = $0.00005 ($5)**



Fundamental FX Analysis

Moderate U.S. growth …

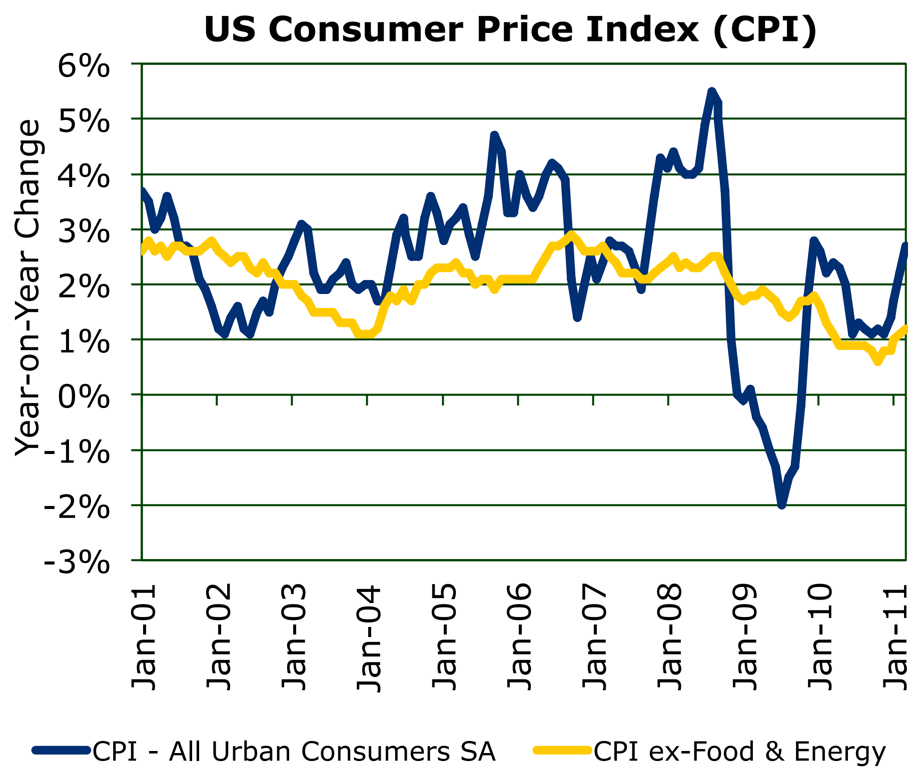
- **U.S. GDP at +1.8% in Q1 2011 … recovered from -6.8% in Q1 2009 near height of crisis**
- **U.S. unemployment rate at 9.0% in Apr-11 … down from Oct-09 peak of 10.1% … but uptick from 8.8% in Mar-11**



Fundamental FX Analysis

U.S. inflation …

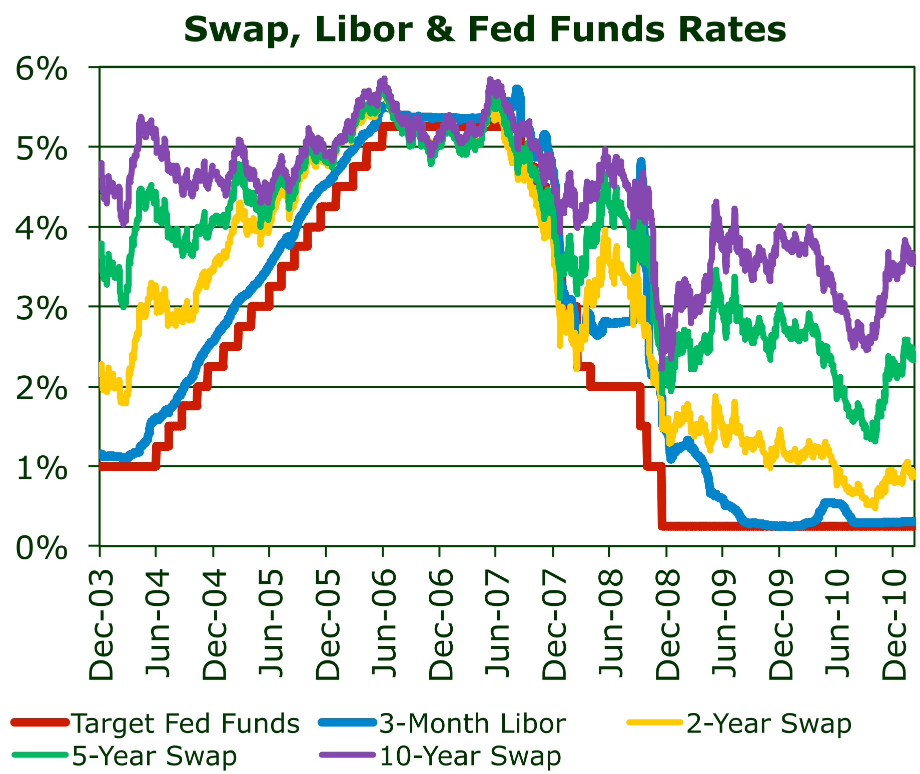
- **Economic growth and commodity prices creating muted inflation**
- **Fiscal stimulus, quantitative easing, expansion of Fed balance sheet resulted in more inflationary fear than real inflation**
  - **Conservative consumer response to crisis resulted in net “debt destruction”**



Fundamental FX Analysis

U.S. monetary & fiscal policies …

- **Short-term rates driven by monetary policy … target Fed Funds at 0-0.25% … not expected to change until 2012**
- **Signs of Federal fiscal restraint in current budget debate … but likely not enough**



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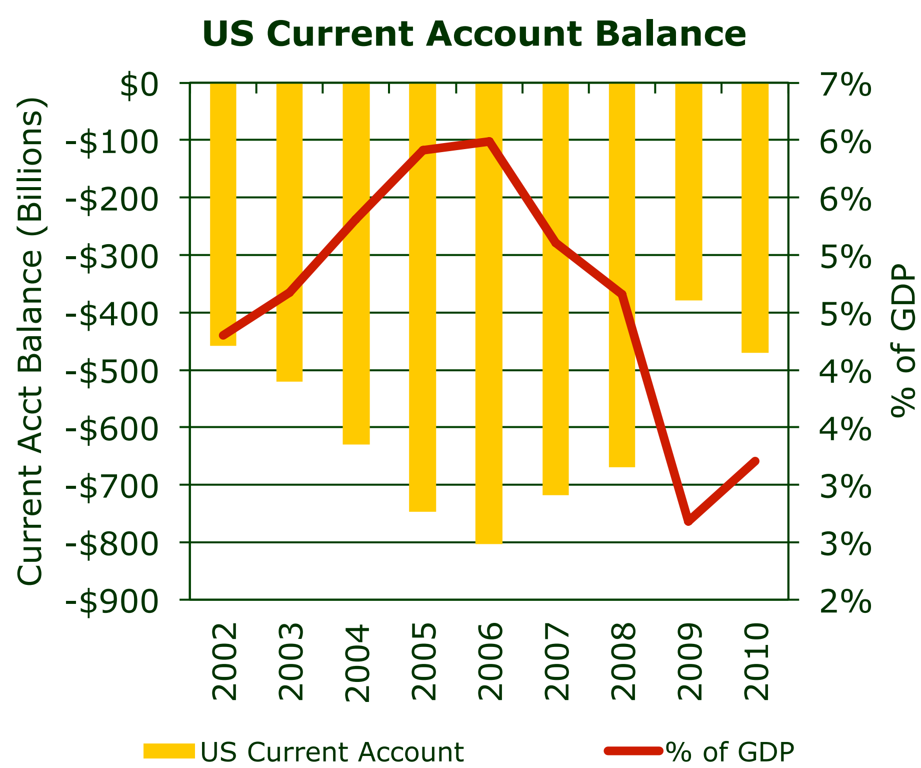
Fundamental FX Analysis

Current account …

- **U.S. current account deficit was $470 trillion or 3.2% of GDP in 2010**
- **Better than $803 trillion deficit in 2006 … but U.S. still running worst balance of payments (BOP) of G10 nations as % of GDP**



Fundamental FX Analysis

Comparative outlook …

	United States	Brazil
Growth & Inflation	Moderate growth and inflation expected. Q4-10 GDP of 3.1% slipped to 1.8% in Q1-11 but 3.5%-4% GDP expected in 2012	Growth expected to moderate from +7.5% in 2010 to 4-5% in 2011. Inflation may rise to 6-7% range in 2011 from +5.9% in 2010
Monetary Policy	Target Fed Funds at 0-0.25%. Because Fed responsible for growth and inflation, consensus suggests that easy money policy may endure until 2012	SELIC rate targeted at 11.75% along with increased reserve requirements may moderate growth. Brazil imposed 6% tax on Cupom Cambial rate (effectively local US dollar borrowing rate) pushing rate to 4.4% to stem BRL advance
Fiscal Policy	Modest fiscal tightening expected but major tightening needed	Expansionary fiscal policy in recent years driven by payroll and social spending. Budget cuts announced but more probably needed. Government has used tax code in attempt to stem BRL advance
Balance of Payments	Current account deficit of $803 trillion in 2010 was at 3.2% and worst of all G10 nations	Current account deficit at $47.5 billion (USD) in 2010 expected to increase to perhaps $60 in 2011 – but capital inflows including FDI expected to rise sharply
Other	Housing market remains vulnerable	Strong commodity prices may improve trade situation

NOTE: This information is based on an interpretative reading of various market sources as of mid April 2011. It is presented for illustrative purposes only, and should not be considered investment advice.

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Classical Exchange Rate Theories

Purchasing power parity (PPP)…

- Exchange rates are in equilibrium when purchasing power is equivalent in 2 countries
- "Law of one price" … same goods should have price equivalency in different markets adjusted for exchange rates
  - Only applicable in absence of trade barriers or artificial constraints
  - Applies to single product … PPP is generalized and applies to economy-wide prices measured by inflation indexes, *e.g.*, CPI, PPI
- Per "relative" PPP theory … inflation & exchange rates should be negatively correlated

If inflation increases ➔ Currency value should decline

If inflation decreases ➔ Currency value should advance

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Classical Exchange Rate Theories

PPP and International Fisher Effect …

- **PPP suggests inflation and exchange rates negatively correlated**

If inflation increases → Currency value should decline

If inflation decreases → Currency value should advance

- **International Fisher Effect (IFE) suggests interest rates and exchange negatively correlated**
  - **Assumes real rates (risk-free rate – inflation) should be equal across countries … inflation and nominal rates should be positively correlated**
  - **Thus … IFE generally consistent with PPP**

If rates increase → Currency value should decline

If rates decline → Currency value should advance

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Classical Exchange Rate Theories

Measuring PPP…

- **Three (3) popular methodologies**
  - **OECD PPP … compares price changes in representative basket of goods in each country**
  - **Bloomberg long-run averaging PPP … based on inflation in base period Jan-82 thru Jun-00 … may be based on either CPI or PPI**
  - **The Economist's "Big Mac PPP" … compares prices of McDonald's Big Mac hamburger in each country … universally available product with verifiable pricing**

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Classical Exchange Rate Theories

Measuring PPP …

- **Rank average %'age over/under valued from 3 methodologies**
- **Buy under- and sell over-valued currencies as possible long-term strategy**
- **"Basket" investment approach may be recommended … buy & sell several currencies**

		% Over/Under Valued vs. USD			
Currency	**Ticker**	**Average**	**OECD**	**Bloomberg**	**Big Mac**
Norwegian Krone	NOK	**60.82%**	40.13%	19.63%	122.71%
Swiss Franc	CHF	**55.90%**	40.99%	29.32%	97.38%
Brazilian Real	BRL	**52.29%**			52.29%
Swedish Krona	SEK	**46.42%**	29.61%	1.46%	108.18%
Australian Dollar	AUD	**29.66%**	36.96%	33.66%	18.37%
Euro	EUR	**23.64%**	13.55%	22.90%	34.48%
Colombian Peso	COP	**21.91%**			21.91%
Canadian Dollar	CAD	**19.98%**	21.07%	19.76%	19.11%
New Zealand Dollar	NZD	**16.60%**	16.53%	27.12%	6.15%
Icelandic Krona	ISK	**15.90%**	15.90%		
Japanese Yen	JPY	**12.57%**	24.70%	9.87%	3.14%
Czech Forint	CZK	**8.42%**			8.42%
British Pound	GBP	**6.42%**	6.37%	12.58%	0.31%
Chilean Peso	CLP	**0.83%**			0.83%
Singapore Dollar	SGD	**-3.30%**			-3.30%
Argentina Peso	ARS	**-6.74%**			-6.74%
Hungarian Forint	HUF	**-17.40%**	-42.74%		7.94%
South African Rand	ZAR	**-22.87%**			-22.87%
Turkish Lira	TRY	**-24.15%**	-54.19%		5.90%
Korean Won	KRW	**-24.35%**	-32.72%		-15.98%
Russian Ruble	RUB	**-30.63%**			-30.63%
Polish Zloty	PLN	**-32.77%**	-46.58%		-18.95%
Mexican Peso	MXN	**-37.91%**	-48.87%		-26.94%
Chinese Renminbi	CNY	**-40.09%**			-40.09%
Hong Kong Dollar	HKD	**-48.77%**			-48.77%

Source: Bloomberg as of 4/13/11

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The Carry Trade

Exploiting cost of carry …

- Carry trade = borrow in low-rate countries & invest in high-rate countries

Carry trade ➔ Sell low-rate currency / Buy high-rate currency

- Strategy recognizes that total currency return consists of 2 components … price movement plus interest

Total Currency Return = Price Movement + Interest

- Carry traders implicitly discount classical exchange rate theories by assuming that disequilibriums may persist
- But economic conditions changed significantly post financial crisis

The Carry Trade

Total return (2003-2007) …

Buy IKR

Sell JPY

Country	Currency	Total Return[1]	Price Return[2]	Interest Return[3]
Turkey	Lira	335.65%	41.46%	207.96%
Brazil	Real	326.41%	98.88%	114.41%
Australia	Dollar	106.79%	55.71%	32.80%
Colombia	Peso	106.36%	42.12%	45.20%
Iceland	**Krona**	**106.13%**	**28.67%**	**60.20%**
New Zealand	Dollar	105.50%	46.05%	40.70%
South Africa	Rand	94.37%	24.88%	55.64%
Canada	Dollar	86.75%	57.91%	18.26%
Chile	Peso	75.40%	44.64%	21.26%
Argentina	Peso	67.34%	6.63%	56.93%
India	Rupee	60.91%	21.77%	32.14%
European Union	Euro	59.73%	39.05%	14.87%
United Kingdom	Pound	56.34%	23.29%	26.80%
South Korea	Won	54.56%	26.80%	21.89%
Mexico	Peso	40.13%	-4.85%	47.27%
Switzerland	Franc	28.89%	22.06%	5.59%
United States	Dollar	18.13%	-	18.13%
Taiwan	Dollar	12.58%	7.15%	5.07%
Japan	**Yen**	**7.34%**	**6.30%**	**0.98%**
China	Renminbi	-	-	13.33%
Russia	Ruble	-	-	29.90%

[1] Return from price movement and interest from January 1, 2003 through December 31, 2007
[2] Return from currency price movement vs. USD as "base currency"
[3] Return from interest at prevailing 3-month rates or implied NDF rate
Source: Bloomberg

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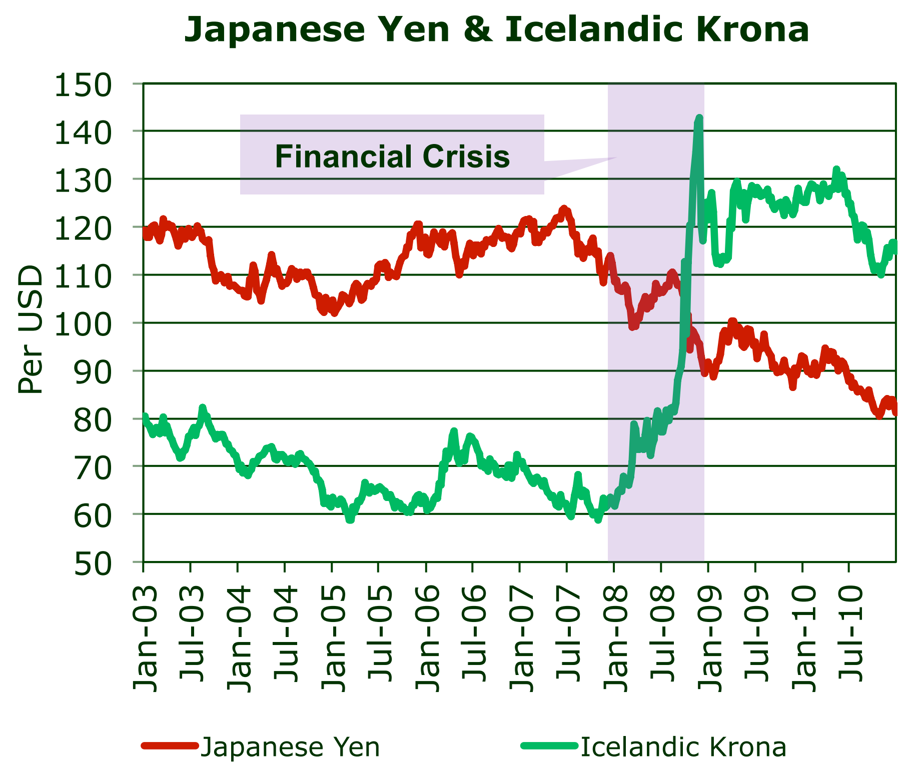
The Carry Trade

Dynamic conditions …

- *E.g.*, trillions in carry trade shorting JPY from 2003-07
- Financial crisis caused rate decline, unwinding of carry trades … JPY rallied while Japanese rates stayed low
- ISK offers high rates but price declined sharply
- Thus … trade can backfire



The Carry Trade

Total return (2008-2010) …

Buy JPY

Sell ISK

Country	Currency	Total Return[1]	Price Return[2]	Interest Return[3]
Argentina	Peso	44.04%	-20.80%	81.87%
Brazil	Real	43.10%	7.15%	33.56%
Japan	**Yen**	**39.89%**	**37.64%**	**1.64%**
Australia	Dollar	36.38%	16.80%	16.76%
South Africa	Rand	35.07%	3.40%	30.63%
Colombia	Peso	26.14%	5.74%	19.29%
Switzerland	Franc	25.24%	21.17%	3.36%
New Zealand	Dollar	17.91%	1.75%	15.88%
Chile	Peso	14.84%	6.40%	7.94%
Taiwan	Dollar	14.39%	10.69%	3.34%
Russia	Ruble	10.50%	-19.32%	36.96%
China	Renminbi	9.16%	10.55%	-1.26%
India	Rupee	8.66%	-11.83%	23.24%
Turkey	Lira	7.75%	-24.22%	42.19%
Mexico	Peso	6.97%	-11.75%	21.21%
Canada	Dollar	4.44%	-0.54%	5.01%
United States	Dollar	4.37%	-	4.37%
European Union	Euro	-2.08%	-8.28%	6.76%
South Korea	Won	-12.87%	-16.93%	4.89%
United Kingdom	Pound	-15.43%	-21.41%	7.60%
Iceland	**Krona**	**-23.55%**	**-45.34%**	**39.86%**

[1] Return from price movement and interest from January 1, 2008 through December 31, 2010
[2] Return from currency price movement vs. USD as "base currency"
[3] Return from interest at prevailing 3-month rates or implied NDF rate
Source: Bloomberg

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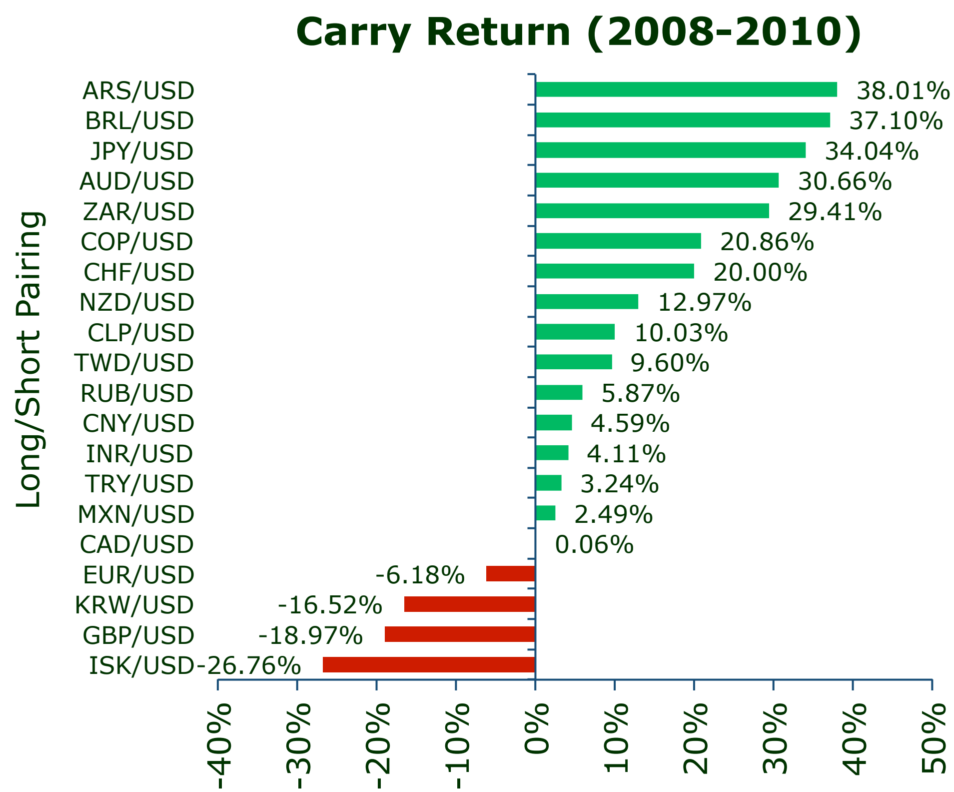
The Carry Trade

Carry trade post-crisis …

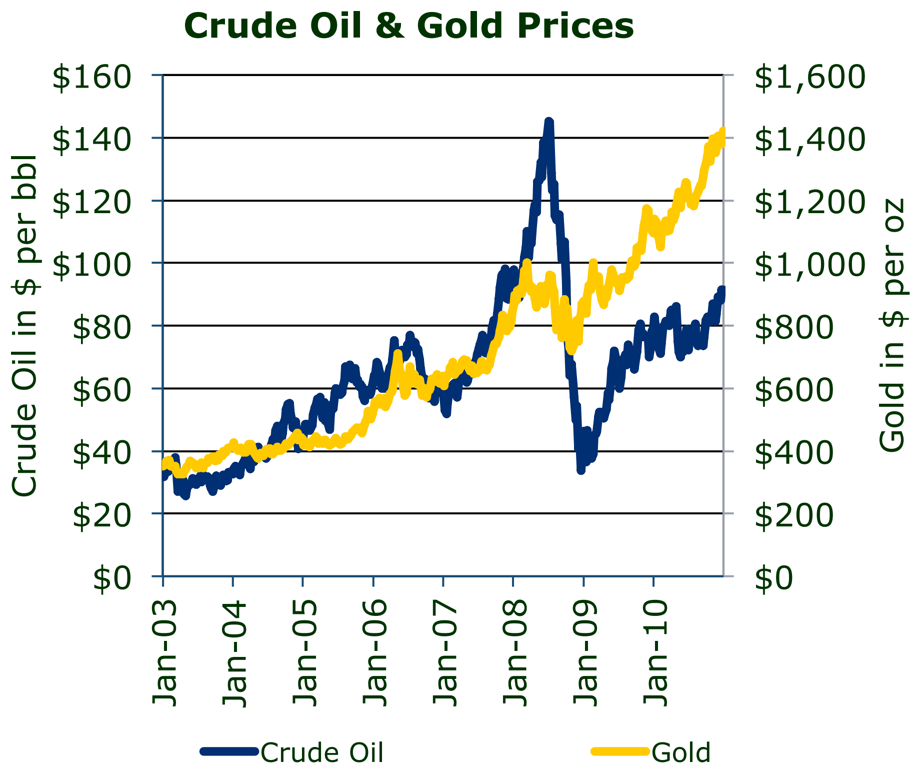
- **USD or EUR now preferred short due to low rates**
- **But some currencies have remained at top of list both pre- and post-financial crisis**



Commodity Countries

Commodity prices …

- **Commodity prices advancing sharply over past decade driven by emerging market demand**
  - ***E.g.*, China, India**
- **Trend broadly affecting value of energy, grain, livestock, precious metals, industrial metals**



Commodity Countries

Commodity exports …

- **Global commodity inflation may benefit "commodity countries" dependent on commodity exportation**
- **Top performing currencies generally from economies driven by commodity values**

Country	Major Exports
Argentina	soybeans and derivatives, petroleum and gas, vehicles, corn, wheat
Brazil	transport equipment, iron ore, soybeans, footwear, coffee, autos
Australia	coal, iron ore, gold, meat, wool, alumina, wheat, machinery and transport equipment
South Africa	gold, diamonds, platinum, other metals and minerals, machinery and equipment
Colombia	petroleum, coffee, coal, nickel, emeralds, apparel, bananas, cut flowers
New Zealand	dairy products, meat, wood and wood products, fish, machinery
Chile	copper, fruit, fish products, paper and pulp, chemicals, wine
Canada	motor vehicles and parts, industrial machinery, aircraft, telecommunications equipment; chemicals, plastics, fertilizers; wood pulp, timber, crude petroleum, natural gas, electricity, aluminum

Source: CIA Factbook

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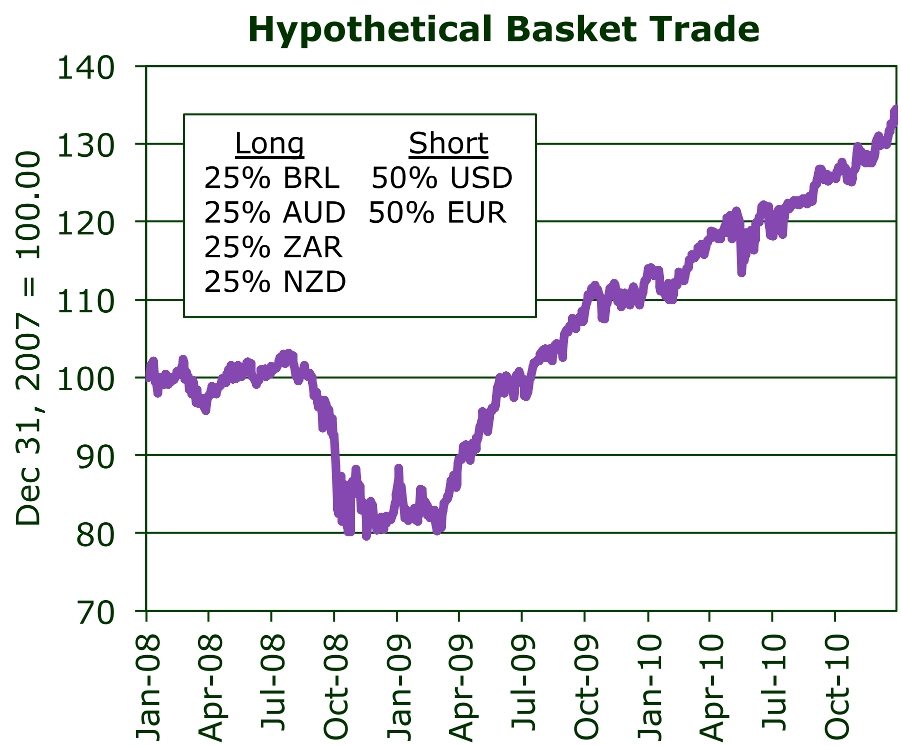
Commodity Countries

Basket trade …

- **Carry trade frequently performed with baskets**
- **Long commodity countries & short developed markets**
  - ***E.g.,* long BRL, AUD, ZAR & NZD … short USD & EUR**
- **Strategy may be pursued using CME FX futures**



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Cross-Border Capital Flows

Economic globalization …

- Fundamental analysis of exchange rates focuses on (1) growth & inflation; (2) monetary & fiscal policy; and (3) trade & current account balances
- BUT … "hot money" capital flows becoming increasingly important in determining direction of exchange rates
  - Current account should balance with capital account … but gross cross-border capital flows often dwarf trade related flows
  - Capital flows may consist of foreign direct investment (FDI), debt investment, equity investment, bank and private flows, derivative and government flows

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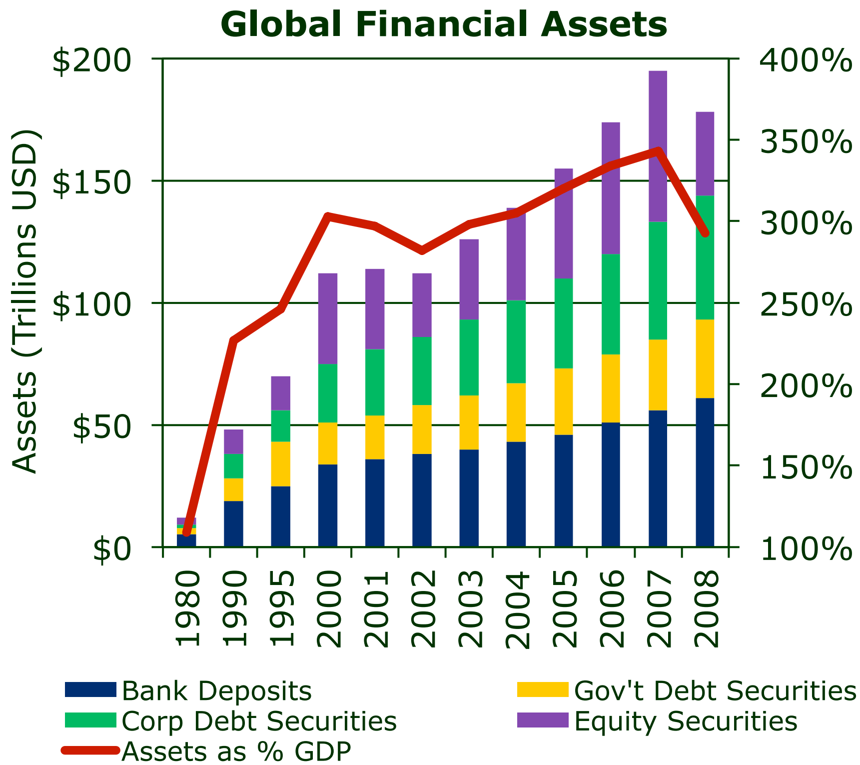
Cross-Border Capital Flows

Global capital markets …

- **Capital markets estimated at $178 trillion in 2008**
  - **2008 decline as equities fell in wake of financial crisis**
- **Financial assets represents 293% of global GDP in 2008**



Cross-Border Capital Flows

Daily FX turnover …

- **Significance of cross-border capital flows reflected in growing FX market turnover**

Average Daily Turnover in FX Markets
(Billions USD)

	Apr-04	Apr-07	Apr-10
Spot	$621	$1,005	$1,490
Forwards	$208	$362	$475
FX swaps	$944	$1,714	$1,765
Currency swaps	$21	$80	$43
Options	$117	$212	$207
CME FX Products	$18	$55	$103
CME market share *	5%	9%	15%

- Represents CME share of market including OTC forwards and options to which futures and options are most directly comparable

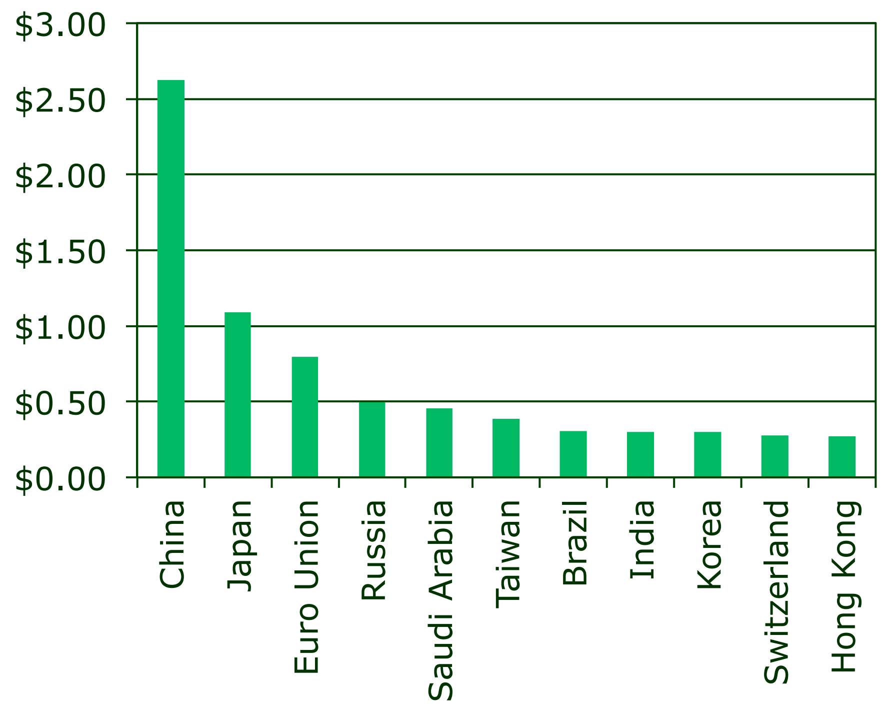
Source: Bank for International Settlements Triennial Survey

Cross-Border Capital Flows

Central bank FX reserves …

- **Monetary authorities and sovereign wealth funds have emerged as major cross-border investors**
- **Most FX reserves held in USD with growing amounts in EUR**
- **China and other emerging market nations hold large reserves**

Central Bank FX Reserves
(Trillions USD as of Jan-11)



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Cross-Border Capital Flows

Treasury International Capital (TIC) data …

- **Capital flows below pre-crisis levels … Treasuries biggest part of flow**
- **Data does not capture FDI, bank, derivative, other government flows**

	Gross Purchases by All Foreigners from US Residents (Trillions USD)						Gross Sales by All Foreigners to US Residents (Trillions USD)					
	US Treas-ury	US Gov't Agency	US Corp	US Stocks	For-eign Bonds	For-eign Stocks	US Treas-ury	US Gov't Agency	US Corp	US Stocks	For-eign Bonds	For-eign Stocks
2010	**$16.16**	$1.11	$0.97	$6.75	$3.65	$3.67	**$15.45**	$1.00	$0.98	$6.64	$3.72	$3.73
2009	**$11.59**	$1.04	$1.19	$6.65	$1.95	$3.17	**$11.05**	$1.05	$1.23	$6.50	$2.08	$3.23
2008	**$14.63**	$2.59	$1.47	$12.04	$2.27	$5.44	**$14.31**	$2.63	$1.37	$11.99	$2.22	$5.42
2007	**$15.13**	$2.05	$1.91	$10.64	$2.97	$5.22	**$14.93**	$1.83	$1.52	$10.44	$3.11	$5.31
2006	**$10.96**	$1.57	$1.68	$6.87	$1.88	$3.64	**$10.76**	$1.29	$1.17	$6.72	$2.02	$3.74
2005	**$10.05**	$1.10	$1.28	$4.73	$1.46	$2.24	**$9.71**	$0.88	$0.90	$4.65	$1.50	$2.37
2004	**$8.94**	$1.21	$1.17	$3.86	$1.46	$1.66	**$8.58**	$0.98	$0.86	$3.83	$1.53	$1.75
2003	**$8.00**	$1.44	$0.98	$3.10	$1.46	$1.30	**$7.74**	$1.28	$0.71	$3.07	$1.43	$1.39
2002	**$7.26**	$1.73	$0.82	$3.21	$1.37	$1.27	**$7.14**	$1.53	$0.64	$3.16	$1.34	$1.27

Source: U.S. Treasury Department TIC database

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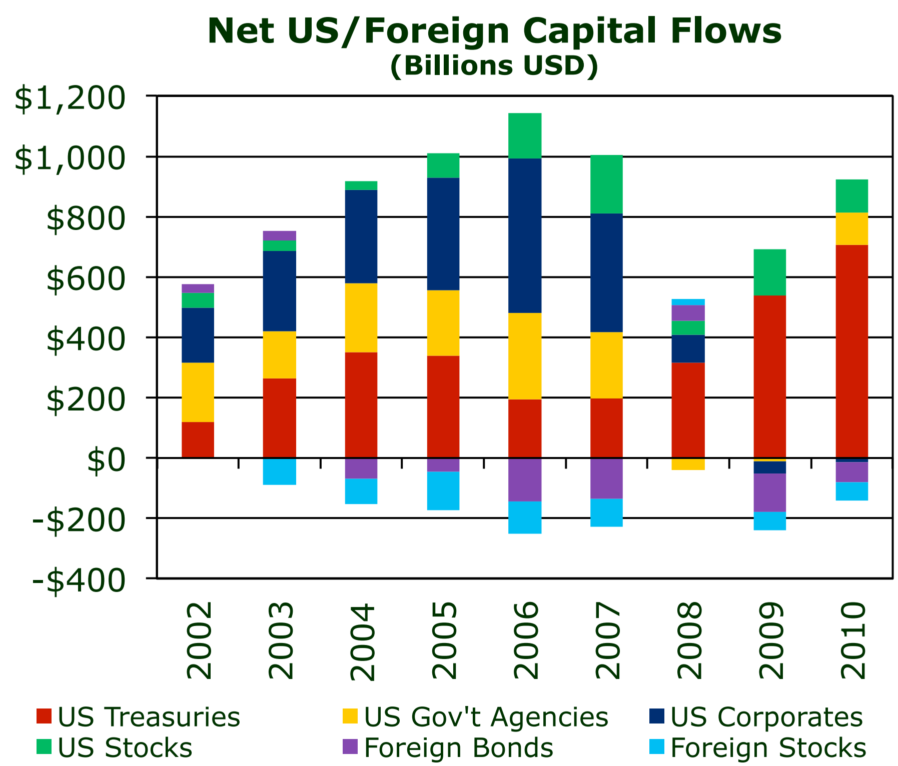
Cross-Border Capital Flows

Treasury International Capital (TIC) data …

- **Treasuries are biggest part of capital flow … U.S. corporate & agency investment off since crisis … U.S. investors net seller of foreign investments**
- **Data available on aggregate or country-by-country basis**

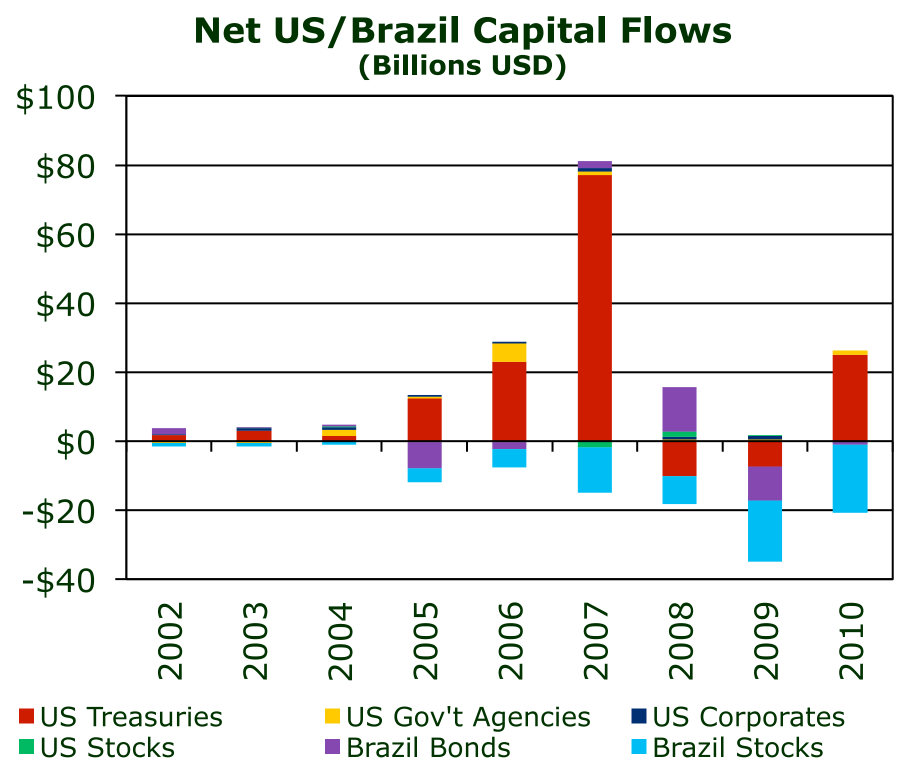


Source: U.S. Treasury Department TIC Database

Cross-Border Capital Flows

TIC data for US/Brazil …

- **Capital flows remain well below pre-crisis levels … funds repatriated to Brazil during crisis on net basis**
- **Brazilians have been net buyers of US Treasuries … U.S. residents net sellers of Brazilian stock**



Source: U.S. Treasury Department TIC Database

Cross-Border Capital Flows

Japanese earthquake …

- **Large insurable losses expected as result of earthquake and tsunami in Japan**
- **Will insurance companies repatriate foreign assets and boost JPY?**
- **Foreign securities comprised 15.8% (~$59 billion USD) of holdings … although much is likely hedged**

Japanese Insurance Company Assets

Balance Sheet Item	Billions	%
Deposits	¥933.5	3.0%
Call Loans	¥334.3	1.1%
Resale Agreement Receivables	¥228.5	0.7%
Monetary Receivables Bought	¥1,295.2	4.1%
Money Trusts	¥113.0	0.3%
Securities	¥22,232.1	70.6%
National Gov't Bonds	¥4,956.0	15.7%
Local Gov't Bonds	¥610.4	1.9%
Corporate Bonds	¥3,809.3	12.1%
Stocks	¥7,452.7	23.7%
Foreign Securities	**¥4,963.9**	**15.8%**
Other Securities	¥439.8	1.4%
Loans	¥2,373.8	7.5%
Real Estate	¥1,098.4	3.5%
Total Working Assets	¥28,609.0	90.8%
Other Assets	¥2,886.6	9.2%
Total Assets	¥31,495.6	100.0%

Source: 2009-10 General Insurance in Japan Fact Book, General Insurance Association of Japan

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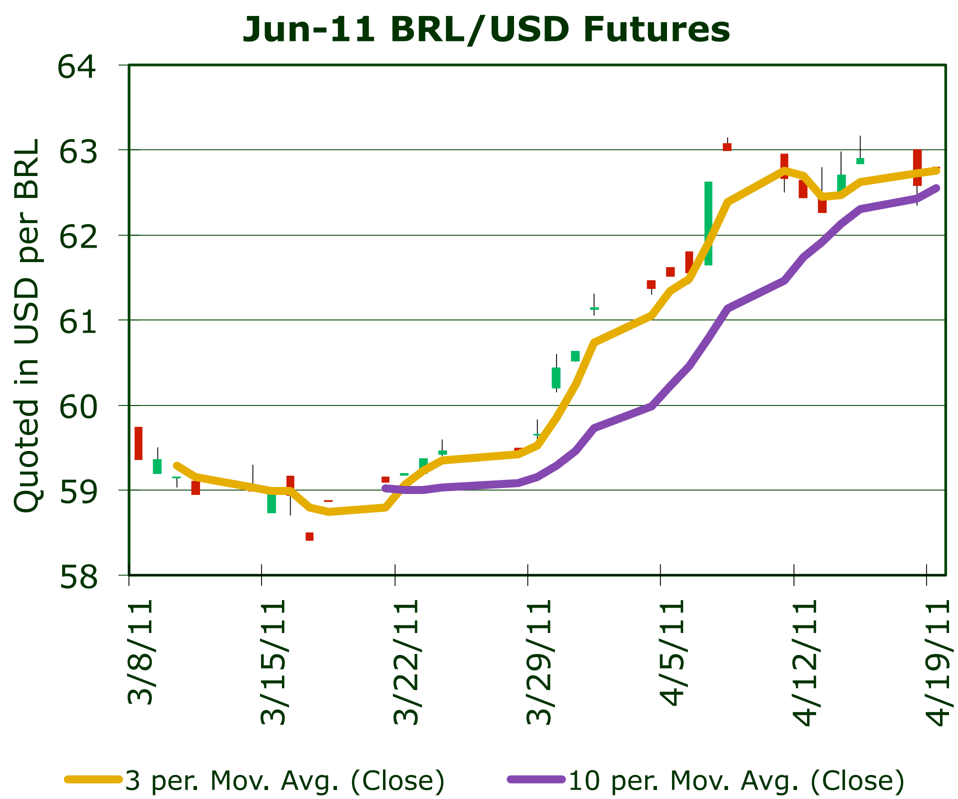
Technical Factors

Short-term trading…

- **Fundamental factors useful for long-term trade**
- **Technical analysis generally more useful for short-term trade**
- **BUT … that's another presentation!**



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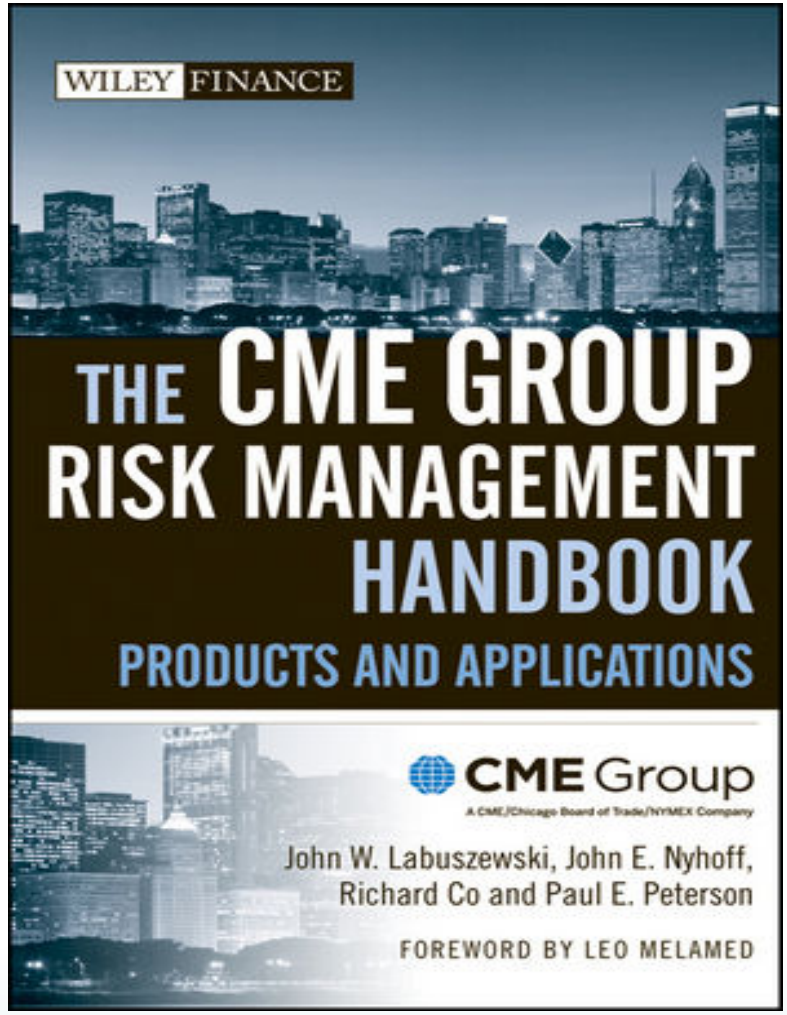
Reference

Check it out!

- **Information in this presentation is covered in <u>The CME Risk Management Handbook</u>**
- **Available through John Wiley & Sons**



Topics in FX Futures

John W. Labuszewski

Supplementary Slides

John W. Labuszewski

FX Futures Fundamentals

Most popular currency futures …

	EUR/USD	JPY/USD	GBP/USD	CHF/USD
Trade Unit	125,000 Euros	12,500,000 yen	62,500 pounds	125,000 francs
Minimum Fluctuation (Tick)	$0.0001 per Euro ($12.50)	$0.000001 per yen ($12.50)	$0.0001 per pound ($6.25)	$0.0001 per franc ($12.50)
Price Limits	No Limits			
Contract Months	1st 6 months in March quarterly cycle (March, June, Sep & Dec)			
CME Globex® Trading Hours	Sundays thru Mondays: 5:00 pm to 4:00 pm the following day (Chicago time)			
Trading Ends at	2nd business day before 3rd Wed of contract month			
Delivery	Thru Continuous Linked Settlement (CLS) Facilities			
Position Limits	No Limits	No Limits	No Limits	No Limits
Ticker	"EC"	"JY"	"BP"	"SF"

FX Futures Fundamentals

EUR/USD futures (3/30/11) …

Month	Open	High	Low	Settle-ment	Volume	Open Interest
Jun-11	1.4069	1.4069	1.4045	**1.4100**	292,004	221,361
Sep-11				1.4066	417	1,730
Dec-11				1.4030		70
Mar-12				1.3991		282
Jun-12				1.3952		8
Sep-11				1.3913	292,421	223,451
Jun-11	1.4069	1.4069	1.4045	1.4100	292,004	221,361

Notional contract value in USD …

Notional Contract Value = Contract Size x Quote

= 125,000 EUR x 1.4100

= <u>$176,250</u>

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FX Futures Fundamentals

Pricing (3/30/11) …

	Contract Size	Jun-11 Contract	Contract Value	Tick Size	$ Value of Tick
EUR/USD	125,000	1.4100	$176,250	$0.0001	$12.50
JPY/USD	12,500,000	0.012072	$150,900	$0.000001	$12.50
GBP/USD	62,500	1.6054	$100,337.50	$0.0001	$6.25
CHF/USD	125,000	1.0884	$136,050	$0.0001	$12.50

"American" vs. "European" quotations …

CME Quotes	American Terms	European Terms
USD per EUR	1.4100 USD per EUR	0.7092 EUR per USD
USD per JPY	0.012072 USD per JPY	82.84 JPY per USD
USD per GBP	1.6054 USD per GBP	0.6229 GBP per USD
USD per CHF	1.0884 USD per CHF	0.9188 CHF per USD

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FX Futures Fundamentals

Physical delivery vs. cash settlement …

- **Physical delivery**
  - Futures outstanding as of delivery month (typically) settled by delivery, *e.g.*, 12.5 million JPY vs. USD; 125,000 EUR vs. USD, 62,500 GBP vs. USD
  - Delivery of major currencies facilitated through CLS
  - BUT … some pairs trade as interbank Non-Deliverable Forwards (NDFs), *e.g.,* RMB/USD, KRW/USD
- **Cash settlement mechanism**
  - First applied to Eurodollar & stock index futures
  - Futures are marked-to-market (MTM), *i.e.*, pay losses and collects profits daily and in cash
  - On final settlement day, positions expire & settle at spot currency mark (typically official central bank rate)

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Fair Value & Arbitrage

Cost of carry …

- Futures priced as function of spot rate adjusted by short-term rates of base and terms currencies

$$\text{Futures} = \text{Spot} \times [1 + R_{term} \times (d/360)] / [1 + R_{base} \times (d/360)]$$

  - FX futures generally quoted as USD per "named" currency
  - THUS … USD = terms currency … named currency = base currency
  - Note that some currencies utilize 365 day count convention, *e.g.*, GBP
- Defining the "basis"

$$\text{Basis} = \text{Futures} - \text{Spot}$$

- Basis analogous to forward points in interbank markets

Fair Value & Arbitrage

- *E.g.,* calculate Jun-11 EUR/USD futures as of 3/30/11
  - Spot rate = 1.4127
  - 75 days between spot settlement on 4/1/11 and futures delivery on 6/15/11
  - Terms rate (USD) = 0.2892%
  - Base rate (EUR) = 1.1526%
- Jun-11 EUR/USD futures should be 1.4102

$$\begin{aligned} \text{Futures} &= \text{Spot x } [1 + R_{term} \text{ x } (d/360)] \,/\, [1 + R_{base} \text{ x } (d/360)] \\ &= 1.4127 \text{ x } [1 + 0.2892\% \text{ x } (75/360)] \,/\, [1 + 1.1526\% \text{ x } (75/360)] \\ &= 1.4102 \end{aligned}$$

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Fair Value & Arbitrage

- **Quoting EUR/USD futures in Euros per USD … spot @ 1.4217**
- **Futures in deferred months at lower levels**
- **Note that earnings accrue when borrowing USD to buy EUR … US rates (terms rate) < Euro rates (base rate)**

	Price	Basis	"Fair Value"	Maturity	Days	Term Rate	Base Rate
Spot	1.4127			4/1/11			
ECM11	1.4100	-0.0027	1.4102	6/15/11	75	0.2892%	1.1526%
ECU11	1.4066	-0.0061	1.4049	9/21/11	173	0.3358%	1.4979%
ECZ11	1.4030	-0.0097	1.4032	12/21/11	264	0.3714%	1.3013%

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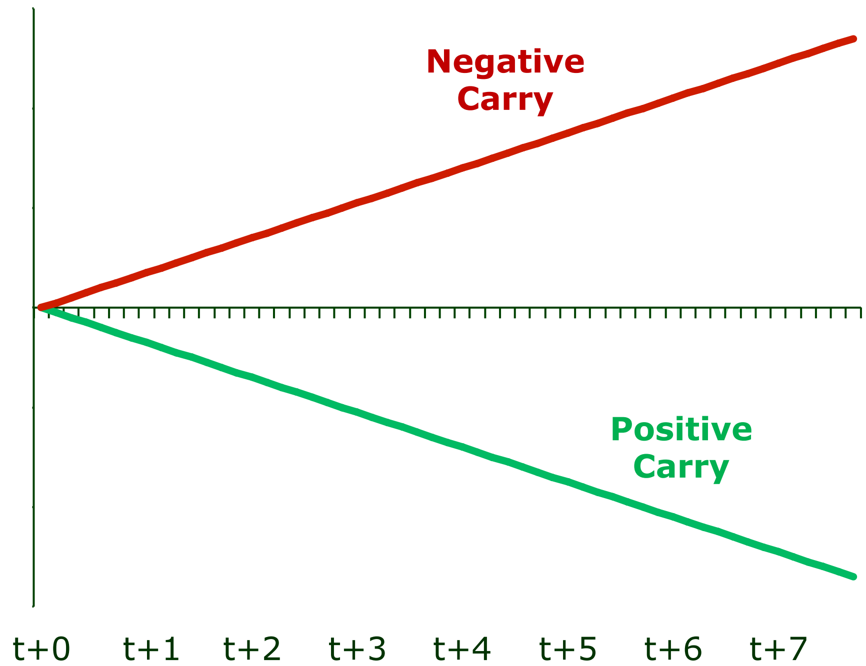
Fair Value & Arbitrage

Cost of Carry …

- **If terms rate < base rate ➔ positive carry**
  - **Futures at lower levels in deferred months … reflecting earnings accrued to carry base currency**
- **If terms rate > base rate ➔ negative carry**
  - **Futures at higher levels in deferred months … reflecting costs incurred to carry base currency**

Positive and Negative Carry



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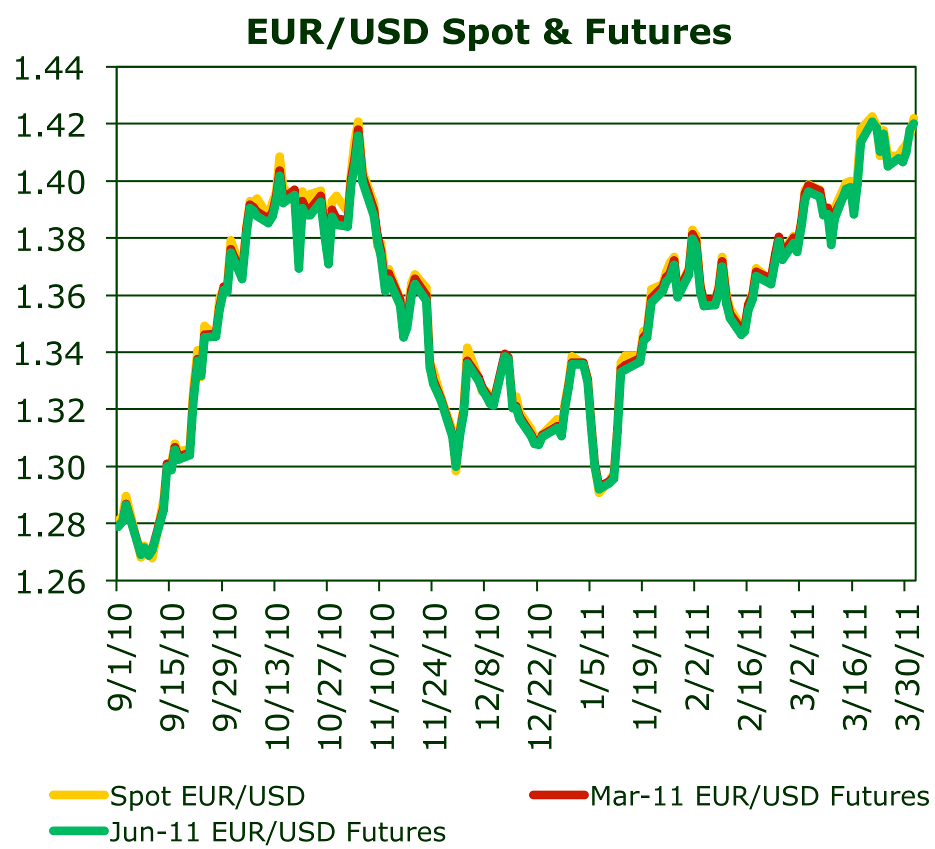
Fair Value & Arbitrage

Spot/futures basis …

- **Spot and futures prices parallel each other closely**
- **But basis movements dwarfed by outright price fluctuations**



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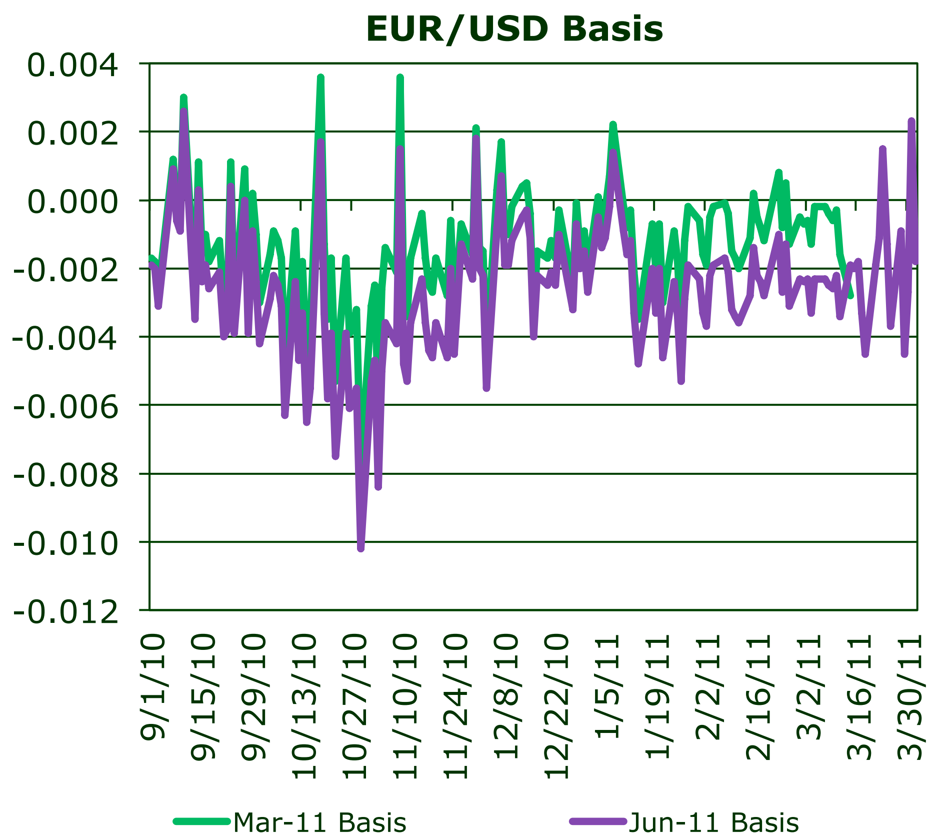
Fair Value & Arbitrage

Spot/futures basis …

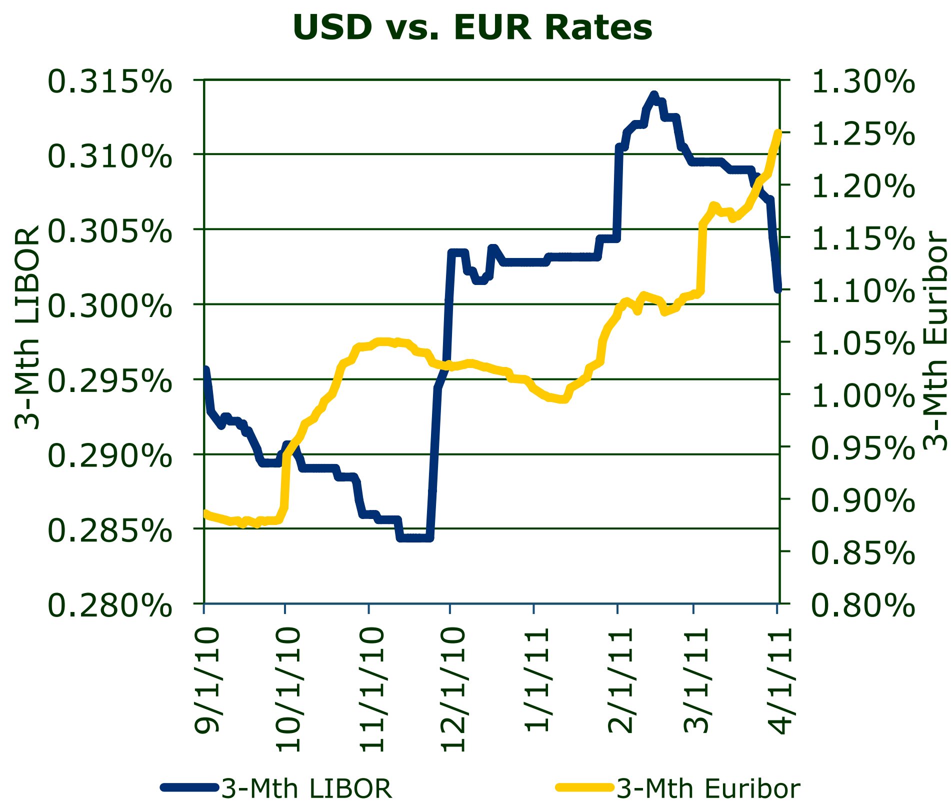
- Basis may be defined as futures less spot prices
- Reflects differential between interest rates associated with two currencies in pairing



Fair Value & Arbitrage

Spot/futures basis …

- **USD & EUR rates generally rising but at uneven pace**
- **Rates diverged in Nov-10 & Mar-11 … USD rates fell while EUR rates rose**
- **This increased positive carry & drove basis down**



Fair Value & Arbitrage

Arbitraging mispriced markets …

- If futures > fair value ➔ sell futures and buy spot

Sell 125,000 EUR @ 1.4127 EUR/USD	$176,587
Invest USD @ 0.2892% for 75 days	$106
Finance EUR @ 0.2892% for 75 days	-$424
Net cost	+$176,269
Divided by 125,000 EUR	1.4102
Expected futures price	1.4102

- OR … if futures < fair value ➔ buy futures and sell spot

Buy 125,000 EUR @ 1.4127 EUR/USD	-$176,587
USD finance charges @ 0.2892% for 75 days	-$106
Invest EUR @ 0.2892% for 75 days	$424
Net cost	-$176,269
Divided by 125,000 EUR	1.4102
Expected futures price	1.4102

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Fair Value & Arbitrage

Arbitraging mispriced markets …

- **Must consider arbitrage costs, *i.e.,* slippage, commissions, fees, etc.**

Fair Value - Arbitrage Costs < Futures Price < Fair Value + Arbitrage Costs

- **THUS … futures trade in "band" above and below fair value**

If futures < band → Buy futures & sell spot

If futures > band → Sell futures & buy spot

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Eurozone Breakup?

Fiscal policies …

- **Profligate government spending in Portugal, Ireland, Greece & Spain threaten long-term viability of European monetary union**
- **Both Greece and Ireland reportedly seeking new EU bailout funds**
- **Even U.S. maintains more conservative fiscal position**

Public Debt as % of GDP (2010)

World Rank	Country	% of GDP
1	Japan	150.7%
5	**Greece**	**144.0%**
8	Italy	118.1%
11	**Ireland**	**94.2%**
14	France	83.5%
15	**Portugal**	**83.2%**
19	Germany	78.8%
23	United Kingdom	76.5%
24	Austria	70.4%
27	**Spain**	**63.4%**
31	Brazil	60.8%
35	**World**	**59.3%**
37	**United States**	**58.9%**
45	India	55.9%
55	Norway	47.7%
79	Switzerland	38.2%
108	Australia	22.4%
113	China	17.5%
123	Russia	9.5%

Source: CIA World Factbook

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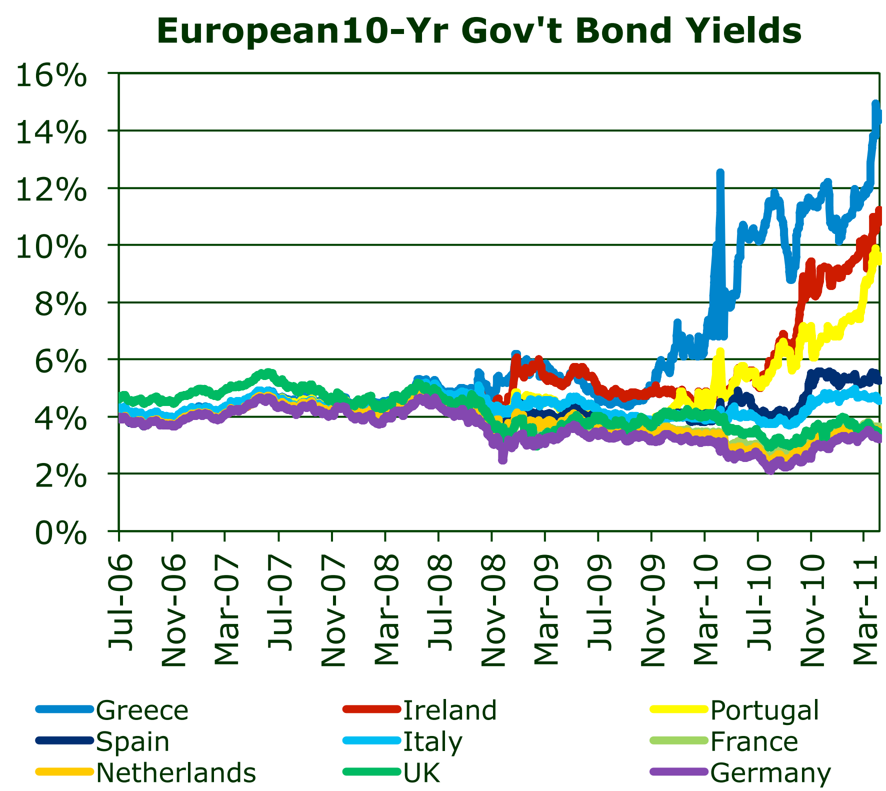
Eurozone Breakup?

Interest rates …

- **Fiscal distress reflected in long-term debt markets**
- **Greece, Ireland, Portugal and Spain have highest 10-year government bond yields within EU**



Source; IHS Global Insight

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Eurozone Breakup?

Comparative outlook of Eurozone vs. U.S. …

	Eurozone	United States
Growth & Inflation	Expect continued recovery for Eurozone in general with weakness in peripheral countries; GDP expected to grow by 2% in 2011-12; inflation expected to moderate in 2-2.5% range	Moderate growth and inflation expected. Q4-10 GDP of 3.1% slipped to 1.8% in Q1-11 but 3.5%-4% GDP expected in 2012
Monetary Policy	ECB objective focused squarely on keeping inflation in check	Target Fed Funds at 0-0.25%. Because Fed responsible for growth and inflation, consensus suggests that easy money policy may endure until 2012
Fiscal Policy	Fiscal consolidation occurring in Eurozone with much distress in periphery nations	Modest fiscal tightening expected but major tightening needed
Balance of Payments	Eurozone runs modest current account deficit funded by FDI and portfolio inflows; merchandise exports healthy	Current account deficit of $803 trillion in 2010 was at 3.2% and worst of all G10 nations
Other	Expect Eurozone crisises to be resolved over next year albeit with some headline events	Housing market remains vulnerable

NOTE: This information is based on an interpretative reading of various market sources as of mid May 2011. It is presented for illustrative purposes only, and should not be considered investment advice.

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Eurozone Breakup?

Euro/USD outlook …

- **Eurozone could be healthier … but *relative* economic health drives FX rates**
- **Analysts expect moderate strength in EUR vs. USD despite weakness in periphery countries**
- **Most analysts suggest Eurozone breakup unlikely … still, this represents "wildcard" event**