

## Burgernomics says currencies are very dear in Europe but very cheap in Asia

EVER since the credit storms first broke last August, the prices of stocks, bonds, gold and other investment assets have been blown this way and that. Currencies have been pushed around too. Did this buffeting bring them any closer to their underlying fair value? Not according to the Big Mac Index, our lighthearted guide to exchange rates. Many currencies look more out of whack than in July 2007, when we last compared burger prices.

The Big Mac Index is based on the theory of purchasing-power parity (PPP), which says that exchange rates should move to make the price of a basket of goods the same in each country. Our basket contains just a single item, a Big Mac hamburger, but one that is sold around the world. The exchange rate that leaves a Big Mac costing the same in dollars everywhere is our fair-value yardstick.

Only a handful of currencies are close to their Big Mac PPP. Of the seven currencies that make up the Federal Reserve's major-currency index, only one (the Australian dollar) is within 10% of its fair value. Most of the rest look expensive. The euro is overvalued by a massive 50%. The British pound, Swedish krona, Swiss franc and Canadian dollar are also trading well above their burger benchmark. All are more overvalued against the dollar than a year ago. Only the Japanese yen, undervalued by 27%, could be considered a snip.

The dollar still buys a lot of burger in the rest of Asia too. The Singapore dollar is undervalued by 18% and the South Korean won by 12%. The currencies of less well-off Asian countries, such as Indonesia, Malaysia and Thailand, look even cheaper. China's currency is among the most undervalued, though a bit less so than a year ago.

The angrier type of China-basher might conclude that the yuan should revalue so that it is much closer to its burger standard. But care needs to be taken when drawing hard conclusions from fast-food prices. PPP measures show where currencies should end up in the long run. Prices vary with local costs, such as rents and wages, which are lower in poor countries, as well as with the price of ingredients that trade across borders. For this reason, PPP is a more reliable comparison for the currencies of economies with similar levels of income.

For all these caveats, more sophisticated analyses come to broadly similar conclusions to our own. John Lipsky, number two at the IMF, said this week that the euro is above the fund's medium-term valuation benchmark. China's currency is "substantially undervalued" in the IMF's view. The dollar is sandwiched in between. The big drop in the greenback's value since 2002 has left it "close to its medium-term equilibrium level," said Mr Lipsky.

If that judgment is right, the squalls stirred up by the credit crises have moved at least one currency—the world's reserve money—closer to fair value. Curiously the crunch has not shaken faith in two currencies favoured by yield-hungry investors: the Brazilian real and Turkish lira. These two stand out as emerging-market currencies that trade well above their Big Mac PPPs. Both countries have high interest rates. Turkey's central bank recently raised its benchmark rate to 16.75%; Brazil's pushed its key rate up to 13% on July 23rd. These rates offer juicy returns for those willing to bear the risks. Those searching for a value meal should look elsewhere.

## The McCurrency menu

The hamburger standard

	Big Mac prices		Implied PPP† of the dollar	actual exchange rate	Under (-)/ over (+) valuation against dollar
	In local currency	in dollars*			
United States‡	\$3.57	3.57	-	-	
Argentina	Peso 11.0	3.64	3.08	3.02	+2
Australia	A\$3.45	3.36	0.97	1.03	-6
Brazil	Real 7.50	4.73	2.10	1.58	+33
Britain	£2.29	4.57	1.56§	2.00	+28
Canada	C\$4.09	4.08	1.15	1.00	+14
Chile	Peso 1,550	3.13	434	494	-12
China	Yuan 12.5	1.83	3.50	6.83	-49
Czech Republic	Koruna 66.1	4.56	18.5	14.5	+28
Denmark	DK28.0	5.95	7.84	4.70	+67
Egypt	Pound 13.0	2.45	3.64	5.31	-31
Euro Area**	€3.37	5.34	1.06††	1.59	+50
Hong Kong	HK\$13.3	1.71	3.73	7.80	-52
Hungary	Forint 670	4.64	187.7	144.3	+30
Indonesia	Rupiah 18,700	2.04	5,238	9,152	-43
Japan	Yen 280	2.62	78.4	106.8	-27
Malaysia	Ringgit 5.50	1.70	1.54	3.2	-52
Mexico	Peso 32.0	3.15	8.96	10.2	-12
New Zealand	NZ\$4.90	3.72	1.37	1.32	+4
Norway	Kroner 40.0	7.88	11.2	5.08	+121
Poland	Zloty 7.00	3.45	1.96	2.03	-3
Russia	Rouble 59.0	2.54	16.5	23.2	-29
Saudi Arabia	Riyal 10.0	2.67	2.80	3.75	-25
Singapore	S\$3.95	2.92	1.11	1.35	-18
South Africa	Rand 16.9	2.24	4.75	7.56	-37
South Korea	Won 3,200	3.14	896	1,018	-12
Sweden	SKr38.0	6.37	10.6	5.96	+79
Switzerland	SFr6.50	6.36	1.82	1.02	+78
Taiwan	NT\$75.0	2.47	21.0	30.4	-31
Thailand	Baht 62.0	1.86	17.4	33.4	-48
Turkey	lire 5.15	4.32	1.44	1.19	+21
UAE	Dirhams 10.00	2.72	2.80	3.67	-24
Colombia	Peso 7000.00	3.89	1960.78	1798.65	9
Costa Rica	Colones 1800.00	3.27	504.20	551.02	-8
Estonia	Kroon 32.00	3.24	8.96	9.87	-9
Iceland	Kronur 469.00	5.97	131.37	78.57	67
Latvia	Lats 1.55	3.50	0.43	0.44	-2
Lithuania	Litas 6.90	3.17	1.93	2.18	-11
Pakistan	Rupee 140.00	1.97	39.22	70.90	-45
Peru	New Sol 9.50	3.35	2.66	2.84	-6
Philippines	Peso 87.00	1.96	24.37	44.49	-45
Slovakia	Koruna 77.00	4.03	21.57	19.13	13
Sri Lanka	Rupee 210.00	1.95	58.82	107.55	-45
Ukraine	Hryvnia 11.00	2.39	3.08	4.60	-33
Uruguay	Peso 61.00	3.19	17.09	19.15	-11

\*At current exchange rates

†Purchasing-power parity: local price divided by price in the United States

‡Average of New York, Chicago, Atlanta and San Francisco §Dollars per pound

\*\*Weighted average of prices in euro area ††Dollars per euro

Sources: McDonald's; *The Economist*

## The Big Mac index

Feb 1st 2007

*The Economist's* Big Mac index is based on the theory of purchasing-power parity (PPP), according to which exchange rates should adjust to equalise the price of a basket of goods and services around the world. Our basket is a burger: a McDonald's Big Mac.

The table below shows by how much, in Big Mac PPP terms, selected currencies were over- or undervalued at the end of January. Broadly, the pattern is such as it was last spring, the previous time this table was compiled (see [article](#)). The most overvalued currency is the Icelandic krona: the exchange rate that would equalise the price of an Icelandic Big Mac with an American one is 158 kronur to the dollar; the actual rate is 68.4, making the krona 131% too dear. The most undervalued currency is the Chinese yuan, at 56% below its PPP rate; several other Asian currencies also appear to be 40-50% undervalued.

The index is supposed to give a guide to the direction in which currencies should, in theory, head in the long run. It is only a rough guide, because its price reflects non-tradable elements—such as rent and labour. For that reason, it is probably least rough when comparing countries at roughly the same stage of development. Perhaps the most telling numbers in this table are therefore those for the Japanese yen, which is 28% undervalued against the dollar, and the euro, which is 19% overvalued. Hence European finance ministers' beef with the low level of the yen.

## A feast of burgernomics

The Big Mac index

	Big Mac prices		Implied PPP* of the dollar	Actual dollar exchange rate Jan 31st	Under (-)/over (+) valuation against the dollar, %
	In local currency	in dollars			
United States†	\$3.22	3.22			
Argentina	Peso 8.25	2.65	2.56	3.11	-18
Australia	A\$3.45	2.67	1.07	1.29	-17
Brazil	Real 6.4	3.01	1.99	2.13	-6
Britain	£1.99	3.90	1.62‡	1.96‡	+21
Canada	C\$3.63	3.08	1.13	1.18	-4
Chile	Peso 1,670	3.07	519	544	-5
China	Yuan 11.0	1.41	3.42	7.77	-56
Colombia	Peso 6,900	3.06	2,143	2,254	-5
Costa Rica	Colones 1,130	2.18	351	519	-32
Czech Republic	Koruna 52.1	2.41	16.2	21.6	-25
Denmark	DKr27.75	4.84	8.62	5.74	+50
Egypt	Pound 9.09	1.60	2.82	5.70	-50
Estonia	Kroon 30	2.49	9.32	12.0	-23
Euro area§	€2.94	3.82	1.10**	1.30**	+19
Hong Kong	HK\$12.0	1.54	3.73	7.81	-52
Hungary	Forint 590	3.00	183	197	-7
Iceland	Kronur 509	7.44	158	68.4	+131
Indonesia	Rupiah 15,900	1.75	4,938	9,100	-46
Japan	¥280	2.31	87.0	121	-28
Latvia	Lats 1.35	2.52	0.42	0.54	-22
Lithuania	Litas 6.50	2.45	2.02	2.66	-24
Malaysia	Ringgit 5.50	1.57	1.71	3.50	-51
Mexico	Peso 29.0	2.66	9.01	10.9	-17
New Zealand	NZ\$4.60	3.16	1.43	1.45	-2
Norway	Kroner 41.5	6.63	12.9	6.26	+106
Pakistan	Rupee 140	2.31	43.5	60.7	-28
Paraguay	Guarani 10,000	1.90	3,106	5,250	-41
Peru	New Sol 9.50	2.97	2.95	3.20	-8
Philippines	Peso 85.0	1.74	26.4	48.9	-46
Poland	Zloty 6.90	2.29	2.14	3.01	-29
Russia	Rouble 49.0	1.85	15.2	26.5	-43
Saudi Arabia	Riyal 9.00	2.40	2.80	3.75	-25
Singapore	S\$ 3.60	2.34	1.12	1.54	-27
Slovakia	Crown 57.98	2.13	18.0	27.2	-34
South Africa	Rand 15.5	2.14	4.81	7.25	-34
South Korea	Won 2,900	3.08	901	942	-4
Sri Lanka	Rupee 190	1.75	59.0	109	-46
Sweden	SKr32.0	4.59	9.94	6.97	+43
Switzerland	SFr6.30	5.05	1.96	1.25	+57
Taiwan	NT\$75.0	2.28	23.3	32.9	-29
Thailand	Baht 62.0	1.78	19.3	34.7	-45
Turkey	Lire 4.55	3.22	1.41	1.41	nil
UAE	Dirhams 10.0	2.72	3.11	3.67	-15
Ukraine	Hryvnia 9.00	1.71	2.80	5.27	-47
Uruguay	Peso 55.0	2.17	17.1	25.3	-33
Venezuela	Bolivar 6,800	1.58	2,112	4,307	-51

Sources: McDonald's; *The Economist*

\*Purchasing-power parity: local price divided by price in United States

†Average of New York, Atlanta, Chicago and San Francisco ‡Dollars per pound

§Weighted average of prices in euro area \*\*Dollars per euro

# McCurrencies

May 25th 2006

Happy 20th birthday to our Big Mac index

## The hamburger standard

	Big Mac prices		Implied PPP* of the dollar	Actual dollar exchange rate May 22nd	Under (-)/ over (+) valuation against the dollar, %
	in local currency	in dollars			
United States†	\$3.10	3.10	-	-	-
Argentina	Peso 7.00	2.29	2.26	3.06	-26
Australia	A\$3.25	2.44	1.05	1.33	-21
Brazil	Real 6.40	2.78	2.06	2.30	-10
Britain	£1.94	3.65	1.60‡	1.88‡	+18
Canada	C\$3.52	3.14	1.14	1.12	+1
Chile	Peso 1,560	2.94	503	530	-5
China	Yuan 10.5	1.31	3.39	8.03	-58
Czech Republic	Koruna 59.05	2.67	19.0	22.1	-14
Denmark	DKr27.75	4.77	8.95	5.82	+54
Egypt	Pound 9.50	1.65	3.06	5.77	-47
Euro area§	€2.94	3.77	1.05**	1.28**	+22
Hong Kong	HK\$12	1.55	3.87	7.75	-50
Hungary	Forint 560	2.71	181	206	-12
Indonesia	Rupiah 14,600	1.57	4,710	9,325	-49
Japan	¥250	2.23	80.6	112	-28
Malaysia	Ringgit 5.50	1.52	1.77	3.63	-51
Mexico	Peso 29.00	2.57	9.35	11.3	-17
New Zealand	NZ\$4.45	2.75	1.44	1.62	-11
Peru	New Sol 9.50	2.91	3.06	3.26	-6
Philippines	Peso 85.00	1.62	27.4	52.6	-48
Poland	Zloty 6.50	2.10	2.10	3.10	-32
Russia	Rouble 48.00	1.77	15.5	27.1	-43
Singapore	S\$3.60	2.27	1.16	1.59	-27
South Africa	Rand 13.95	2.11	4.50	6.60	-32
South Korea	Won 2,500	2.62	806	952	-15
Sweden	SKr33.00	4.53	10.6	7.28	+46
Switzerland	SFr6.30	5.21	2.03	1.21	+68
Taiwan	NT\$75.00	2.33	24.2	32.1	-25
Thailand	Baht 60.00	1.56	19.4	38.4	-50
Turkey	Lire 4.20	2.72	1.35	1.54	-12
Venezuela	Bolivar 5,701	2.17	1,839	2,630	-30
Aruba	Florin 4.95	2.77	1.60	1.79	-11
Bulgaria	Lev 2.99	1.94	0.96	1.54	-37
Colombia	Peso 6,500	2.60	2,097	2,504	-16
Costa Rica	Colon 1,130	2.22	365	510	-28
Croatia	Kuna 15.0	2.62	4.84	5.72	-15
Dominican Rep	Peso 60.0	1.84	19.4	32.6	-41
Estonia	Kroon 29.5	2.40	9.52	12.3	-23
Fiji	Fiji \$4.65	2.69	1.50	1.73	-13
Georgia	Lari 4.15	2.31	1.34	1.80	-26
Guatemala	Quetzal 17.25	2.27	5.56	7.59	-27
Honduras	Lempira 35.95	1.90	11.6	18.9	-39
Iceland	Kronur 459	6.37	148	72.0	+106
Latvia	Lats 1.35	2.47	0.44	0.55	-20
Lithuania	Litas 6.50	2.41	2.10	2.69	-22
Macau	Pataca 11.1	1.39	3.59	7.99	-55
Moldova	Leu 23.0	1.75	7.42	13.2	-44
Morocco	Dirham 24.5	2.82	7.92	8.71	-9
Norway	Kroner 43.0	7.05	13.9	6.10	+127
Pakistan	Rupee 130	2.16	41.9	60.1	-30
Paraguay	Guarani 9,000	1.63	2,903	5,505	-47
Saudi Arabia	Riyal 9.00	2.40	2.90	3.75	-23
Slovakia	Koruna 58.0	1.97	18.7	29.5	-37
Slovenia	Tolar 520	2.76	168	189	-11
Sri Lanka	Rupee 190	1.85	61.3	103	-40
Ukraine	Hryvna 8.50	1.68	2.74	5.05	-46
UAE	Dirham 9.00	2.45	2.90	3.67	-21
Uruguay	Peso 42.3	1.77	13.6	23.9	-43

Sources: McDonald's; †Average of New York, Chicago, Atlanta and San Francisco; ‡Dollars per pound; §Weighted average of prices in euro area; \*\*Dollars per euro

WHEN our economics editor invented the Big Mac index in 1986 as a light-hearted introduction to exchange-rate theory, little did she think that 20 years later she would still be munching her way, a little less sylph-like, around the world. As burgernomics enters its third decade, the Big Mac index is widely used and abused around the globe. It is time to take stock of what burgers do and do not tell you about exchange rates.

*The Economist's* Big Mac index is based on one of the oldest concepts in international economics: the theory of purchasing-power parity (PPP), which argues that in the long run, exchange rates should move towards levels that would equalise the prices of an identical basket of goods and services in any two countries. Our "basket" is a McDonald's Big Mac, produced in around 120 countries. The Big Mac PPP is the exchange rate that would leave burgers costing the same in America as elsewhere. Thus a Big Mac in China costs 10.5 yuan, against an average price in four American cities of \$3.10 (see the first column of the table). To make the two prices equal would require an exchange rate of 3.39 yuan to the dollar, compared with a market rate of 8.03. In other words, the yuan is 58% "undervalued" against the dollar. To put it another way, converted into dollars at market rates the Chinese burger is the cheapest in the table.

In contrast, using the same method, the euro and sterling are overvalued against the dollar, by 22% and 18% respectively; the Swiss and Swedish currencies are even more overvalued. On the other hand, despite its recent climb, the yen appears to be 28% undervalued, with a PPP of only ¥81 to the dollar. Note that all emerging-market currencies also look too cheap.

The index was never intended to be a precise predictor of currency movements, simply a take-away guide to whether currencies are at their "correct" long-run level. Curiously, however, burgernomics has an impressive record in predicting exchange rates: currencies that show up as overvalued often tend to weaken in later years. But you must always remember the Big Mac's limitations. Burgers cannot sensibly be traded across borders and prices are distorted by differences in taxes and the cost of non-tradable inputs, such as rents.

Despite our frequent health warnings, some American politicians are fond of citing the Big Mac index rather too freely when it suits their cause—most notably in their demands for a big appreciation of the Chinese currency in order to reduce America's huge trade deficit. But the cheapness of a Big Mac in China does not really prove that the yuan is being held far below its fair-market value. Purchasing-power parity is a long-run concept. It signals where exchange rates are eventually heading, but it says little about today's market-equilibrium exchange rate that would make the prices of tradable goods equal. A burger is a product of both traded and non-traded inputs.

## **An idea to relish**

It is quite natural for average prices to be lower in poorer countries than in developed ones. Although the prices of tradable things should be similar, non-tradable services will be cheaper because of lower wages. PPPs are therefore a more reliable way to convert GDP per head into dollars than market exchange rates, because cheaper prices mean that money goes further. This is also why every poor country has an implied PPP exchange rate that is higher than today's market rate, making them all appear undervalued. Both theory and practice show that as countries get richer and their productivity rises, their real exchange

rates appreciate. But this does not mean that a currency needs to rise massively today. Jonathan Anderson, chief economist at UBS in Hong Kong, reckons that the yuan is now only 10-15% below its fair-market value.

Even over the long run, adjustment towards PPP need not come from a shift in exchange rates; relative prices can change instead. For example, since 1995, when the yen was overvalued by 100% according to the Big Mac index, the local price of Japanese burgers has dropped by one-third. In the same period, American burgers have become one-third dearer. Similarly, the yuan's future real appreciation could come through faster inflation in China than in the United States.

The Big Mac index is most useful for assessing the exchange rates of countries with similar incomes per head. Thus, among emerging markets, the yuan does indeed look undervalued, while the currencies of Brazil, Turkey, Hungary and the Czech Republic look overvalued. Economists would be unwise to exclude Big Macs from their diet, but Super Size servings would equally be a mistake

# Fast food and strong currencies

Jun 9th 2005

From The Economist print edition

How much burger do you get for your euro, yuan or Swiss franc?

**The hamburger standard**

	Big Mac price in dollars*	Implied PPP <sup>†</sup> of the dollar	Under (-)/over (+) valuation against the dollar, %		Big Mac price in dollars*	Implied PPP <sup>†</sup> of the dollar	Under (-)/over (+) valuation against the dollar, %
United States <sup>‡</sup>	3.06	—	—	Aruba	2.77	1.62	-10
Argentina	1.64	1.55	-46	Bulgaria	1.88	0.98	-39
Australia	2.50	1.06	-18	Colombia	2.79	2124	-9
Brazil	2.39	1.93	-22	Costa Rica	2.38	369	-22
Britain	3.44	1.63 <sup>§</sup>	+12	Croatia	2.50	4.87	-18
Canada	2.63	1.07	-14	Dominican Rep	2.12	19.6	-31
Chile	2.53	490	-17	Estonia	2.31	9.64	-24
China	1.27	3.43	-59	Fiji	2.50	1.39	-18
Czech Republic	2.30	18.4	-25	Georgia	2.00	1.19	-34
Denmark	4.58	9.07	+50	Guatemala	2.20	5.47	-28
Egypt	1.55	2.94	-49	Honduras	1.91	11.7	-38
Euro area	3.58 <sup>**</sup>	1.05 <sup>††</sup>	+17	Iceland	6.67	143	+118
Hong Kong	1.54	3.92	-50	Jamaica	2.70	53.9	-12
Hungary	2.60	173	-15	Jordan	3.66	0.85	+19
Indonesia	1.53	4,771	-50	Latvia	1.92	0.36	-37
Japan	2.34	81.7	-23	Lebanon	2.85	1405	-7
Malaysia	1.38	1.72	-55	Lithuania	2.31	2.12	-24
Mexico	2.58	9.15	-16	Macau	1.40	3.66	-54
New Zealand	3.17	1.45	+4	Macedonia	1.90	31.0	-38
Peru	2.76	2.94	-10	Moldova	1.84	7.52	-40
Philippines	1.47	26.1	-52	Morocco	2.73	8.02	-11
Poland	1.96	2.12	-36	Nicaragua	2.11	11.3	-31
Russia	1.48	13.7	-52	Norway	6.06	12.7	+98
Singapore	2.17	1.18	-29	Pakistan	2.18	42.5	-29
South Africa	2.10	4.56	-31	Paraguay	1.44	2941	-53
South Korea	2.49	817	-19	Qatar	0.68	0.81	-78
Sweden	4.17	10.1	+36	Saudi Arabia	2.40	2.94	-22
Switzerland	5.05	2.06	+65	Serbia & Montenegro	2.08	45.8	-32
Taiwan	2.41	24.5	-21	Slovakia	2.09	21.6	-32
Thailand	1.48	19.6	-52	Slovenia	2.56	163	-16
Turkey	2.92	1.31	-5	Sri Lanka	1.75	57.2	-43
Venezuela	2.13	1,830	-30	Ukraine	1.43	2.37	-53
				UAE	2.45	2.94	-20
				Uruguay	1.82	14.4	-40

\*At current exchange rates †Purchasing-power parity  
<sup>‡</sup>Average of New York, Chicago, San Francisco and Atlanta  
<sup>§</sup>Dollars per pound \*\*Weighted average of member countries  
Sources: McDonald's; The Economist ††Dollars per euro

ITALIANS like their coffee strong and their currencies weak. That, at least, is the conclusion one can draw from their latest round of grumbles about Europe's single currency. But are the Italians right to moan? Is the euro overvalued?

Our annual Big Mac index (see table) suggests they have a case: the euro is overvalued by 17% against the dollar. How come? The euro is worth about \$1.22 on the foreign-exchange markets. A Big Mac costs €2.92, on average, in the euro zone and \$3.06 in the United States. The rate needed to equalise the burger's price in the two regions is just \$1.05. To patrons of McDonald's, at least, the single currency is overpriced.

The Big Mac index, which we have compiled since 1986, is based on the notion that a currency's price should reflect its purchasing power. According to the late, great economist Rudiger Dornbusch, this idea can be traced back to the Salamanca school in 16th-century Spain. Since then, he wrote, the doctrine of purchasing-power parity (PPP) has been variously seen as a “truism, an empirical regularity or a grossly misleading simplification.”

Economists lost some faith in PPP as a guide to exchange rates in the 1970s, after the world's currencies abandoned their anchors to the dollar. By the end of the decade, exchange rates seemed to be drifting without chart or compass. Later studies showed that a currency's purchasing power does assert itself over the long run. But it might take three to five years for a misaligned exchange rate to move even halfway back into line.

Our index shows that burger prices can certainly fall out of line with each other. If he could keep the burgers fresh, an ingenious arbitrageur could buy Big Macs for the equivalent of \$1.27 in China, whose yuan is the most undervalued currency in our table, and sell them for \$5.05 in Switzerland, whose franc is the most overvalued currency. The impracticality of such a trade highlights some of the flaws in the PPP idea. Trade barriers, transport costs and differences in taxes drive a wedge between prices in different countries.

More important, the \$5.05 charged for a Swiss Big Mac helps to pay for the retail space in which it is served, and for the labour that serves it. Neither of these two crucial ingredients can be easily traded across borders. David Parsley, of Vanderbilt University, and Shang-Jin Wei, of the International Monetary Fund, estimate that non-traded inputs, such as labour, rent and electricity, account for between 55% and 64% of the price of a Big Mac\*.

The two economists disassemble the Big Mac into its separate ingredients. They find that the parts of the burger that are traded internationally converge towards purchasing-power parity quite quickly. Any disparity in onion prices will be halved in less than nine months, for example. But the non-traded bits converge much more slowly: a wage gap between countries has a “half-life” of almost 29 months.

Seen in this light, our index provides little comfort to Italian critics of the single currency. If the euro buys less burger than it should, perhaps inflexible wages, not a strong currency, are to blame.

## The Big Mac Index

### Food for thought

May 27th 2004

From The Economist print edition

### **The world economy looks very different once countries' output is adjusted for differences in prices**

HOW fast is the world economy growing? How important is China as an engine of growth? How much richer is the average person in America than in China? The answers to these huge questions depend crucially on how you convert the value of output in different countries into a common currency.

Converting national GDPs into dollars at market exchange rates is misleading. Prices tend to be lower in poor economies, so a dollar of spending in China, say, is worth a lot more than a dollar in America. A better method is to use purchasing-power parities (PPP), which take account of price differences.

The theory of purchasing-power parity says that in the long run exchange rates should move towards rates that would equalise the prices of an identical basket of goods and services in any two countries. This is the thinking behind *The Economist's* Big Mac index. Invented in 1986 as a light-hearted guide to whether currencies are at their “correct” level, our “basket” is a McDonalds' Big Mac, which is produced locally in almost 120 countries.

The Big Mac PPP is the exchange rate that would leave a burger in any country costing the same as in America. The first column of our table converts the local price of a Big Mac into dollars at current exchange rates. The average price of a Big Mac in four American cities is \$2.90 (including tax). The cheapest shown in the table is in the Philippines (\$1.23), the most expensive in Switzerland (\$4.90). In other words, the Philippine peso is the world's most undervalued currency, the Swiss franc its most overvalued.

The second column calculates Big Mac PPPs by dividing the local currency price by the American price. For instance, in Japan a Big Mac costs ¥262. Dividing this by the American price of \$2.90 produces a dollar PPP against the yen of ¥90, compared with its current rate of ¥113, suggesting that the yen is 20% undervalued. In contrast, the euro (based on a weighted average of Big Mac prices in the euro area) is 13% overvalued. But perhaps the most interesting finding is that all emerging-market currencies are undervalued against the dollar. The Chinese yuan, on which much ink has been spilled in recent months, looks 57% too cheap.

The Big Mac index was never intended as a precise forecasting tool. Burgers are not traded across borders as the PPP theory demands; prices are distorted by differences in the cost of non-tradable goods and services, such as rents.

Yet these very failings make the Big Mac index useful, since looked at another way it can help to measure countries' differing costs of living. That a Big Mac is cheap in China does not in fact prove that the yuan is being held massively below its fair value, as many American politicians claim. It is quite natural for average prices to be lower in poorer countries and therefore for their currencies to appear cheap.

The prices of traded goods will tend to be similar to those in developed economies. But the prices of non-tradable products, such as housing and labour-intensive services, are generally much lower. A hair-cut is, for instance, much cheaper in Beijing than in New York.

One big implication of lower prices is that converting a poor country's GDP into dollars at market exchange rates will significantly understate the true size of its economy and its living standards. If China's GDP is converted into dollars using the Big Mac PPP, it is almost two-and-a-half-times bigger than if converted at the market exchange rate. Meatier and more sophisticated estimates of PPP, such as those used by the IMF, suggest that the required adjustment is even bigger.

### **Weight watchers**

The global economic picture thus looks hugely different when examined through a PPP lens. Take the pace of global growth. Anyone wanting to calculate this needs to bundle together countries' growth rates, with each one weighted according to its share of world GDP. Using weights based on market exchange rates, the world has grown by an annual average of only 1.9% over the past three years. Using PPP, as the IMF does, global growth jumps to a far more robust 3.1% a year.

The main reason for this difference is that using PPP conversion factors almost doubles the weight of the emerging economies, which have been growing much faster. Measured at market exchange rates, emerging economies account for less than a quarter of global output. But measured using PPP they account for almost half.

## The hamburger standard

	Big Mac price in dollars*	Implied PPP <sup>†</sup> of the dollar	Under (-)/over (+) valuation against the dollar, %
United States <sup>‡</sup>	2.90	–	–
Argentina	1.48	1.50	-49
Australia	2.27	1.12	-22
Brazil	1.70	1.86	-41
Britain	3.37	1.54 <sup>§</sup>	+16
Canada	2.33	1.10	-20
Chile	2.18	483	-25
China	1.26	3.59	-57
Czech Rep.	2.13	19.5	-27
Denmark	4.46	9.57	+54
Egypt	1.62	3.45	-44
Euro area	3.28**	1.06 <sup>††</sup>	+13
Hong Kong	1.54	4.14	-47
Hungary	2.52	183	-13
Indonesia	1.77	5,552	-39
Japan	2.33	90.3	-20
Malaysia	1.33	1.74	-54
Mexico	2.08	8.28	-28
New Zealand	2.65	1.50	-8
Peru	2.57	3.10	-11
Philippines	1.23	23.8	-57
Poland	1.63	2.17	-44
Russia	1.45	14.5	-50
Singapore	1.92	1.14	-34
South Africa	1.86	4.28	-36
South Korea	2.72	1,103	-6
Sweden	3.94	10.3	+36
Switzerland	4.90	2.17	+69
Taiwan	2.24	25.9	-23
Thailand	1.45	20.3	-50
Turkey	2.58	1,362,069	-11
Venezuela	1.48	1,517	-49

**MORE COUNTRIES** Data for the countries below are not provided in printed editions of *The Economist*

	Big Mac price in dollars*	Implied PPP <sup>†</sup> of the dollar	Under (-)/over (+) valuation against the dollar, %
Aruba	2.29	1.41	-21
Belarus	1.37	1021	-53
Bulgaria	1.85	1.03	-36
Colombia	2.35	2241	-19
Costa Rica	2.61	390	-10
Croatia	2.42	5.14	-17
Dom. Rep.	1.32	20.7	-54
Estonia	2.27	10.2	-22
Fiji	2.35	1.47	-19
Georgia	1.90	1.26	-34
Guatemala	2.01	5.52	-31
Honduras	1.98	12.4	-32
Iceland	6.01	151	107
Jamaica	1.88	39.0	-35
Jordan	3.65	0.89	26
Kuwait	7.33	0.74	153
Latvia	2.00	0.38	-31
Lebanon	2.84	1483	-2
Lithuania	2.26	2.24	-22
Macau	1.40	3.86	-52
Macedonia	1.84	32.8	-36
Moldova	1.93	7.93	-33
Morocco	0.26	0.82	-91
Nicaragua	2.19	11.9	-25
Norway	5.18	12.2	79
Pakistan	1.90	37.9	-34
Qatar	0.68	0.85	-77
Saudi Arabia	0.64	0.83	-78
Slovakia	1.98	22.8	-32
Slovenia	2.42	166	-17
Sri Lanka	1.41	48.3	-51
Ukraine	1.36	2.50	-53
UAE	0.67	0.84	-77
Uruguay	1.00	10.3	-65

\*At current exchange rates †Purchasing-power parity ‡Average of New York, Chicago, San Francisco and Atlanta  
§Dollars per pound \*\*Weighted average of member countries ††Dollars per euro

Sources: McDonald's; *The Economist*

Small wonder, then, that global economic rankings are dramatically transformed when they are done on a PPP basis rather than market exchange rates. America remains number one, but China leaps from seventh place to second, accounting for 13% of world output. India jumps into fourth place ahead of Germany, and both Brazil and Russia are bigger than Canada. Similarly, market exchange rates also exaggerate inequality. Using market rates, the average American is 33 times richer than the average Chinese; on a PPP basis, he is “only” seven times richer.

The way in which economies are measured also has a huge impact on which country has contributed most to global growth in recent years. Using GDP converted at market rates China has accounted for only 7%

of the total increase in the dollar value of global GDP over the past three years, compared with America's 25%. But on PPP figures, China has accounted for almost one-third of global real GDP growth and America only 13%.

This helps to explain why commodity prices in general and oil prices in particular have been surging, even though growth has been relatively subdued in the rich world since 2000. Emerging economies are not only growing much faster than rich economies and are more intensive in their use of raw materials and energy, but they also account for a bigger chunk of global output if measured correctly. As Charles Dumas, an economist at Lombard Street Research, neatly puts it, even if a Chinese loaf is a quarter of the cost of a loaf in America, it uses the same amount of flour.

All measures of PPP are admittedly imperfect. But most economists agree that they give a more accurate measure of the relative size of economies than market exchange rates—and a better understanding of some of the dramatic movements in world markets. The humble burger should be part of every economist's diet

## Economics focus

### McCurrencies

Apr 24th 2003

From The Economist print edition

#### **Hamburgers should be an essential part of every economist's diet**

THE past year has been one to relish for fans of burgernomics. Last April *The Economist's* Big Mac index flashed a strong sell sign for the dollar: it was more overvalued than at any time in the index's history (see [article](#)). The dollar has since flipped, falling by 12% in trade-weighted terms.

Invented in 1986 as a light-hearted guide to whether currencies are at their “correct” level, burgernomics is based on the theory of purchasing-power parity (PPP). This says that, in the long run, exchange rates should move toward rates that would equalise the prices of an identical basket of goods and services in any two countries. To put it simply: a dollar should buy the same everywhere. Our basket is a McDonald's Big Mac, produced locally to roughly the same recipe in 118 countries. The Big Mac PPP is the exchange rate that would leave burgers costing the same as in America. Comparing the PPP with the actual rate is one test of whether a currency is undervalued or overvalued.

The first column of the table shows local-currency prices of a Big Mac. The second converts them into dollars. The average price of a Big Mac in four American cities is \$2.71. The cheapest burgers are in China (\$1.20); the dearest are in Switzerland (\$4.52). In other words, the yuan is the most undervalued currency, the Swiss franc the most overvalued. The third column calculates Big Mac PPPs. Dividing the local Chinese price by the American price gives a dollar PPP of 3.65 yuan. The actual exchange rate is 8.28 yuan, implying that the Chinese currency is undervalued by 56% against the dollar. The average price of a Big Mac in the euro area is now exactly the same as in America. This implies that the euro's PPP is exactly \$1, so at its current rate of \$1.10 the euro is 10% overvalued. The British, Swedish and Danish currencies are still significantly overvalued against the euro.

Among rich economies, the most undervalued currency is the Australian dollar. The Aussie dollar is still 31% below PPP against its American counterpart: its rise over the past year has been largely offset by a fall in the relative price of burgers in Australia. Many emerging-market currencies are undervalued against the dollar by 30-50%. One exception is the South Korean won, which is exactly at its PPP, implying that it is overvalued against other emerging-market currencies.

Many readers complain that burgeronomics is hard to swallow. We admit it is flawed: Big Macs are not traded across borders as the PPP theory demands, and prices are distorted by taxes, tariffs, different profit margins and differences in the cost of non-tradables, such as rents. It was never intended as a precise predictor of currency movements, but as a tool to make exchange-rate theory more digestible. Yet in the early 1990s, just before the crisis in Europe's exchange-rate mechanism, it signalled that several currencies, including sterling, were markedly overvalued against the D-mark. It also predicted the fall in the euro after its launch in 1999.

Academic economists are taking burgeronomics more seriously, chewing over the Big Mac index in almost a dozen studies. Now a whole book has been written about the index\* by Li Lian Ong, of the International Monetary Fund. She says it has been surprisingly accurate in tracking exchange rates in the long term. But there are some persistent deviations from PPP. In particular, emerging-market currencies are consistently undervalued.

Differences in productivity are one explanation of this. Rich countries have higher productivity than poor countries, but their advantage tends to be smaller in non-tradable goods and services than in tradables. Because wages are the same in both sectors, non-tradables are cheaper in poorer countries. Therefore, if currencies are determined by the relative prices of tradables, but PPP is calculated from a basket that includes non-tradables, such as the Big Mac, the currencies of poor countries will always look undervalued. Ms Ong finds that currency deviations from PPP are indeed related to productivity differences relative to America. After adjusting for this, she finds that the Big Mac index performs better in tracking exchange rates.

The Big Mac index suggests that the dollar is no longer overvalued against the euro. But having overshoot PPP, the dollar may well now undershoot, because America's huge current-account deficit is becoming harder to finance. Without stronger domestic demand in Japan and Europe to help trim the deficit, the dollar will have to take more of the strain. What are this year's other hot tips? The Australian dollar is likely to see the biggest gain. The pound will fall further against the euro. And China will come under increasing pressure to revalue the yuan.

Table below is for Apr 22, 2003

## The hamburger standard

	Big Mac prices		Implied PPP* of the dollar	Actual dollar exchange rate April 22nd	Under (-)/over (+) valuation against the dollar, %
	in local currency	in dollars			
United States†	\$2.71	2.71			
Argentina	Peso 4.10	1.43	1.51	2.88	-47
Australia	A\$3.00	1.86	1.11	1.61	-31
Brazil	Real 4.55	1.48	1.68	3.07	-45
Britain	£1.99	3.14	1.36‡	1.58‡	+16
Canada	C\$3.20	2.21	1.18	1.45	-18
Chile	Peso 1,400	1.95	517	716	-28
China	Yuan 9.90	1.20	3.65	8.28	-56
Czech Rep	Koruna 56.57	1.96	20.9	28.9	-28
Denmark	DKr27.75	4.10	10.2	6.78	+51
Egypt	Pound 8.00	1.35	2.95	5.92	-50
Euro area	€2.71	2.97	1.00§	1.10§	+10
Hong Kong	HK\$11.50	1.47	4.24	7.80	-46
Hungary	Forint 490	2.18	181	224	-19
Indonesia	Rupiah 16,100	1.84	5,941	8,740	-32
Japan	¥262	2.19	96.7	120	-19
Malaysia	M\$5.04	1.33	1.86	3.80	-51
Mexico	Peso 23.00	2.18	8.49	10.53	-19
New Zealand	NZ\$3.95	2.21	1.46	1.78	-18
Peru	New Sol 7.90	2.29	2.92	3.46	-16
Philippines	Peso 65.00	1.24	24.0	52.5	-54
Poland	Zloty 6.30	1.62	2.32	3.89	-40
Russia	Rouble 41.00	1.32	15.1	31.1	-51
Singapore	S\$3.30	1.86	1.22	1.78	-31
South Africa	Rand 13.95	1.84	5.15	7.56	-32
South Korea	Won 3,300	2.71	1,218	1,220	nil
Sweden	SKr30.00	3.60	11.1	8.34	+33
Switzerland	SFr6.30	4.59	2.32	1.37	+69
Taiwan	NT\$70.00	2.01	25.8	34.8	-26
Thailand	Baht 59.00	1.38	21.8	42.7	-49
Turkey	Lira 3,750,000	2.34	1,383,764	1,600,500	-14
Venezuela	Bolivar 3,700	2.32	1,365	1,598	-15

## The additional hamburger standard

Aruba	Florin 4.10	2.29	1.51	1.79	-15
Bahrain	Dinar 0.85	2.25	0.31	0.38	-17
Belarus	Ruble 2,450	1.21	904	2,018	-55
Bulgaria	Lev 2.98	1.68	1.10	1.78	-38
Colombia	Peso 6,200	2.13	2,288	2,914	+1
Costa Rica	Colon 1,130	2.89	417	390	+7
Croatia	Kuna 14.9	2.17	5.50	6.87	-20
Dominican Rep.	Peso 60.0	2.61	22.1	23.0	-4
Estonia	Krooni 29.5	2.07	10.9	14.3	-24
Georgia	Lari 3.65	1.65	1.35	2.21	-39
Guatemala	Quetzal 16.0	2.03	5.90	7.87	-25
Honduras	Lempira 25.95	1.51	9.58	17.2	-44
Iceland	Kronur 439	5.79	162	75.8	+114
Jamaica	Jam. \$113.04	1.99	41.7	56.7	-26
Kuwait	Dinar 0.65	2.17	0.24	0.30	-20
Lebanon	Pound 4,301	2.85	1,587	1,512	+5
Lithuania	Lita 6.50	2.06	2.40	3.15	-24
Macau	Pataca 11.2	1.39	4.13	8.03	-49
Macedonia	Denar 95.0	1.70	35.1	55.8	-37
Morocco	Dirhams 23.0	2.34	8.49	9.82	-14
Norway	Kroner 39.5	5.51	14.6	7.16	+64
Oman	Rial 0.90	2.34	0.33	0.39	-14
Pakistan	Rupee 99.0	1.71	36.5	57.8	-37
Qatar	Riyal 9.00	2.47	3.32	3.64	-9
Saudi Arabia	Riyal 9.00	2.40	3.32	3.75	-4
Slovakia	Koruna 66.0	1.76	24.4	37.4	-35
Slovenia	Tolar 480	2.26	177	212	-17
Sri Lanka	Rupee 130	1.34	48.0	97.0	-51
Suriname	S. guilder 8,000	3.18	2,952	2,515	+17
Ukraine	Hryvnia 7.00	1.31	2.58	5.34	-52
UAE	Dirham 9.00	2.45	3.32	3.67	-10
Uruguay	Peso 29.8	1.05	11.0	28.5	-61
Yugoslavia	Dinar 105	1.77	38.7	59.2	-35

\*Purchasing-power parity: local price divided by price in United States

†Average of New York, Chicago, San Francisco and Atlanta

‡Dollars per pound §Dollars per euro

Sources: McDonald's; *The Economist*