

Purchasing Power Parity, The Big Mac Index, and Wages

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Abstract

This paper looks into the issue of purchasing power parity (PPP) and the debate surrounding its existence in the short run. It includes a brief discussion on the implications of PPP in the macro-economic and consumer level. Special focus is placed on the relationship between wages and real exchange rates across countries. The paper attempts to discover the extent to which short-term departures from PPP can be attributed to wages. Conclusions are drawn from the results of two analysis methods using the Big Mac Index and the ILO October Inquiry as data sources.

Introduction

Apple® is a computer, software, and electronic device company that has delivered many popular products in the market. One of its most recent innovations is the iPod®, a handheld digital mp3 player that has received much commercial success in the US and in other countries abroad. Although it has been embraced internationally, the iPod has not escaped all manner of controversy...in particular, the noticeable gap in prices charged in different countries. This price differential is significant enough to alarm consumers. More recent entries in European blogs¹ for Apple have messages ranging from inquiry, irritation, to outright anger over the perceived price discrimination (Appendix A).

If an iPod, which is a mere luxury item, can arouse this much emotional reaction, what of price differentials that exist for basic commodities such as food and clothing?

Purchasing Power Parity

What all this consumer anxiety illustrates is that individuals, at an instinctual level, subscribe to the economic theory of Purchasing Power Parity (PPP). PPP states that price levels in any two countries should be identical after converting prices into a common currency and after accounting for transportation costs, taxes, and tariffs. A major foundation of PPP is the *law of one price*. It states that any good that is traded on world markets will sell for the same price in every country engaged in trade, when prices are expressed in a common currency. The reason for this is the possibility of international goods arbitrage, which allows an

¹ A Weblog or “blog” is a frequently updated, personalized website where posts or messages appear in reverse chronological order. Blogs include comments and a list of links for every entry. And, each posted message has a unique html address, which is directly accessible.

individual to make a risk-less profit by taking advantage of price differentials (i.e., buying a product from a low priced country and selling the same product at the high priced country). These individual activities magnified at the macro, international level will cause the supply adjustments that will lead to the convergence of prices around the world. This is the main premise of the PPP theory.

Much effort has been placed in putting the PPP theory to test. “The study of real exchange rates, defined as the international relative price of a basket of goods expressed in a common currency, is perhaps the most intensely researched area in international macroeconomics” (Imbs 2005, p.1). This is because there are very important implications in the macro-level to resolving the issue of PPP. For example, measurements of the size of the global world economy considerably vary whether or not real exchange rates are taken into consideration. Using market exchange rates in the most straightforward manner (i.e., converting all the national economic outputs to a single currency such as the American dollar), the size of the world economy is measured at \$36 trillion for the year 2003. However, if purchasing power parity is taken into account, the size of the world economy during the same year is at \$50 trillion (The Economist 2004a).

The method of measurements used affects important matters such as the global rate of growth and the extent of inequality between rich and poor countries. It also makes the appropriate ranking of countries in terms of the relative size of economies more ambiguous. Take China for example. Using simple market exchange rate conversions, its economy can be ranked as the 7th largest in the world. However, after adjusting for PPP, China’s ranking moves up to the 2nd largest in the world, just behind the United States (The Economist 2004b). This illustrates that currencies can be grossly over-valued or under-valued at a given point in time. Therefore, the use of market exchange rates alone can produce misleading results that stimulate bad policies.

Background on the PPP Debate

In spite of the intensive research devoted to the subject, there is still much debate about the existence of PPP. According to Alan Taylor, “the concept of purchasing power parity was originally propounded by the sixteenth-century scholars of the University of Salamanca and was revived in the interwar period in the context of the debate concerning the appropriate level at which to re-establish international exchange rate parities” (2004). PPP has been

generally accepted as a long-run equilibrium condition in the post-war period. But starting in the early 1970s, the idea of PPP as a condition of short-run equilibrium was advanced. At present, the most intense focus of the debate centers on finding a consensus on whether PPP holds or does not hold in the short run.

Some academics and researchers claim that the empirical data over the last two or three decades does not support the theory. One of the most common measurements used to look at PPP persistence is a time series of real exchange rates. This method relies on the fact that in order for PPP to hold, the real exchange rate should show 'stationarity' over an extended time period. Stationarity implies that deviations from parity should be temporary and the real exchange rate level should settle at an equilibrium level. "If the real exchange rate is to settle down at *any* level whatsoever, including a level consistent with PPP, it must display reversion towards its own mean" (Taylor 2004). According to Brendan McCabe from the University of Liverpool, the time series of real exchange rates is not stationary when looking at available data (2005). Even after expanding the number of countries and widening the dataset, the study still indicates that PPP does not hold in the short run.

On the other side of the debate are advocates of PPP who argue that the disparity can be explained by considering various factors which can influence the measurement of real exchange rates. For example, David Pappell argues that monetary shocks mostly occurring during the 1980s have considerable impacts on exchange rates. And, in order to conduct proper measurements of stationarity, exogenous, one-time shocks to the monetary system should be excluded from the data analysis (1997). Furthermore, it has been argued that systematic departures from PPP can be addressed by three main explanations: pricing to market, barriers to trade, and the inclusion of non-traded elements in the cost of the goods (Pakko 2003, p.16).

Pricing to market explains the deviation from PPP by pointing out the existence of imperfect competition in certain sectors of the economy. In this scenario, firms have market power and are able to charge unequal prices across countries. One of the fundamental requirements for PPP to hold is that markets are perfectly competitive. Therefore, the deviation from PPP can be explained if imperfect competition exists. The second explanation involves barriers to trade. This includes transportation costs, taxes, and trade restrictions. The different levels of these barriers to trade across various countries inflate or deflate local prices of a product in

comparison to world market prices. Relatively speaking, this explanation to the observed PPP departure is fairly easy to account for because, for the most part, taxes, transportation costs, and trade restrictions in the form of tariffs are transparent and measurable. And in the absence of barriers to trade, the law of one price states that the price of tradable goods will be the same in all countries. On the other hand, the third explanation for price disparities is not as straightforward to explain. The non-traded components of goods are embedded into the pricing of the commodity. Non-traded components of goods include labor and capital, which are production inputs that cannot be quickly moved across national borders. And, these factors are considered as the primary explanation for deviations from PPP (Pakko 2003,p.21).

PPP and Wages

In order to contribute to the discussion regarding whether PPP prevails in the short run, this paper will focus on the labor aspect of the non-tradable elements of goods. Specifically, it will look into wages from various countries around the world to determine if it can explain deviations from PPP and the extent it affects the disparity in real prices. In short, the research question this paper will attempt to address is “To what extent do wages influence the disparity in prices across countries?”

Two primary data sources will be utilized in order to answer this question: 1) The Big Mac Index and 2) The ILO October Inquiry.

The Big Mac Index

Starting in 1986, the Big Mac Index (BMI) has been generated on an annual basis in order to evaluate the purchasing power parity of various currencies around the world. Although it is a simplification of the complex issues surrounding the international monetary system, it can serve as a proxy for the consumer price index (CPI) because the Big Mac® is served in 120 countries around the world and, for the most part, uses the same ingredients in its composition. Therefore, it can be regarded as a small ‘basket of goods’ that are comparable across many countries. A study conducted by David Parsley and Shang-Jin Wei showed that the Big Mac real exchange rates are highly correlated with the CPI-based real exchange rates both in levels and in first differences (2003). So the lessons from the Big Macs have general implications for CPI-based real exchange rates.

The Big Mac Index has been derived from publications of *The Economist* magazine. The dataset includes Big Mac prices in the local currency and its corresponding price in US dollars based on the prevailing exchange rate at the time of publication. The US dollar was used as the nominal base currency². As of 2004, The Economist has included up to 42 countries in the Big Mac Index. However, many countries have only been recently added and do not have complete historical data. For example, coverage for some countries started at later years like 1994 for Poland, 1996 for South Africa, 2001 for the Philippines, and 2002 for Turkey. Meanwhile, Big Mac Index data for countries like Ireland, Portugal, and Israel becomes unavailable starting on 1994, 1995, and 2001 respectively. Of most significant impact to the data source is the integration of the currencies of several European countries in 1999. When the physical currency became available in January of 2002, prices for Big Macs throughout the euro area were posted in euros and The Economist ceased from reporting prices of Big Macs for individual euro area countries.

The inconsistency and data lapses in BMI information means only a subset of the entire time period covered is reliable enough to include in the dataset. For the purpose of this analysis, the time period from 1992 to 2001 will be used in order to have a complete series of contiguous data available for at least a 10-year period. Fourteen countries out of the 42 covered as of 2004 are able to meet this criterion.

Using the reported Big Mac prices during this period and the prevailing monetary exchange rates for each corresponding year, real exchange rates can be calculated using the following formula:

$$\frac{\text{Price in foreign currency}}{\text{Price in US\$}} \times \frac{1}{\text{Exchange Rate}}$$

Multiplying the result by 100, this calculation yields a BMI PPP valuation for each country where 100 equates to parity. Values below 100 indicate that the local currency is undervalued relative to the US dollar and values above 100 indicate that the local currency is overvalued relative to the US dollar. Table 1 displays the mean, minimum, and maximum values for each of the 14 qualifying countries.

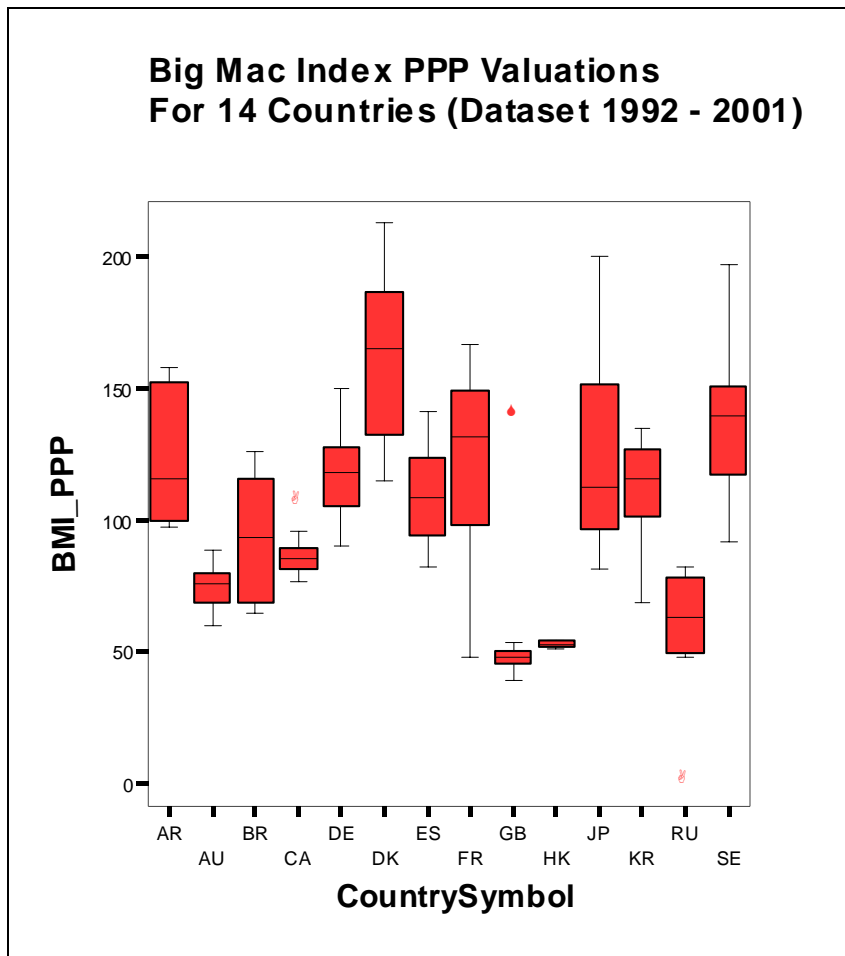
² The use of the US dollar as the nominal base currency is a common practice in real exchange rate calculations because it is considered as the international ‘reserve’ currency. However, for PPP calculations, the results in terms of deviations are the same even if another currency other than the US dollar is used as the nominal base.

Table 1: BMI PPP Valuation (1992 to 2001, Select Countries)

Country	N	Mean	Minimum	Maximum
Argentina	10	122.49	98	158
Australia	10	74.08	60	89
Brazil	10	93.67	65	126
Britain	10	56.55	39	139
Canada	10	87.16	77	106
Denmark	10	163.03	115	212
France	10	118.90	48	166
Germany	10	117.66	90	150
Hong Kong	10	52.71	51	54
Japan	10	124.20	81	200
Russia	10	58.91	0	82
South Korea	10	111.28	69	135
Spain	10	108.77	82	141
Sweden	10	137.40	92	196

The same results are displayed in box plot chart format in Figure 1.

Figure 1



Looking at these results, three significant observations can be made. First of all, it is clear that there are wide variations on the BMI PPP valuation among the observed countries. While the British pound and the Hong Kong dollar shows negligible fluctuations in their valuation against the US dollar, the currencies of Japan, Denmark, and France have swung more wildly in terms of its relative valuation. Secondly, most of the observed currencies do not show signs of a leveling off to a mean valuation, which equals the parity level (i.e., 100). The Brazilian real and the Spanish peseta are the only two exceptions that give a slight hint to this phenomenon. Finally, the deviations from PPP indicated by most of the observed countries support the argument that PPP does not show stationarity over a given time series and instead, the pattern is best described as a random walk.

The departure of the Big Mac Index from the PPP is a good launching point for this paper's investigation into the influence of wages in the divergence in prices.

The ILO October Inquiry

The ILO October Inquiry is “a rarely used but most far-ranging survey of wages around the world” (Oostendorp 2004, p.3).

[The dataset reports average monthly wages in various forms for 161 occupations and up to 76 countries covering the periods from 1983 to 2003. However, it is important to point out that the reporting of wages has not been consistent for all countries during this time period. Also, wage data availability is dependent on the type of occupation reported because countries do not report data for every occupation in the years when they do report. Nevertheless, the actual number of observations (year/country/observation) present in the 1983-2003 ILO October Inquiry is 90,772] (Oostendorp 2005).

Several treatments were applied to the full dataset in order to match the data available for the Big Mac Index. These treatments include:

1. Restricting the time period from 1992 to 2001 (the same time period where there is a contiguous series of Big Mac prices for the 14 countries).
2. Filtering out the records that do not fall within the restaurant and hotel industry (i.e., industry code “MC”)

- Filtering out the records for the occupational codes that are not in the food service sector. These leaves in three occupations to be included in the analysis: cash desk cashier, cook, and waiter (i.e., occupational codes 95, 98, and 99 respectively).

Treatments 2 and 3 above are applied in order to more appropriately mirror the actual labor input that goes into the production of Big Macs³.

Of the available metrics for average monthly wages in the ILO October Inquiry, the “wage with country-specific calibration (type 2, lexicographic weighting) will be used for the analysis on this paper (i.e., x2wlus). The average monthly wages for each occupation code are already expressed in US dollar terms for all countries with reported data. Table 2 lists the mean average monthly wages for the food service occupation/industry of countries with reported data.

Table 2: Average Monthly Wages for Food Service Industry/Occupations

Country	Wages
Argentina	\$509.41
Brazil	\$156.30
Canada	\$1,017.60
Germany	\$1,971.08
Denmark	\$2,792.66
Britain	\$1,379.98
Hong Kong	\$1,335.02
Japan	\$2,197.92
Sweden	\$1,958.49

Relationship between Wages and Prices

To determine the relationship between wages and prices, the correlation is calculated between the Big Mac Index and occupational wage data. This reveals a Pearson’s correlation value of $r = .529$ (Table 3). This result indicates that BMI PPP valuations and average monthly wages have a strong positive correlation. Countries that have higher average monthly wages for food service related occupations in the food service industry also have a higher real exchange rate valuation.

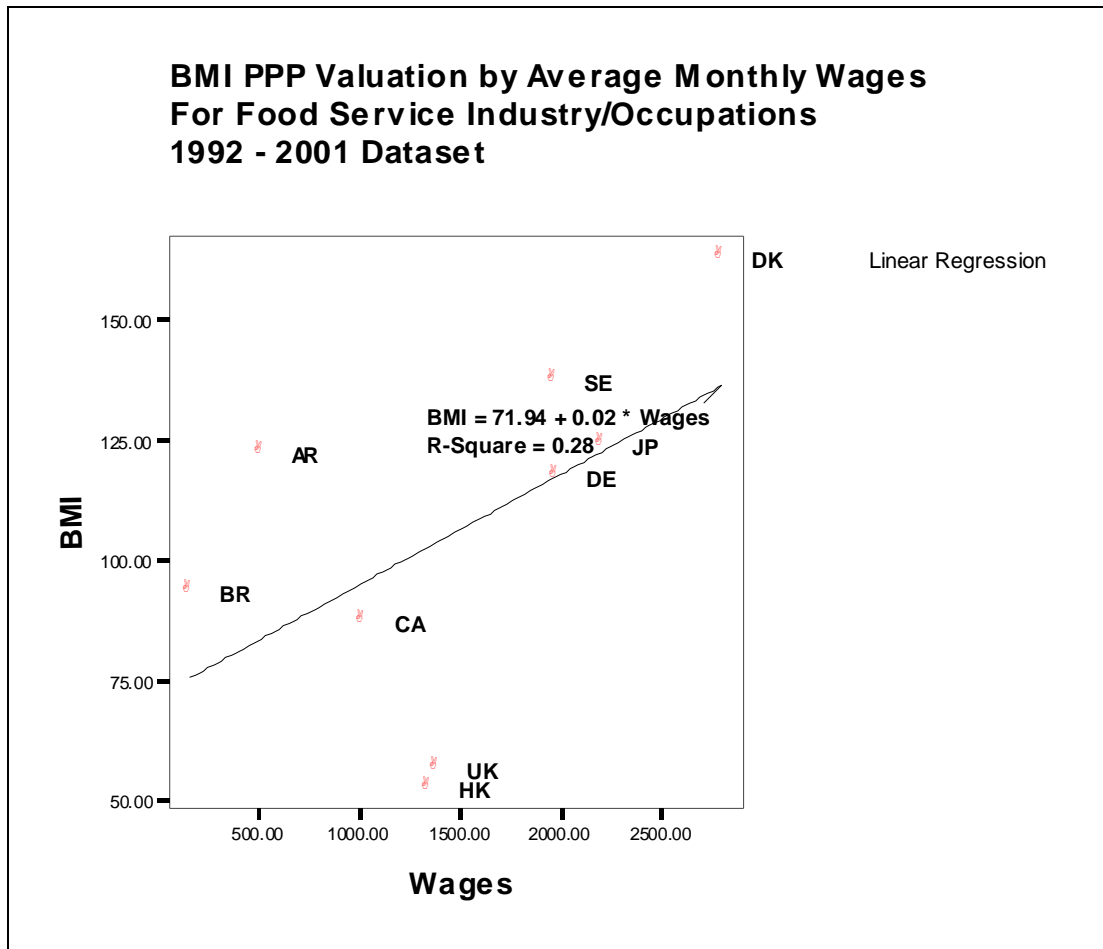
Table 3: Correlation between BMI PPP Valuation and Average Monthly Wages

		BMI	Wages
BMI	Pearson Correlation	1	.529
	Sig. (2-tailed)		.143
	N	10	9
Wages	Pearson Correlation	.529	1
	Sig. (2-tailed)	.143	
	N	9	9

³ Ideally, wages or salaries of Mc Donald’s employees across the world would be the most valid dataset to use for the analysis. However, the source of this data is unavailable for this research paper. Therefore, the wages of workers in the food service industry and occupational fields are used as a proxy.

This relationship is displayed visually in a scatter plot with average monthly wages in the x-axis and BMI PPP valuations in the y-axis (Figure 2).

Figure 2:



The Wage Effect on Prices

Several 'goodness-of-fit' measurements are available in order to quantify how much wages influences BMI PPP valuations (i.e., the wage effect). For the purpose of all analysis in this paper, the following formula is used to measure how much of the absolute relative deviation is explained by wages:

$$\text{Wage Effect} = 1 - (\Sigma (\text{ABS} ((AV_n - PV_n)/AV_n)) / N)$$

where:

AV_n = Actual BMI PPP Valuation for country (n)

PV_n = Predicted BMI PPP Valuation for country (n) based on the linear regression equation: $BMI = 71.94 + 0.02 * Wages$

N = Total number of countries with available BMI and wage data

Appendix B displays the summary dataset on average monthly wages, actual BMI PPP valuation, predicted PPP valuation, and absolute relative deviation for the 9 qualifying countries. Using these inputs for the wage effect formula, the resulting figure comes out to be 69.48%. In other words, 69.48% of the disparity in real prices of Big Macs can be explained by differences in wages between the countries.

Less Pure, More Data

Although the previous analysis has treated the BMI and occupational wage data in a very careful manner, the trade off has been the restriction of the dataset to the exclusion of many other countries (and currencies). Therefore, the biggest weakness of the previously presented results is the small sample size that might not be representative.

In order to address this criticism, a less restrictive, secondary method for extracting the wage effect on prices is also offered. In this alternative method, the filtering treatments applied to both data sources are relaxed. For the Big Mac Index, the time period will be expanded to include data from 1992 to 2003. And, all countries/currencies will be included regardless of completeness for the coverage period as long as there is at least one single year with reported BMI data. Using these criteria, the number of currencies with BMI PPP valuation increases to 41. Appendix C lists the qualifying countries along with the mean, minimum, and maximum values of each country's BMI PPP valuation.

For the ILO October Inquiry, the dataset used in this alternative analysis is the same expanded time period of 1992 to 2003. However, wages will be drawn from 17 randomly selected occupational fields out of the 161 total⁴. This is a departure from the previous method wherein only wage data for the food service industry/occupations were included. From the 41 countries with BMI data, 21 also have occupational wage data from the new extraction method on the ILO October Inquiry.

⁴ This randomization was accomplished by including only occupational codes within increments of 10 starting from 1. This includes the occupational codes 1, 11, 21, 31, 41,151, 161. Using this strategy, the total number of occupational codes extracted from the full dataset is 17.

As a result of this less restrictive, alternative method for defining the dataset used in the analysis, the number of countries that qualify increases from 9 to 21. This more than doubles the sample size in terms of the number of unique countries.

From this dataset, a new Pearson correlation between BMI PPP valuation and average monthly wages is extracted. This correlation value comes out to $r = .547$ (Table 4) which is only slightly higher than the value from the pure method ($r = .529$). Therefore, the alternative method echoes the previous findings. Countries that have higher average monthly wages also have a higher real exchange rate valuation. And, since the wage data was selected randomly, the result can be generalized beyond the full range of occupational fields (whereas the correlation from the pure method is restricted to the food service industry/occupation).

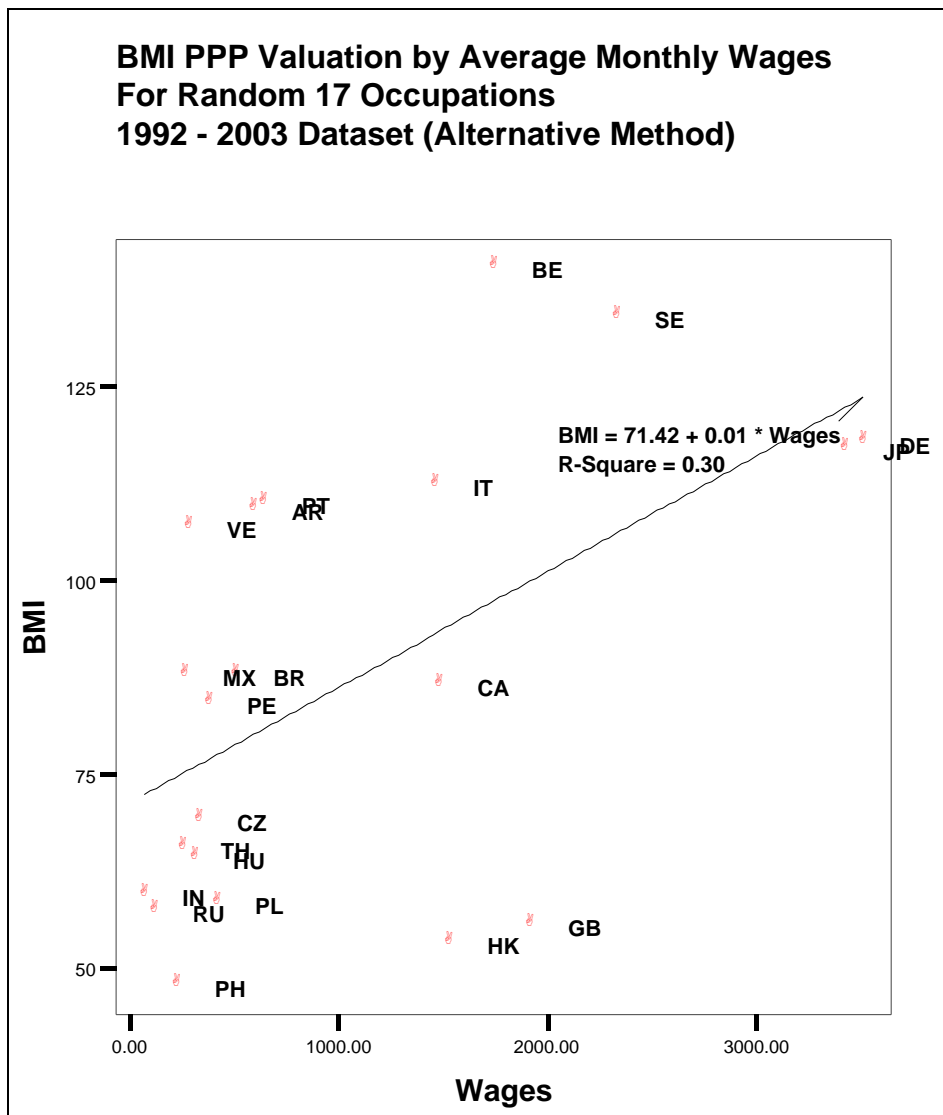
Table 4: Correlation between BMI PPP Valuation and Average Monthly Wages (Alternative Method)

		Wages	BMI
Wages	Pearson Correlation	1	.547(*)
	Sig. (2-tailed)		.010
	N	21	21
BMI	Pearson Correlation	.547(*)	1
	Sig. (2-tailed)	.010	
	N	21	21

* Correlation is significant at the 0.05 level (2-tailed).

This relationship is also displayed visually in a scatter plot with average monthly wages in the x-axis and BMI PPP valuations in the y-axis (Figure 3).

Figure 3:



The alternative method uses the new linear regression equation ($BMI = 71.42 + 0.01 * Wages$) from this calculation and the same formula on wage effect ($1 - (\sum (ABS ((AV_n - PV_n)/AV_n)) / N)$). Appendix D displays the summary dataset on average monthly wages, actual BMI PPP valuation, predicted PPP valuation, and absolute relative deviation for the 21 qualifying countries. The new wage effect resulting from the alternative method of data analysis comes out to 74.65%. In other words, 74.65% of the disparity in real prices of Big Macs can be explained by differences in wages between the countries.

Table 5 briefly summarizes the comparative results from the pure, restrictive method and the less restrictive, alternative method when deriving the wage effect.

Table 5: Comparison of Two Methods

	Pure/Restrictive	Less Restrictive/Alternative
Time Period Covered	1992 - 2001	1992 - 2003
BMI Dataset	only countries w/ contiguous data	all countries w/ at least 1 year of data
ILO Dataset	only food service industry/occupations	random 17 occupations
Qualifying Countries	9	21
Pearson's Correlation	.529	.547
Correlation Co-efficient (r^2)	.28	.30
Wage Effect	69.48%	74.65%

It is important to note that the differences in the results from the two methods are minor. Regardless of which method is applied, the positive correlation between BMI PPP valuations and average monthly wages is strong (.529 versus .547). Also, the difference between the variance of the two methods is almost negligible (.28 versus .30). Most important for the research focus of this paper, the resulting wage effect is substantial whether the available data is treated in a pure/restrictive manner or a less restrictive/alternative manner (i.e., 69.48% and 74.65%). These findings can be viewed as a hint to the persistence of wages in influencing the differences in real prices.

Conclusion

The findings of this paper lend support to the persistence of PPP in the short run when non-tradable elements of goods (wages in particular) are taken into consideration. On a macro-economic level, the results favor measurements that incorporate PPP in order to more accurately reflect real prices across countries. On a consumer level, the results suggest that perceived price differences can be explained by a primary input of production (i.e., wages from labor).

On the basis of the empirical data presented in this paper, the theory of PPP is given a boost in its status as an established rule that governs the movements of real exchange rates. And, the law of one price becomes more than just a normative statement.

Bibliography

The Economist, 1992 – 2004. *The Big Mac Index*.

The Economist, 2004a. *Garbage In Garbage Out*. Vol. 371 Issue 8377, 5/29/2004, p13, 2p.

The Economist, 2004b. *Economic Weight-Watching*. September 30, 2004.

Imbs, J. et. al. 2005. *PPP Strikes Back: Aggregation and the Real Exchange Rate*. The Quarterly Journal of Economics. Vol. CXX. Issue 1. February 2005.

Pakko, M.R. and Pollard, P.S., 2003. *Burgernomics: A Big Mac Guide to Purchasing Power Parity*. Federal Reserve Bank of St. Louis.

Parsley, D. and Wei, S. 2003. *A Prism Into the PPP Puzzles: The Micro-Foundations of Big Mac Real Exchange Rates*. National Bureau of Economic Research: Working Paper 10074. Cambridge: NBER.

Papell, David H. 1997. *Searching for Stationarity: Purchasing Power Parity Under the Current Float*. Journal of International Economics. 43:3–4, pp. 313–32.

McCabe, Brendan 2005. *Panel Stationarity Tests for Purchasing Power Parity with Cross-sectional Dependence*. Econometric Seminar. Tinbergen Institute. Amsterdam. June 3, 2005



NBER 2005. *Occupational Wages around the World*. Available Online: www.nber.org/oww [Accessed on May 15, 2005].

Oostendorp, R.H. 2004. *Globalization and the Gender Wage Gap*. World Bank Policy Research Working Paper 3250, March 2004.



Oostendorp, R.H. 2005. *The Standardized ILO October Inquiry 1983-2003*. Amsterdam: Vrije University.

Taylor, A.M. and Taylor, M.P., 2004. *The Purchasing Power Parity Debate*. National Bureau of Economic Research: Working Paper 10607. Cambridge: NBER.

Appendix A

FernandoD Joined: Aug 05, 2002 Posts: 1 From: Madrid, Spain 	 Posted: 2002-08-05 14:09 Hi, A 20Gb ipod costs 650 US dollars in Europe, being the price for a 10Gb 500 US dollars. This is unfair, folks. That's a lot of money for it. Hope Apple reconsiders their policies, otherwise I won't purchase it. Best regards / Fernando
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Anonymous Unregistered User	 Posted: 2002-12-12 11:30 Here in Italy, the 20GB ipod costs 540€ before taxes (iva is 20%, so total after taxes is 649€), where in the US it costs \$499 before taxes (After taxes i don't know, it depends on the state). Anyways since the € and the \$ are approximately the same value (1\$= 1,008€), the european Ipod costs about 40\$ more than the US version NOT CONSIDERING TAXES. Which makes me want to say:APPLE, YOU BASTARDS!!!   
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wldmstng Joined: Feb 07, 2003 Posts: 7 From: Istanbul, Turkey 	 Posted: 2003-02-11 15:27 I also used to think that \$650 was too much money for iPod but I think the reason for the price tag is extended warranty we receive in Europe. As far as I know in UK most products like this have minimum 2 years warranty. Here in Turkey, Apple sells iPod with 1 year warranty. I think if you consider warranty+localized support+cost of importing \$150 is not such a steep price to pay. I'm sure Apple could cut some of the cost for European countries though if they wanted to!
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Source: www.ipodhacks.com

Appendix B

Data Summary (Pure Method)

Country	Country Code	Average Monthly Wages	Actual BMI PPP Valuation	Predicted BMI PPP Valuation	Absolute Relative Deviation
Argentina	AR	\$509.41	122	82	0.329522569
Brazil	BR	\$156.30	94	75	0.198650691
Canada	CA	\$1,017.60	87	92	0.058907103
Germany	DE	\$1,971.08	118	111	0.053492079
Denmark	DK	\$2,792.66	163	128	0.216139166
Britain	GB	\$1,379.98	57	100	0.760332685
Hong Kong	HK	\$1,335.02	53	99	0.871416307
Japan	JP	\$2,197.92	124	116	0.066844066
Sweden	SE	\$1,958.49	137	111	0.191314192
				Wage Effect	69.48%

Appendix C

BMI PPP Valuation (1992 to 2003, Alternative Method)

Country	N	Mean	Minimum	Maximum
Argentina	12	109.13	32	158
Australia	12	72.86	60	89
Austria	4	128.92	102	173
Belgium	7	140.29	112	165
Brazil	12	87.77	55	126
Britain	12	55.59	39	139
Canada	12	86.52	77	106
Chile	10	86.64	0	119
China	11	49.34	44	66
Czech Republic	9	68.97	55	82
Denmark	12	158.33	115	212
Egypt	1	49.87	50	50
EU	5	106.41	91	120
France	10	118.90	48	166
Germany	10	117.66	90	150
Holland	7	111.15	3	152
Hong Kong	12	53.26	51	58
Hungary	11	64.07	47	81
Indonesia	7	59.30	17	75
Ireland	2	75.35	42	109
Israel	7	276.15	101	1160
Italy	9	112.39	77	152
Japan	12	116.96	81	200
Malaysia	11	60.49	25	150
Mexico	11	87.90	74	105
New Zealand	8	75.50	57	93
Peru	1	84.25	84	84
Philippines	3	47.68	46	51
Poland	10	58.47	51	63
Portugal	1	109.95	110	110
Russia	12	57.33	0	82
Singapore	11	77.09	1	131
South Africa	8	58.18	36	73
South Korea	12	109.01	69	135
Spain	9	109.79	82	141
Sweden	12	134.01	92	196
Switzerland	11	161.91	75	225
Taiwan	10	91.14	74	109
Thailand	11	65.41	48	84
Turkey	2	103.87	86	121
Venezuela	2	106.74	85	128

Appendix D

Data Summary (Alternative Method)

Country	Country Code	Average Monthly Wages	Actual BMI PPP Valuation	Predicted BMI PPP Valuation	Absolute Relative Deviation
Argentina	AR	\$590.74	109	77	0.291403768
Belgium	BE	\$1,739.51	140	89	0.366935931
Brazil	BR	\$505.84	88	76	0.128633106
Canada	CA	\$1,478.73	87	86	0.003571325
Czech Republic	CZ	\$325.71	69	75	0.082777068
Germany	DE	\$3,508.67	118	107	0.094755599
Britain	GB	\$1,912.69	56	91	0.628902831
Hong Kong	HK	\$1,526.55	53	87	0.627488335
Hungary	HU	\$305.62	64	74	0.162473173
Indonesia	IN	\$67.30	59	72	0.215707212
Italy	IT	\$1,463.03	112	86	0.234355722
Japan	JP	\$3,424.26	117	106	0.096584947
Mexico	MX	\$258.20	88	74	0.158088396
Peru	PE	\$375.57	84	75	0.107730976
Philippines	PH	\$220.13	48	74	0.543952759
Poland	PL	\$416.13	58	76	0.292574647
Portugal	PT	\$638.34	110	78	0.292342674
Russia	RU	\$118.27	57	73	0.266399216
Sweden	SE	\$2,332.63	134	95	0.292967136
Thailand	TH	\$253.14	65	74	0.130530725
Venezuela	VE	\$279.77	107	74	0.304656236
				Wage Effect	74.65%