

Cross-country Comparisons of Wage Rates: The Big Mac Index

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October 2001

Abstract

Comparisons of wage rates across countries have become key ingredients in evaluating theories of international trade, the role of trade in exacerbating wage inequality, and the role of capitalist reforms in economic transition. Despite the importance of cross-country wage comparisons, it is widely agreed that no credible, comparable wage estimates exist. This paper suggests a simple procedure for comparing the average wage rate of workers in identical jobs in different countries and over time. The procedure is implemented with new data we have collected on average wage rates in McDonald's restaurants in 27 countries that are at dramatically different stages of economic development. Real wage rates are computed at current exchange rates, and also after adjustment for purchasing power parity in units of "Big Macs" per hour. The results indicate that real wages for identical jobs in the U.S., Japan, and Western Europe are some four to five times higher than in Eastern Europe, Korea, or Brazil, and an order of magnitude higher than in China, India, or Colombia.

Acknowledgments Most of the data contained in this paper was collected for us by staff members at McKinsey & Co. We are grateful to Bill Lewis and Martin Baily (formerly of McKinsey) for supporting our efforts and to Brion Harris for providing contacts with McKinsey offices in each of the countries surveyed. We are grateful to Solomon Polachek, Surjit Bhalla, Olga Kviatkovskaya, Tim Beacom, Naomi Ishiyama, Eunkyong Choi, Marcos Gomes, Patrice Lancry, Alessandra Romano, Jacob Osterberg, Alexander Guntram, Eef Wuyts, Moira Sofronas, Alberto Bueno, Isil Cinetci, Katia Waegemans, Bismo Prakoso, Antonette Consuelo, Fotini Sideris, Connie Kuo, Bordee Pitayatanakul, Fumiko Okada, Jenny Luo, Ingela Dahrén, Tatiana Rodriguez, Andrea Rakers, Celena Yew, Alicia Marsa, Norsaleen Salleh, Marcin Mazurek, Kristina Kalinová, Herman Choi, Bridget Withers, and Mijin Jung, who were responsible for collecting the basic data. Ivan Bruthans, manager of McDonald's Savarin Restaurant in central Prague, kindly provided us with detailed information on McDonald's operational protocols and on local wage rates.

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Introduction

In this paper we report comparisons of basic wage rates for workers in identical jobs located in 27 countries that vary widely in their levels of economic development. Our primary goal is to provide simple, easily collected, and credible measures of real wage rates that may be compared across widely varied economic circumstances.

Our purpose in undertaking this analysis is fourfold. First, as more countries move toward market based economies, comparisons of living standards across countries and over time have become key ingredients in evaluating the success and desirability of economic reforms. Since the institutional stakes are high and the necessary data are difficult to obtain, considerable controversy has developed over issues that should, in principle, be matters of fact.¹ We propose and implement a simple data collection method that could be useful in resolving some of these controversies.

Second, the flurry of recent work testing the basic predictions of the Heckscher-Ohlin-Vanek model of trade flows has highlighted the importance of the role of factor price equalization (FPE) as a key assumption in tests of the theory.² In practice, despite considerable anecdotal evidence, there have been few direct tests of FPE.³ Our goal in this paper is to offer direct evidence on factor price equalization by quantifying where it appears to survive straightforward, direct observation.

Third, the extent to which changing patterns of trade are expected to affect the distribution of wages depends critically upon the extent to which the developed and developing economies are integrated. The existence of factor price differences provides key evidence on the nature and extent of the integration among trading partners and on the extent to which increasing integration may be expected to affect within-country wage inequality.⁴

Finally, providing comparable data on wage rates, incomes, or prices in widely different institutional settings raises many problems of both interpretation and implementation.⁵ We have deliberately avoided many of these problems by collecting data on a narrowly defined, company-

¹ See, for example, Deaton and Terraza (2000), which has been widely discussed in the popular press of India, and which provides new computations of poverty rates before and after economic reforms, and which has become a major source of discussions of the desirability of further reforms.

² Trefler (1993), like the much earlier work of Krueger (1968), uses the assumption that measured wage differences reflect productivity differences. Work by Davis, Weinstein, Bradford, and Shimpo (1997) attempts to tailor assumptions to the likely presence or absence of factor price equalization.

³ Mokhtari and Rassekh (1989) provide a survey of earlier direct empirical tests and evidence favorable to FPE among the OECD countries. O'Rourke and Williamson (1996) study the historical record, while more recent indirect tests are contained in Hanson and Slaughter (1999) and Bernard, Jensen, and Schott (2001)

⁴ Johnson and Stafford (1999) provide a detailed review of the theoretical and empirical issues associated with the relationship between trade and wage inequality and references to the huge literature on the latter. Leamer (1997) provides a somewhat different view.

⁵ Freeman and Oostendorp (2000) provide a detailed discussion of the enormous difficulty of comparing the available international wage data. Deaton (2001) provides a general discussion of similar issues in the measurement of poverty.

specific job that exists in many countries. Although there are many possibilities, we have chosen to collect data on the wage rate in the basic entry-level job at McDonald's restaurants. These restaurants exist in many countries at dramatically different levels of development and provide us the ability to measure wages for virtually identical jobs by those producing identical products. Since these data are comparable across countries, we believe they may provide a benchmark with which to determine the reliability of other, more widely reported wage measures.

In addition to basic wage rates, we also collected data on the price of a Big Mac in each country surveyed. The Big Mac is a standardized hamburger sandwich that is produced in virtually all McDonald's restaurants. The price of Big Macs has been continuously compiled by the Economist since 1986 as an easily obtained measure of purchasing power parity, and we use these data for the same purpose here. We measure hourly wage rates in local currency, in US dollars at current exchange rates, and in units of "Big Macs." Wage rates measured in a common currency provide a simple test for the equalization of factor prices, while wage rates measured in "Big Macs" provide a measure of worker welfare that is adjusted for one simple measure of purchasing power parity (PPP). We also compare the PPP adjustment implied by the Big Mac index with other measures.

The results of our analysis indicate that there are extraordinarily large differences in the wage rates of workers doing identical jobs in countries at different levels of economic development. Loosely speaking, base wage rates—whether measured in US\$ or Big Macs—are quite similar among the Western European countries, Japan, and the US. However, wage rates in these countries are some 3 to 5 times higher than they are in Eastern Europe, Korea, or Brazil, and an order of magnitude higher than they are in China, India, or Colombia. Among the developed countries wage measurements are not much different whether adjusted for purchasing power parity and they are not sensitive to which PPP adjustment is used. Among the least developed countries wage rates differ depending on whether the measurements are made in US\$ or with a purchasing power parity adjustment, as well as by which PPP adjustment is used.

Measurement of Wages and Prices

Wage Rates

We selected McDonald's restaurants for the measurement of wage rates because these restaurants operate with a standardized protocol for employee work. Food ingredients are delivered to the restaurant and stored in standardized coolers and freezers. These ingredients are handled using a

highly mechanized food preparation system with equipment that differs very little from place to place. Although the skills necessary to handle contracts with suppliers or to manage and select employees may differ among restaurants, the basic food preparation work in each restaurant is highly standardized. Employees typically start work at a food preparation station, and are then rotated through various stations and eventually to the sales counter. As a result, workers may undertake several different assignments at different times.

A key motivation for the use of standardized work protocols is the implied warrantee of food safety that eating at a McDonald's restaurant provides when a traveler has little information about the quality of local establishments. The standardized McDonald's brand is both a risk (in case of some failure) and a reward (when failure is rare). We suspect there are other internationally diversified companies that have a similar structure and that might also make suitable candidates for data collection.

Wage rates differ within each country and across countries. Differences in wage rates within a country are typically related to shift premia, seniority, and full-time/part-time status. In general our data refer to the gross wage, without any adjustment for taxes. Since these differences may affect our results, we describe how we handled each issue in a detailed data appendix. We initially collected data in the month of December 1998 for the limited list of 13 countries contained in Table 1. Since the data collection went quite smoothly we were able to collect data for 27 countries during the summer of 2000. In general, these data refer a McDonald's restaurant operating in a large urban area, typically a capitol city.

Our survey was carried out with the cooperation of the McKinsey Global Institute. Although we have relied on McKinsey's analysts for most of our information on wages, we visited a McDonald's restaurants in the Czech Republic to verify McKinsey's work and to inspect the methods of operation. As indicated in Table 1, McKinsey reported an average wage rate of 47 crowns per hour and the price of a Big Mac at 53 crowns in December 1998. As the Table indicates, these data imply a wage rate of .89 Big Macs per hour in the Czech Republic. In our own survey in the summer of 2000 we found an average wage rate of 50 crowns, with the price of a Big Mac at 56 crowns. These figures imply an annual inflation rate of about 4% and an unchanged average wage rate of .89 Big Macs per hour. These figures are consistent with what is known about the local inflation rate and with what was reported by the McKinsey analysts for the purchasing power adjusted wage rate. When McKinsey returned to the Czech Republic in 2000 they reported an average wage rate of 45 crowns and a Big Mac price of 53 crowns.

These comparisons provide some indication of the nature of the variability that no doubt will exist in any data collection of this type. Although we are certain that the within-country

variability in wages at McDonald's restaurants is small compared to the across-county variability we report below, it would be useful to have explicit within-country variance measures.

Prices

Since we wanted to construct purchasing power parity adjustments that were coincident with the timing of our collection of wage data, we also collected the price of a Big Mac in each country at the time of the wage survey. Big Mac prices are reported regularly by the Economist and have, in fact, been studied by Cumby (1996)⁶ for evidence of purchasing power parity adjustments.

To measure the reliability of our estimates of Big Mac prices we compared our estimates with those from the Economist. Columns 5 and 6 in Table 1 contain the relevant data on Big Mac prices evaluated in US\$ for each country. A straightforward measure of the reliability of these estimates is provided by the correlation between the two measures of the US\$ Big Mac price. For the nine countries for which we have two independent measures in 1998 the correlation is .87,⁷ while this correlation is 0.99 in 2000, indicating that most of the variance across countries is due to variation in the true price, not to measurement error.

Empirical Findings

Wages in a Common Currency: The basic results of our first and second surveys are contained in Tables 1 and 2. The first column in each table provides our estimate of the wage rate in local currency units, while the second provides our estimate of the price of a Big Mac in the local currency. The third column in Tables 1 and 2 contains the exchange rate (in local currency units per US\$) at the time of the data collection. These are the basic data from our survey.

The fourth column of Tables 1 and 2 provides our measures of the local average wage rate expressed in US\$. It is apparent that these wage rates vary dramatically. In 2000, for example, wage rates (in US\$) varied from a low of \$.29 in India to a high of \$7.73 in Japan.

We think there are two broad conclusions supported by these data:

(1) It is apparent that the data strongly rule out the equality of wage rates measured in a common currency, as would be implied by factor price equalization. Figure 1 shows this disparity

⁶ Cumby (1996) suggests that although average deviations from absolute Big Mac parity are large for several currencies, convergence to relative Big Mac parity is quite rapid. In addition, deviations from relative Big Mac parity appear to provide useful information for forecasting exchange rates.

⁷ The obvious outlier in the comparison of Big Mac prices is Brazil—if this observation is deleted the correlation between the two measure of price is .97.

graphically. It is an overwhelming strong confirmation of vast disparity in wages rates that has often been referred to only anecdotally.

(2) Aside from the striking overall inequality in wages demonstrated in Tables 1 and 2, what is most notable about these data is the striking equality of wage rates among the OECD countries; that is, among the countries of Western Europe, the USA, and Japan. Wage differences among these countries typically are no more than 10% to 15%—very small when compared to the likely measurement error in our data.

Prices: The fifth column of Table 2 contains the US\$ price of a Big Mac. These prices range from a low of \$1.20 in several Asian countries, including China and India, in Russia to a high of \$3.02 in the UK. There are two striking conclusions from the data on prices:

(1) The price of a Big Mac is far less variable than the wage of someone who makes a Big Mac. Figure 2 shows the relation between the US\$ price and wages. It is apparent that the slope of the relation is far below unity. Indeed, a regression of price on the wage rate gives a slope of .17 (t-value of 4.4).

(2) Using the price of a Big Mac it is possible to construct a simple purchasing-power-parity adjusted wage rate for McDonald's workers in each country. This measure of the number of Big Macs that an hour of work will buy is contained in column (7) of Table 2. It is immediately apparent that because the price of a Big Mac varies so little, this PPP-adjusted wage rate is highly correlated with the hourly wage expressed in a common currency. Figure 3 shows the relationship. In short, making this adjustment in purchasing power narrows the gap in wages between the highest and lowest wage workers by about one-half, but it does little to change the rank order of the wage differences and leaves dramatic wage differences remaining.

Comparison with Other Wages: Table 3 contains detailed data on other wage rates that we have been able to collect. Our goal in collecting these data was to see whether they were highly correlated with the wage rates we had collected. Columns (7)-(9) provide our estimates of other wage rates for workers in manufacturing and for construction laborers in several countries in various years.

As Figures 4 and 5 indicate there is a very high correlation between the wages of workers as we have measured them and the more conventional wage measures we have been able to obtain. These results indicate that the wage differences observed in the conventional sources are not the result of inherent productivity differences among the laborers or manufacturing workers represented in the data sets. Unfortunately these data are relatively sparse, and we are reluctant to

draw strong conclusions. Nevertheless, as these data stand they indicate that adjustments to the Hecksher-Ohlin-Vanek model of trade flows that are derived by assuming that wage rates reflect workers of different “quality” will have a hard time explaining our findings.

Interpretation and Conclusion

In this paper we have provided a simple, credible measure of wage rates for identical jobs in countries that are at very different stages of development. These wage measures indicate that similar work is compensated at dramatically different rates, whether measured in US dollars at current exchange rates or adjusted for purchasing power parity using the price of the Big Macs that these workers produce.

These results imply three key conclusions. First, it is apparent that there are considerable differences in living standards for workers performing essentially identical tasks in different countries. These large differences in living standards across countries appear to have little or nothing to do with differences in the skills of these workers or in the non-pecuniary characteristics of the jobs these workers hold. This suggests that models of economic development in which organizational and structural differences account for differences in income levels are of considerable importance.

Second, as Figure 1 indicates, it is also apparent that within some country groups, such as Western Europe, the USA, and Japan, there is a striking similarity in wage rates whether measured in a common currency or with purchasing-power adjustments. This suggests that models of trade flows that assume factor-price-equalization among these countries may well be empirically successful, but that other assumptions will be required in tests that are more expansive. These results also suggest that there is little reason to expect substantial mobility across the borders of these countries, but more reason to expect mobility from other parts of Europe into these countries should this become feasible.

Finally, in future research it would be useful to collect similar data on wage rates for standardized occupations over time. Among other things, this would begin to provide the factual basis to appraise economic reforms being undertaken in both the transitional and developing countries. We believe that our own research demonstrates that this is a feasible task and that it could be carried out with a modicum of resources.

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Table 1: McDonalds Cashier or Crew Wages and Big Mac Prices, December 1998

<i>Country</i>	Estimated hourly wage rate (1)	Reported Big Mac price (2)	Exchange Rate per \$1 (3)	\$ hourly wage rate (4)	\$ Big Mac price (5)	Economist \$ Big Mac 3/99** (6)	Big Macs per hour of work (7)
Russia	8.00	25.5	19.57	0.41	1.30		0.31
Korea	1700	3000	1210	1.41	2.48		0.57
Brazil	2.87	4.45	1.73*	1.66	2.57	1.71	0.65
Poland	4.12	5.3	3.50	1.18	1.51	1.38	0.78
Czech Rep.	45.00	53	30.30	1.49	1.75		0.85
UK	3.60		0.62*	5.80	3.07	3.07	1.89
USA	6.00		1.00	6.00	2.43	2.43	2.12
Germany	11.28	4.95	1.67	6.76	2.97	2.72	2.28
France	40.22	17.5	5.76	6.99	3.04	2.87	2.30
Italy	10417	4500	1646	6.33	2.73	2.5	2.31
Belgium	280.00	114	34.50	8.12	3.30		2.46
Sweden	64.90	25	8.03	8.09	3.11	2.88	2.60
Japan	844	280	120*	7.03	2.33	2.44	3.01

Note: First two columns in local currencies. See the Appendix Table for detailed data source information

* Estimate based on the Economist

** The correlation between the reported McKinsey and Economist Big Mac prices is 0.87.

Table 2: McDonald's Cashier or Crew Wages and Big Mac Prices, August 2000

Country	Estimated hourly wage rate (1)	Reported Big Mac price (2)	Exchange Rate per \$1 (3)	\$ hourly wage rate (4)	\$ Big Mac price (5)	Big Macs per hour of work (7)
India	12.00	52.00	41.3	0.29	1.26	0.23
Columbia	1,200	5,300	2,181	0.55	2.43	0.23
China	3.50	9.80	8.28*	0.42	1.18	0.36
Indonesia	5,000	14,500	7,945	0.63	1.74	0.36
Venezuela	900	2,200	689	1.30	3.19	0.41
Thailand	23.50	55.00	41.01	0.57	1.34	0.43
Philippines	25.00	54.90	44.50	0.56	1.23	0.46
Russia	14.00	29.50	27.69	0.51	1.07	0.47
Brazil	1.61		1.79*	0.89	1.65*	0.54
Argentina	1.50	2.50	1.00	1.50	2.50	0.60
Malaysia	3.00	4.30	3.80	0.79	1.13	0.70
Korea	2,100	3,000	1,115	1.88	2.69	0.70
Turkey	1,133,000	1,500,000	647,335	1.75	2.32	0.75
Czech Rep.	45.00	55.00	38.74	1.16	1.42	0.82
Poland	5.01	5.80	4.36	1.15	1.33	0.86
Taiwan	66.00	70.00	30.00	2.20	2.33	0.94
Singapore	4.00	3.20	1.73	2.31	1.85	1.25
Hong Kong	14.50	10.20	7.80	1.86	1.31	1.42
Italy (2001)	10,000	4,900	1,668	6.00	2.94	2.04
UK	4.00	1.90	0.63*	6.35	3.02	2.11
Germany	11.25	4.99	2.11*	5.33	2.36	2.25
Canada	6.95	2.89	1.54	4.51	1.87	2.40
USA	6.50		1.00	6.50	2.51*	2.59
Sweden	65.00	25.00	9.19	7.07	2.72	2.60
Belgium	304.35	115.00	44.11	6.90	2.61	2.65
France	42.02	18.50	7.07*	7.12	2.62	2.72
Japan	850	280	110	7.73	2.55	3.04

Note: First two columns in local currencies

* Estimate based on the Economist. The correlation between the reported McKinsey and Economist Big Mac prices from April 2000 is 0.99

Table 3: McDonald's Crew Wages and Big Mac Prices: Wage Inequality, PPP adjustment, and Other Wage Measures

Country	\$ hourly	PPP hourly	Big Macs	Big Mac	PPP			\$ hourly wage rate			GDP PPP	Wage
	wage rate	wage rate	per hour	parity	adjuster			in manuf.	in manuf.	of a laborer	per cap.	inequality
	2000	2000	2000	2000	1998	1999	1992	1998	2000	1995	1998	1998
(1)	(2a)	(2b)	(3)*	(4)a	(5) ^b	(6) ^c	(7) ^d	(8) ^f	(9) ^e	(10) ^a	(11) ^{a+}	
Argentina	1.50	2.25	0.60	1.00	1.50		1.32	4.12			12,013	
Belgium	6.90	6.78	2.65	0.96	0.98	1.02	0.83	9.20	14.87	6.31	23,223	25.0
Brazil	0.89	1.29	0.54	1.52	1.45		2.15				6,625	60.0
Canada	4.51	5.70	2.40	1.34	1.27	1.27			13.52		23,582	31.5
China	0.42	1.74	0.36	2.12	4.12		5.09			0.32	3,105	40.3
Columbia	0.55	1.35	0.23	1.03	2.45		3.07	1.25			6,006	57.1
Czech Rep.	1.16	2.69	0.82	1.77	2.32	2.59	1.56	1.50		1.18	12,362	25.4
France	7.12	6.40	2.72	0.96	0.90	0.93	0.79	10.69	11.12		21,175	32.7
Germany	5.33	4.67	2.25	1.06	0.88	0.93	0.74	10.71	17.38	6.69	22,169	30.0
Hong Kong	1.86	1.60	1.42	1.92	0.86		1.53	4.86	5.35	0.35	20,763	
India	0.29	1.41	0.23	1.99	4.87		5.22				2,077	37.8
Indonesia	0.63	3.71	0.36	1.44	5.90		4.15				2,651	36.5
Italy (2001)	6.00	6.24	2.04	0.85	1.04	1.14	0.82		10.39	6.76	20,585	27.3
Japan	7.73	6.18	3.04	0.99	0.80	0.72	0.62		18.48		23,257	24.9
Korea	1.88	3.78	0.70	0.93	2.01	1.85	1.54		5.96		13,478	31.6
Malaysia	0.79	2.02	0.70	2.22	2.56		2.34			1.35	8,137	48.5
Philippines	0.56	2.36	0.46	2.04	4.22		2.63			0.56	3,555	46.2
Poland	1.15	2.20	0.86	1.89	1.91	2.15	2.37	1.43		1.29	7,619	32.9
Russia	0.51	1.78	0.47	2.36	3.52						6,460	48.7
Singapore	2.31	2.16	1.25	1.36	0.93		1.21	6.82	6.64	2.98	24,210	
Sweden	7.07	5.87	2.60	0.92	0.83	0.84	0.65	10.37	14.48	4.95	20,659	25.0
Taiwan	2.20		0.94	1.08			1.39		5.43			
Thailand	0.57	1.77	0.43	1.87	3.08		2.81	0.86			5,456	41.4
Turkey	1.75	3.69	0.75	1.08	2.11	2.26	3.02				6,422	41.5
UK	6.35	5.78	2.11	0.83	0.91	0.94	0.96	5.30	13.83		20,336	36.1
USA	6.50	6.50	2.59	1.00	1.00	1.00	1.00	13.49	15.69	5.12	29,605	40.8
Venezuela	1.30	1.90	0.41	0.79	1.46		2.70				5,808	48.8

*Big Mac parity=\$ Big Mac price in the US / \$ Big Mac price in a given country

^aWorld Bank: World Development Indicators, 2000.

^bOECD 2000: <http://www.oecd.org/std/ppp/pps.htm>

^cWorld Penn Tables, v. 5.6: PPP of consumption relative to the US. Data for Argentina, Czechoslovakia, Korea, and Taiwan come from 1990.

^dILO: www.ilo.org. The estimate is combined from hourly, daily and monthly wage measures.

^eILO: Statistics on Occupational Wages and Hours of Work and on Food Prices, 1997, Geneva.

^fBLS, US DOL: Foreign Labor Statistics: <ftp://ftp.bls.gov/pub/special.requests/ForeignLabor/supptab.txt>.

^h<http://www.oecd.org/std/gdpperca.htm>

^{a+} World Bank: WDI, 2000: Gini Index

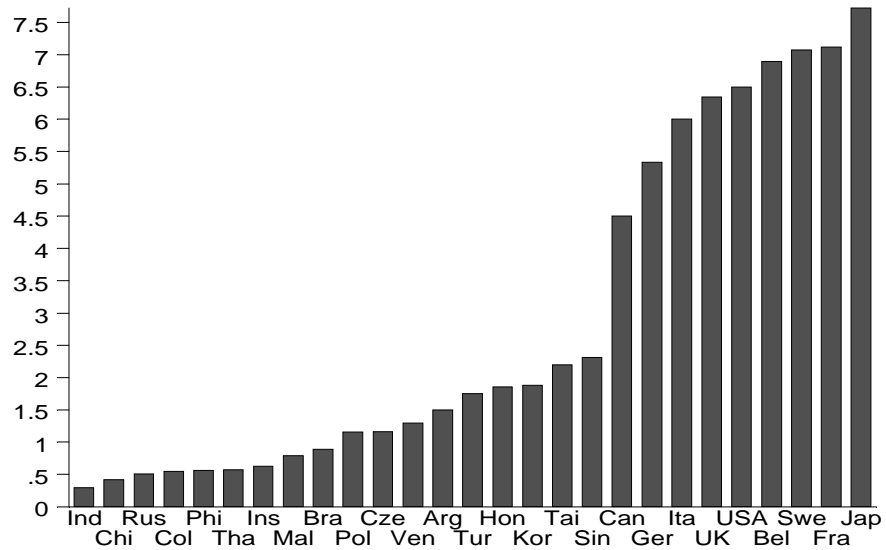


Figure 1: \$ Hourly McWages in 2000

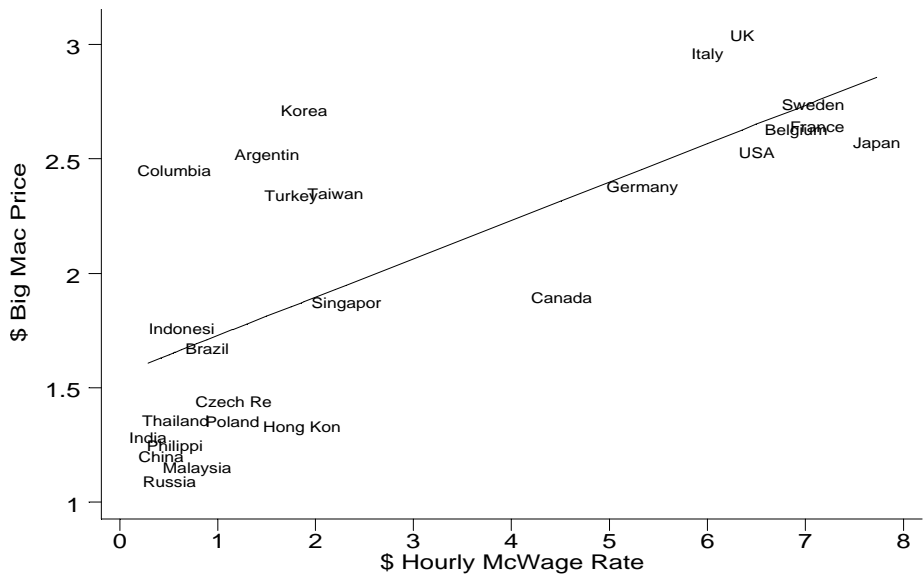


Figure 2: McDonalds Prices and Wages in 2000, $R^2=0.43$

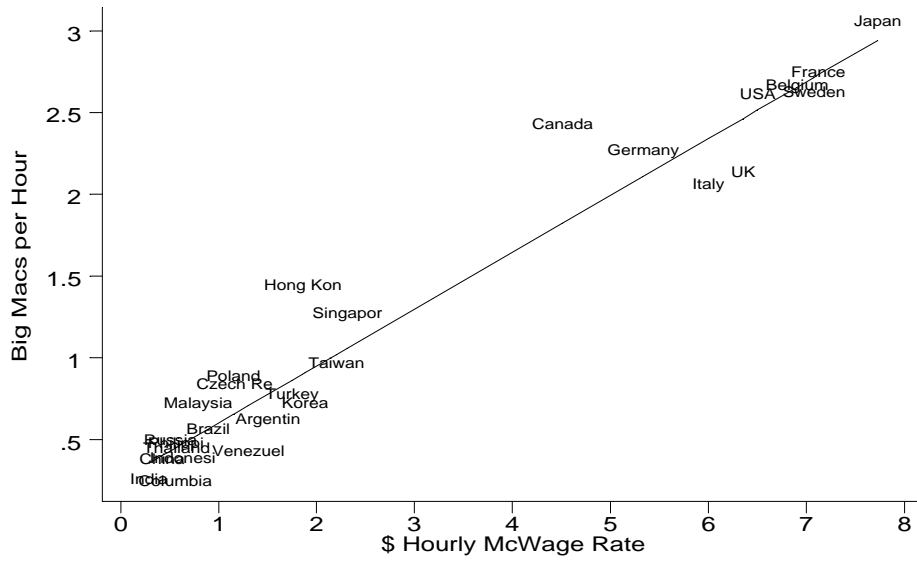


Figure 3: Big Macs per Hour and \$ McWages, $R^2 = .95$

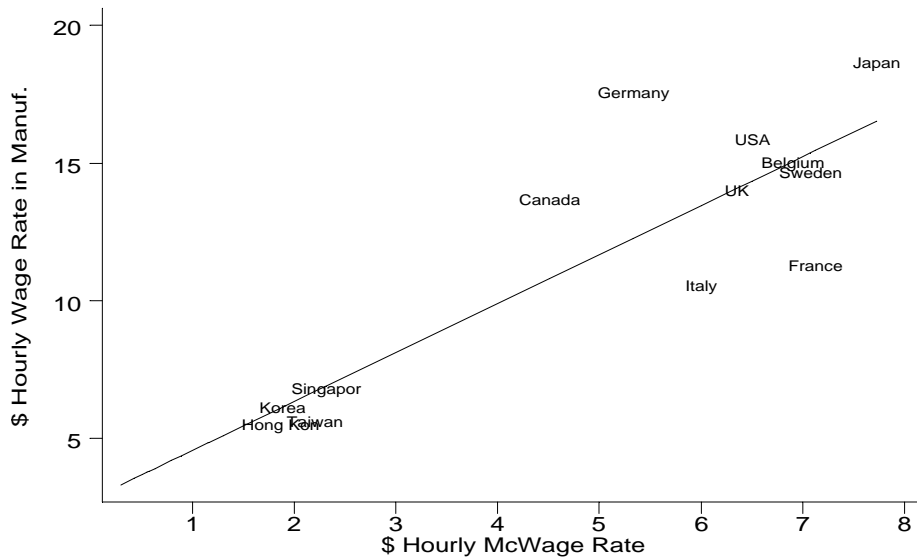


Figure 4: McWage and Wage in Manufacturing, $R^2 = 0.73$

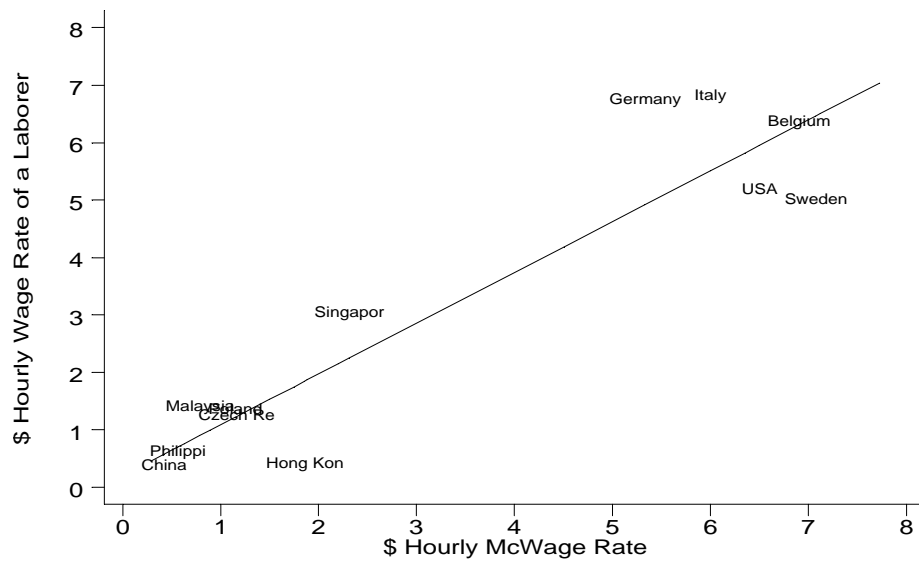


Figure 5: McWage and Wage of a Laborer (1995), $R^2 = 0.87$