Comparing Real Wages:
The McWage Project

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The Value of Real Wage Comparisons

A “real” wage is the amount of consumption goods that an hour of work will buy. The ($/Hour)/($/Good)=Goods/Hour

- Measures of the real wage permit us to compare living standards over time and across places
- This permits evaluation of the success of reforms in a way that is not easy to manipulate.
- It also permits us to measure the price of an identical factor of production – lets us measure productivity differences

TABLE 1: REAL WAGE RATES IN LONDON AND CANTON, 1704

	English Price/Chinese Price	English Budget Shares	Chinese Budget Shares
Starch	4.79	0.48	0.6
Meat	1.66	0.13	0.05
Milk	0.89	0.13	0.01
Tea	26.6	0.03	0.05
Sugar	15.24	0.04	0.12
Charcoal	0.19	0.04	0.02
Lighting	1.96	0.05	0.03
Cotton Cloth	3.38	0.05	0.08
Iron Work	3.12	0.02	0.02
Nails	1.45	0.02	0.02
CPI		3	4.91
Wage Rate	3.67	3.67	3.67
Real Wage		1.22	0.75

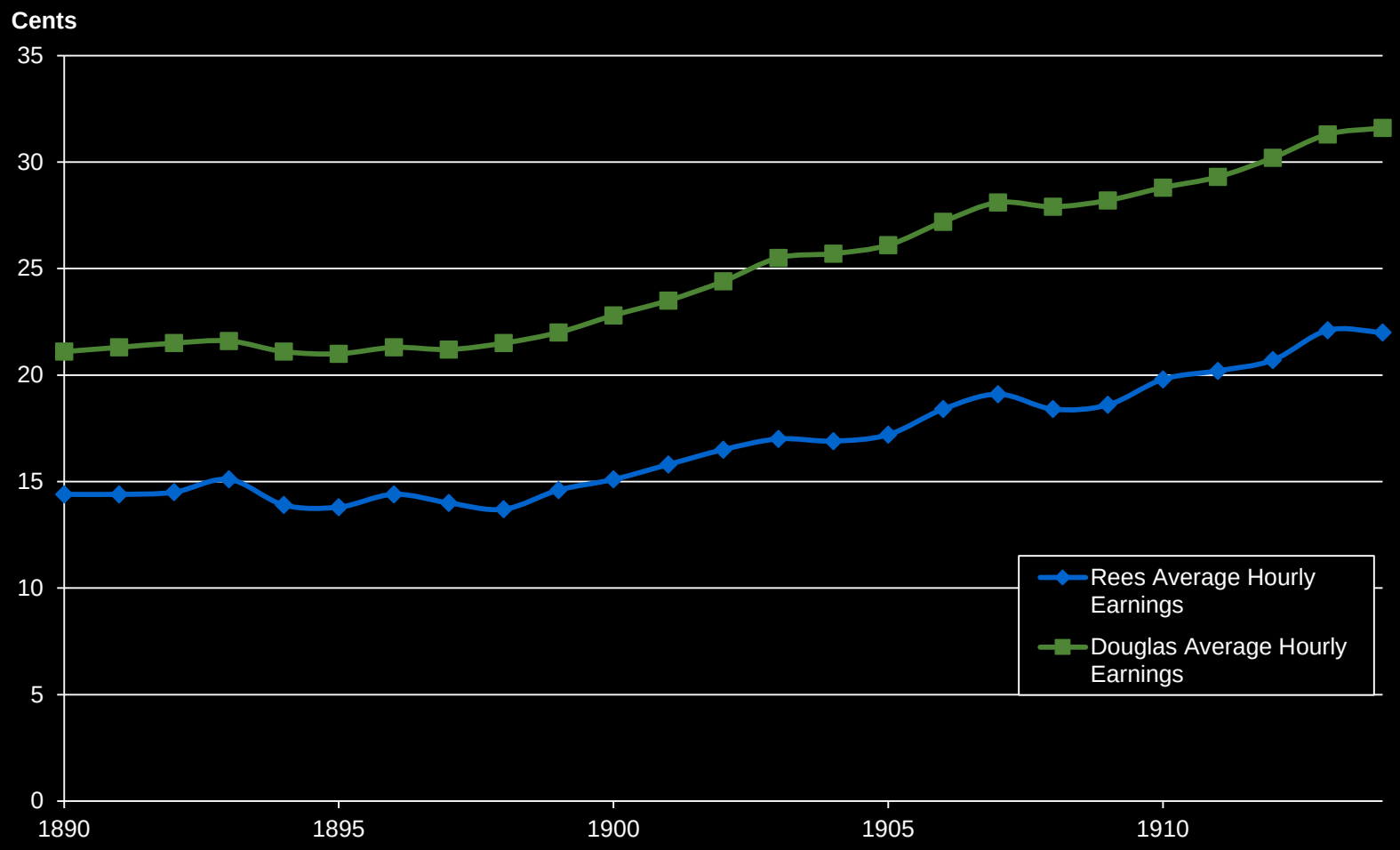


FIGURE 1: AVERAGE HOURLY EARNING IN CENTS, 1890-1914

Source: Douglas (1930), Rees (1962)

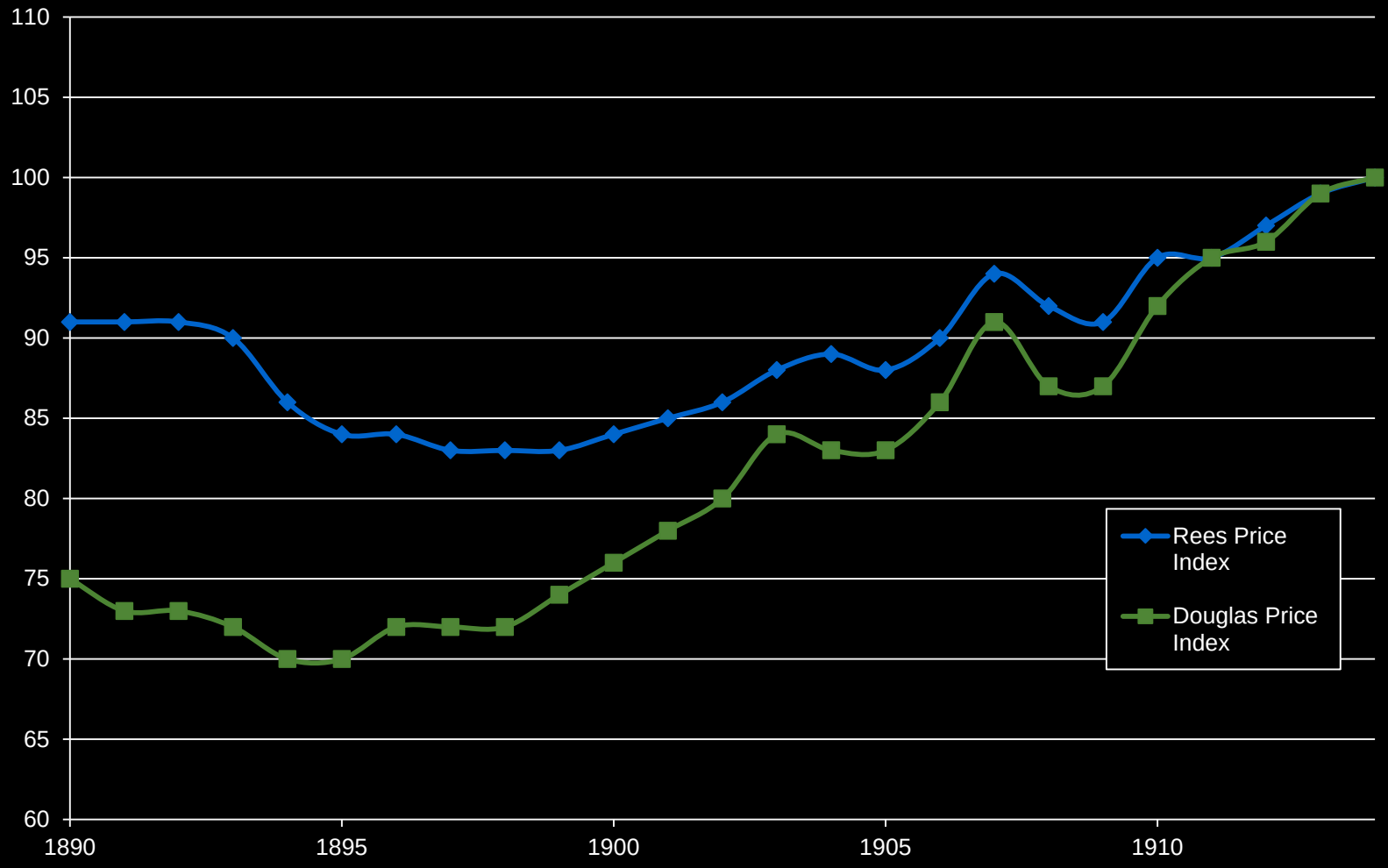


FIGURE 2: CONSUMER PRICE INDEXES, 1890-1914 (1914=100)

Source: Douglas (1930), Rees (1962)

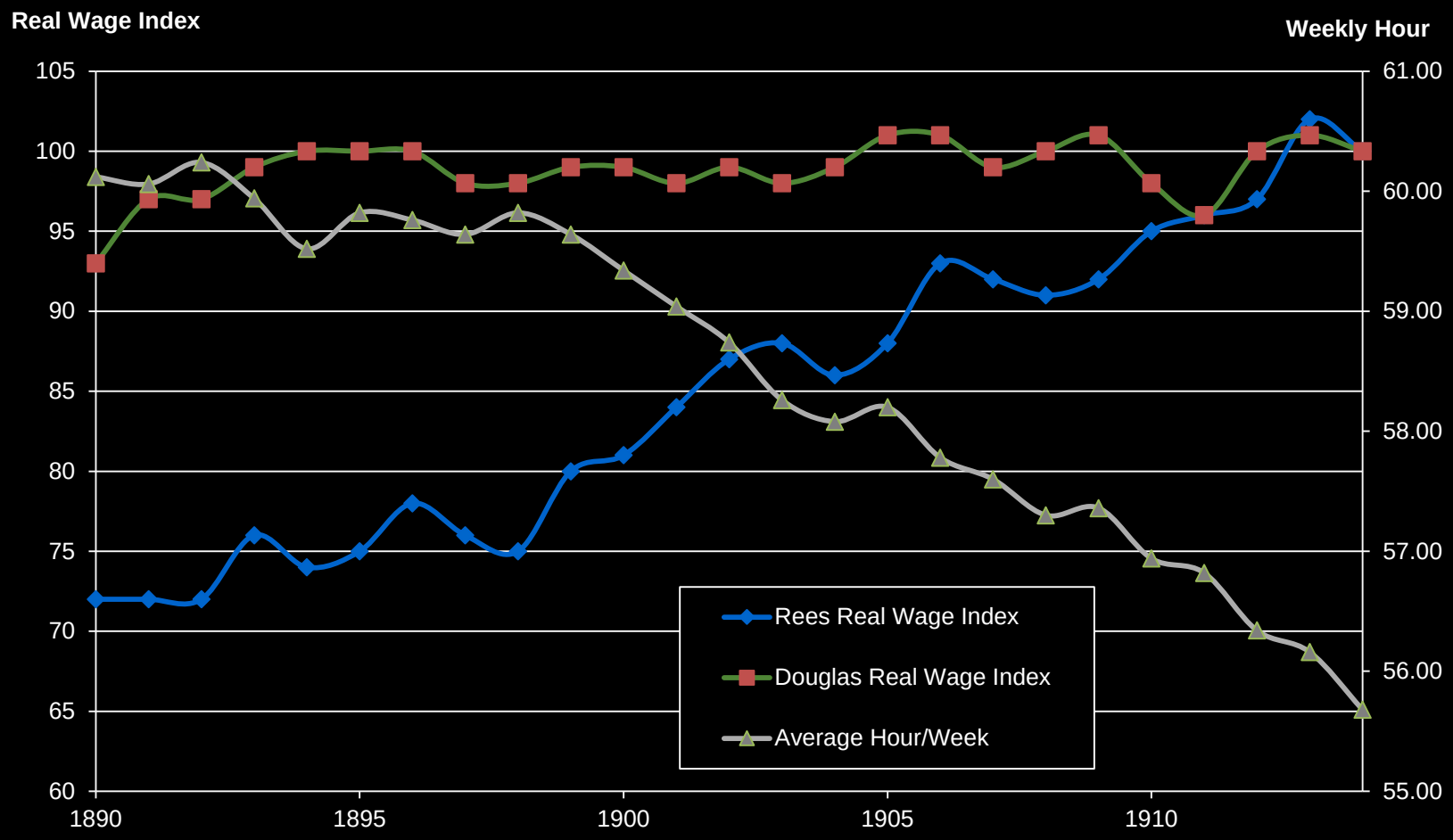


FIGURE 3: REAL WAGE INDEXES AND WEEKLY HOURS WORKED, 1890-1914 (1914=100)

Source: Douglas (1930), Rees (1962)

TABLE 2: REAL WAGE RATES IN VARIOUS PARTS OF THE WORLD, 1900-1914

	Wage Relative to "Barebones Subsistence" Cost (1900-1914)
Japan	1.36
Canton	1.01
Beijing	1.39
Delhi	1.43
Florence	1.8
Bengal	1.51
London	7.49
Oxford	6.06
Amsterdam	5.07
Mexico City	1.51
Bogota	1.33
Chicago	6.08

Interpreting Real Wage Measures: Standard of Living and Welfare

Think of w* as the wage that would be needed today to achieve the living standards in another place or another time. It is the solution of the indirect utility function for the wage.

A comparison of the observed w with w* indicates whether the worker's real wage has increased or differs from another location. w/w* is thus a real wage index from the worker's point of view. It decreases with increased prices.

The interpretation is not affected by market distortions or wage regulation.

Prices with Tradable and Non-Tradable Goods

If a quasi-tradable good is produced with (Cobb-Douglas) technology using non-tradable labor paid wage w_{0i} , and if the tradable good is priced p, then

$$p_{ni}=w_{0i}^{a}p^{1-a},$$

describes the price of the quasi-tradable good (p_n) as a concave function of the local wage, where a is the share of the non-tradable in total cost. This is the Balassa-Samuelson-Penn Effect.

A real wage defined as

$$w_{0i}/p_{ni}=(w_{0i}/p)^{1-a},$$

Is a purchasing-power-parity adjusted wage where the weights in the puchasing power basket are a and 1-a, and it is concave function of the real wage measured in tradables.

The Real Wage as Marginal Product of Labor

- Assuming workers are paid the marginal product of their labor, real wage rates for comparable workers can be used to control for skill differences ($\mathbf{h_i}$) and measure Total Factor Productivity ($\boldsymbol{A_i}$). Hall and Jones (1999) write (Cobb-Douglas) production as

  $$Y_i/L_i = y_i = (K_i/Y_i)^{\alpha/(1-\alpha)} A_i h_i$$

  Selecting h_{0i} identically in each location , and **ASSUMING that wages are not distorted by regulation** implies that

- $w_{0i}/w_{00} = [A_i (K_i/ Y_i)^{\alpha/(1-\alpha)}]/ A_0 (K_0/ Y_0)^{\alpha/(1-\alpha)}$.

- Relative wages adjusted for capital/output ratios measure relative TFP.

The Real Wage as Marginal Product of Labor

- Assuming workers are paid the marginal product of their labor, real wage rates for comparable workers can be used to control for skill differences.

- ***Selecting*** *the wage rate of workers doing identical tasks* in each location , and **ASSUMING that wages are not distorted by regulation** implies that, apart from capital/labor ratio differences:

- **Relative wages measure relative Total Factor Productivity differences, after adjustment for capital/labor ratio differences.**


Coca-Cola


SONI HOUSE
McDonald's
FAMILY RESTAURANT


Rs 32/-
Large Rs 49/-
Medium Rs 41/-
Meal Combos (With Medium Fries and Medium Soft Drink)
NEW
Chicken Mexican Wrap
Rs. 99/-
Chicken Maharaja Mac™
Rs. 99/-
McChicken™
Rs 94/-
Filet-O-Fish™
Rs 94/-
NEW
Paneer Salsa Wrap
Rs. 89/-
McVeggie™ Burger with Cheese
Rs 89/-

MCDONALDS AT BASANT LOK
LC/02/187932/0496
6147219/6149662
THANKS FOR COMING
* IMPLIES FROZEN DESSERT

21-JUL-00 11:45 REG 3 RCT92 ST 10

HIGH ORDER RECEIPT

QTY	ITEM	EACH	TOTAL
1	VEGCCM	59.00	59.00
1	MAHMAC	52.00	52.00
1	MSHCH*	31.00	31.00
1	MDCOKE	20.00	20.00

EAT-IN TOTAL INCL TAX 162.00

CASH TEND 500.00
CHANGE 338.00

T 1	142.00 RATE	8.0000% INCL	10.54
T 2	20.00 RATE	15.0000% INCL	2.61


CASINO PALAIS SAVARIN
I'm lovin' it


CASINO
CASINO KARTIČ
NON STOP
McDonald's

McWages

Entry-level basic-crew jobs at McDonald's are virtually identical in terms of

- skill input
- hedonic job qualities
- producing identical product with identical technology

in over 140 countries of the world.

- Operations are monitored using the 600-page Operations and Training Manual
- McDs do not adjust technology
- pay local market wage (MP)

Data collection

- Data for 64-66 countries since 2007, 27 since 2000
- Hourly wages of Crew + Price of Big Mac
- Data from large urban areas (2 cities, 2 restaurants per city). Corr of median and average wages is 0.99.
- Regional data for about 10 additional cities in India, China, Russia, and the US since 2007
- Data from Starbucks have been added since 2011
- Reliability?
  - We collected several McWages ourselves
  - Big Mac price correlates with the Economist (0.99)
  - Corr with other wages from low-income countries

Limitations

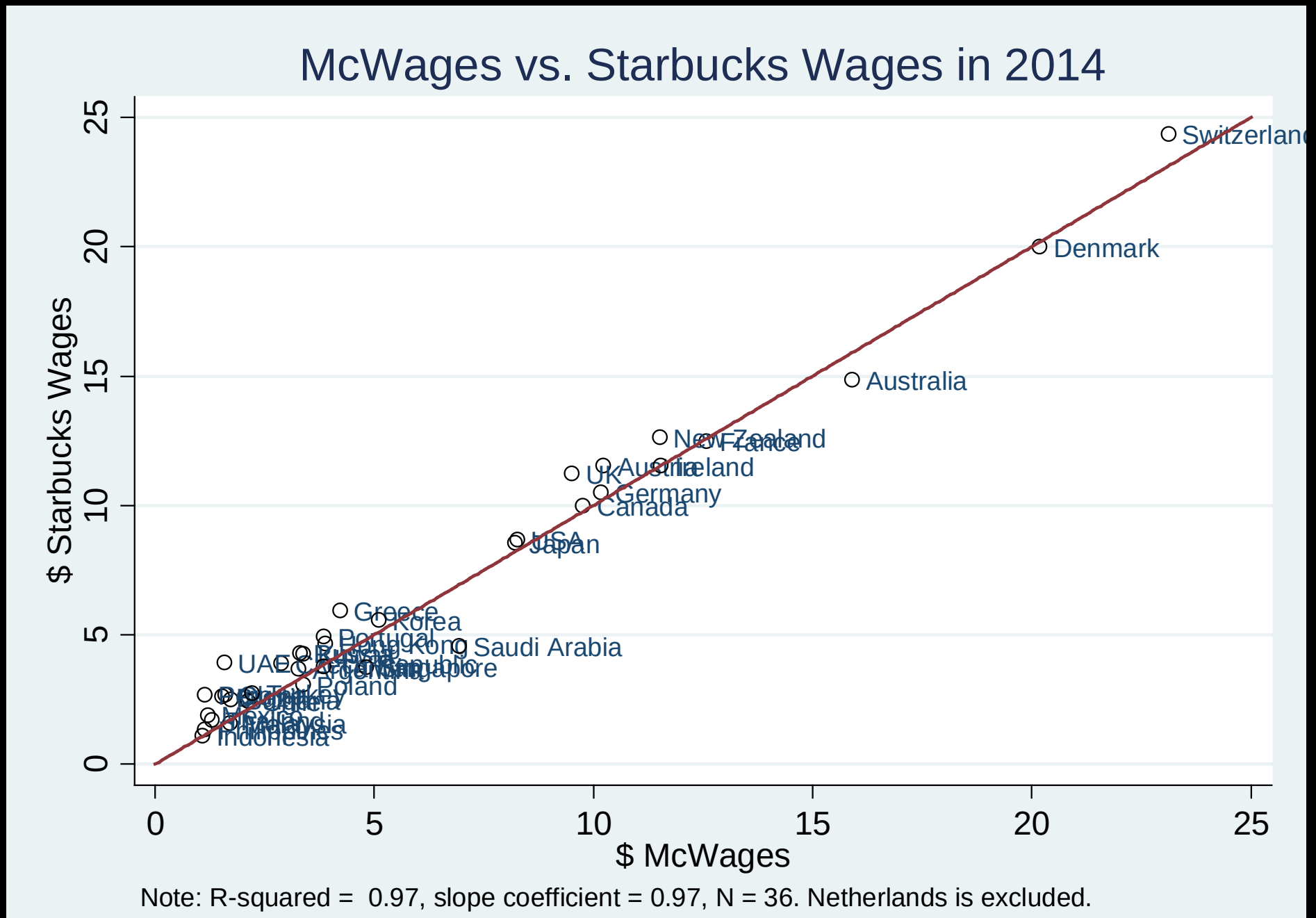
1. Is the wage rate the market wage?— minimum wages may result in wages that do not reflect the market. A problem in developed countries, i.e. Denmark, France.

2. Is the fast food price the market price?— entry barriers to fast food chains may result in prices that do not reflect the market. Perhaps a problem in developing countries, i.e. Colombia.

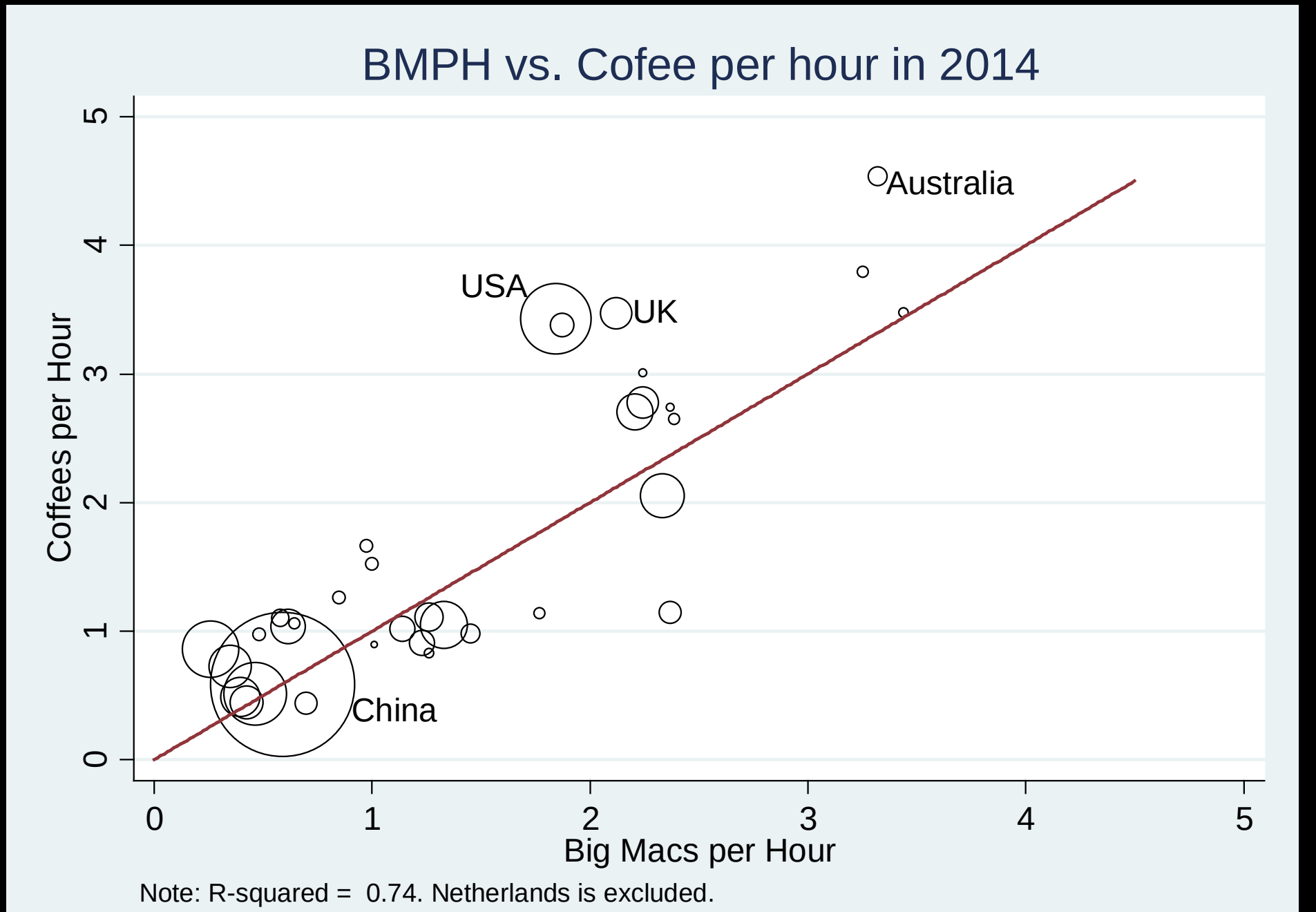
This presentation

- Comparisons to other wage data
- BMPH a useful measure of income?
- McWages a measure of productivity?

Comparison to Other Wage Data



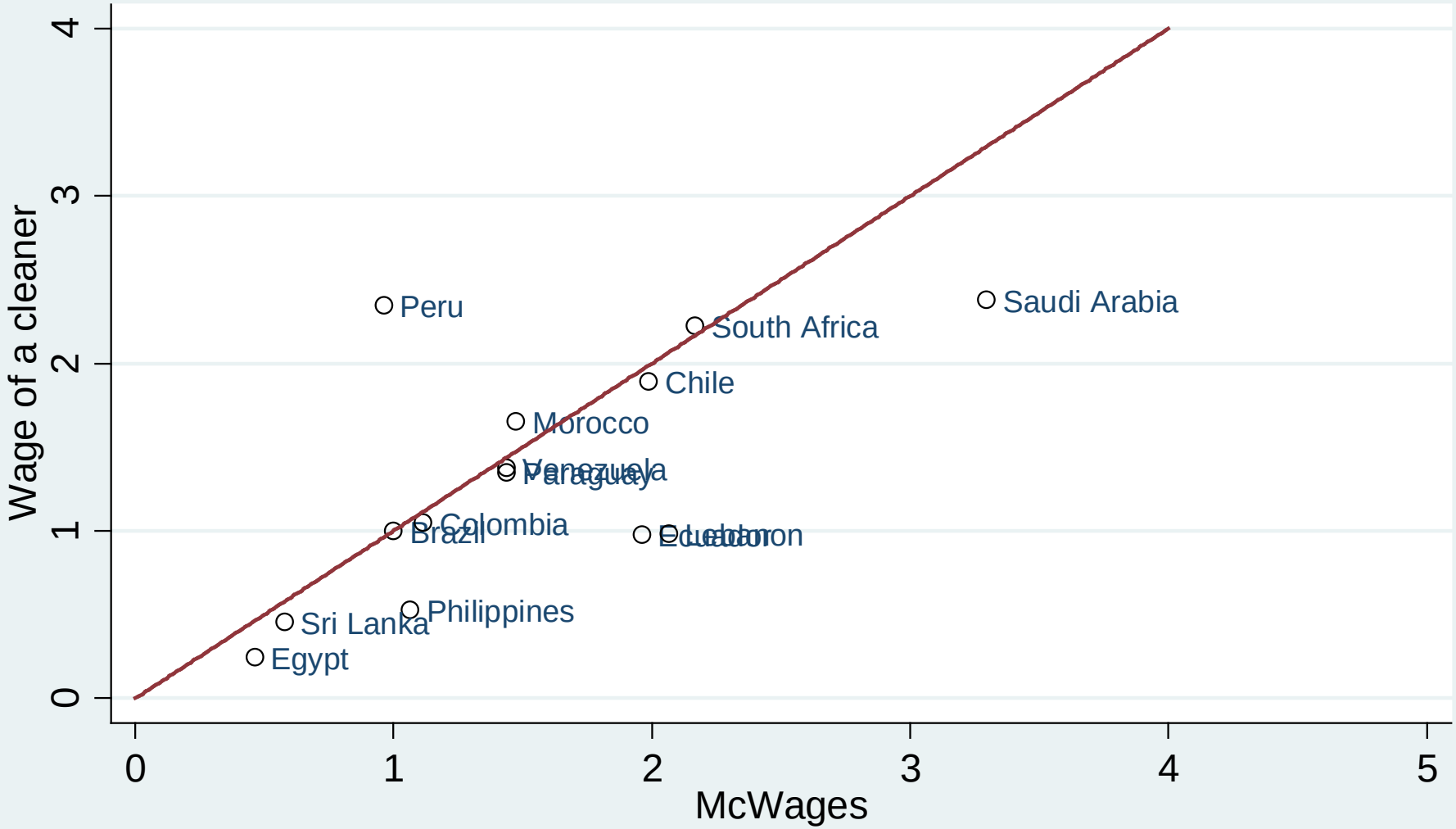
Note: R-squared = 0.97, slope coefficient = 0.97, N = 36. Netherlands is excluded.


BMPH vs. Cofee per hour in 2014
Coffees per Hour
0
1
2
3
4
5
Big Macs per Hour
0
1
2
3
4
5
Australia
USA
UK
China
Note: R-squared = 0.74. Netherlands is excluded.

McWages vs. Manufacturing Wages in 2012

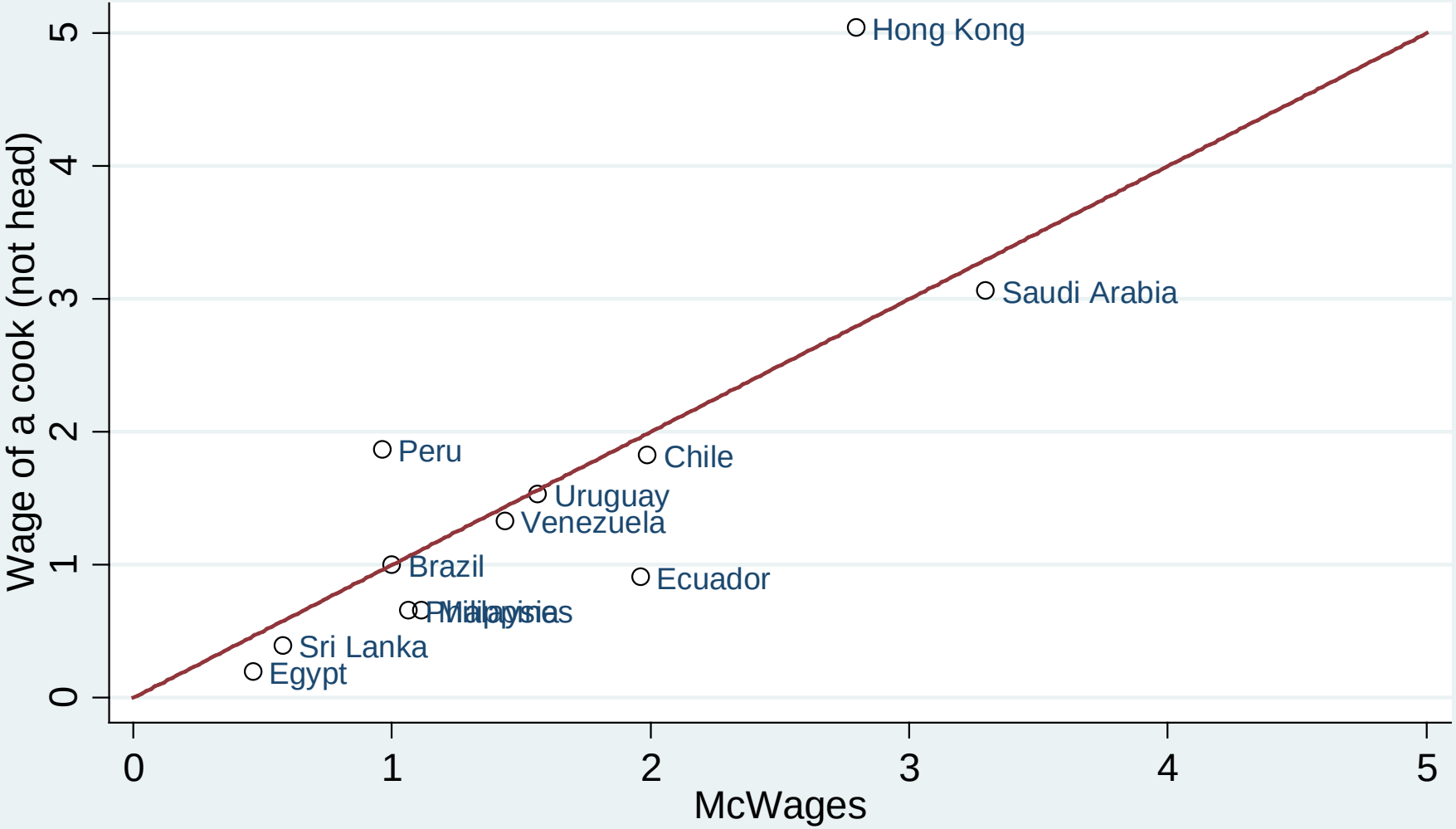
Note: All values relative to the US. BLS wages: $ hourly direct pay in manufacturing.
R-squared = 0.87

ICP wages vs McWages



Note: All values relative to Brazil
R-squared = 0.42
Mcwages for 2007; ICP wages for 2005
Countries excluded: JPN, GBR, EST

ICP wages vs McWages

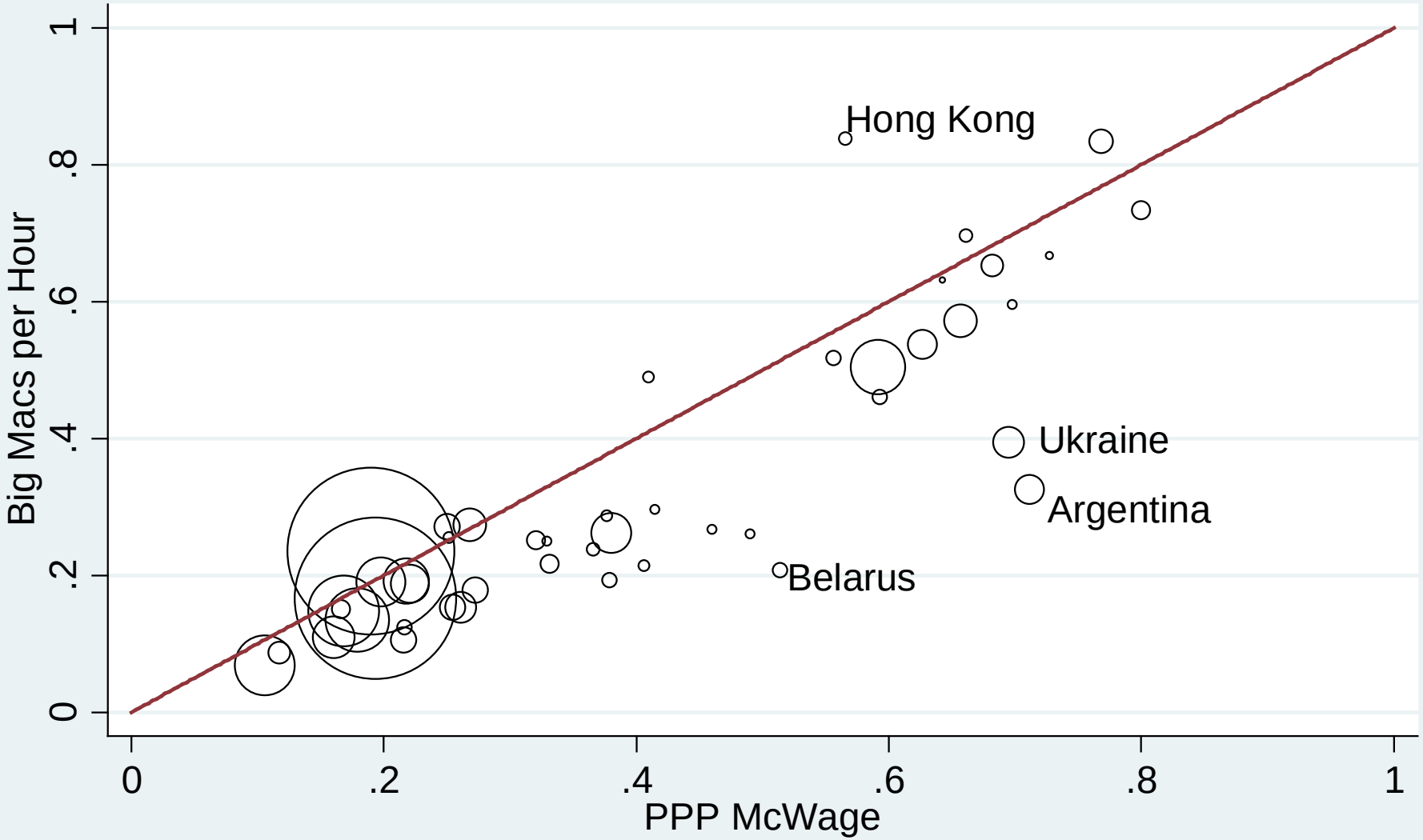


Note: All values relative to Brazil
R-squared = 0.66
Mcwages for 2007; ICP wages for 2005
Countries excluded: JPN, GBR, EST

BMPH – Shorthand for Income?

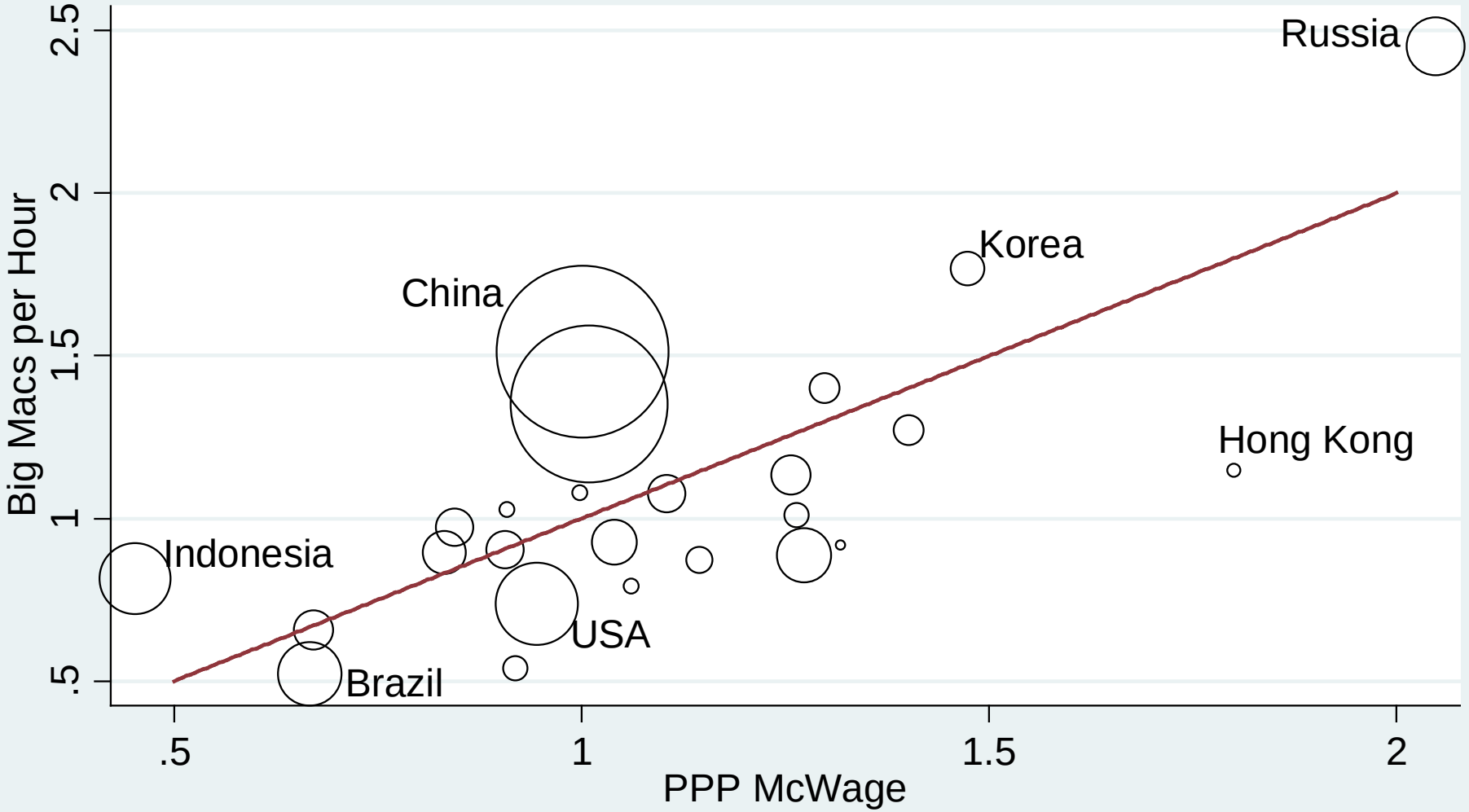
Compare BMPH to
McWage in PPP for household consumption
PPP from PWT8, except El Salvador, last available year is 2011

Purchasing power of McWages in 2011



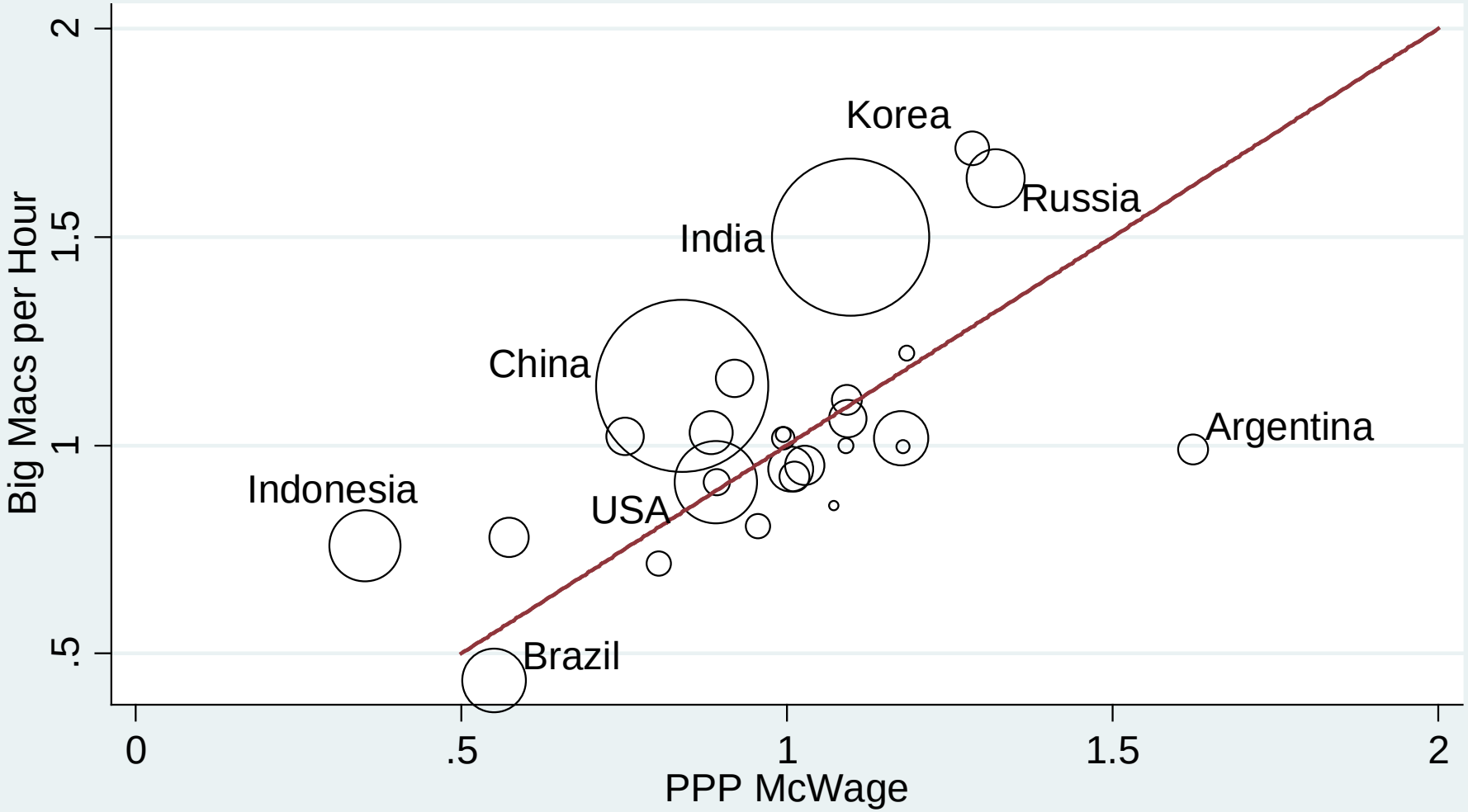
Note: All values relative to the US. Weights correspond to population.
McWages in 2005 US$ adjusted by price level of household consumption.
R-squared = 0.76.

Change in PPP McWages vs. change in BMPH between 2000 and 2012



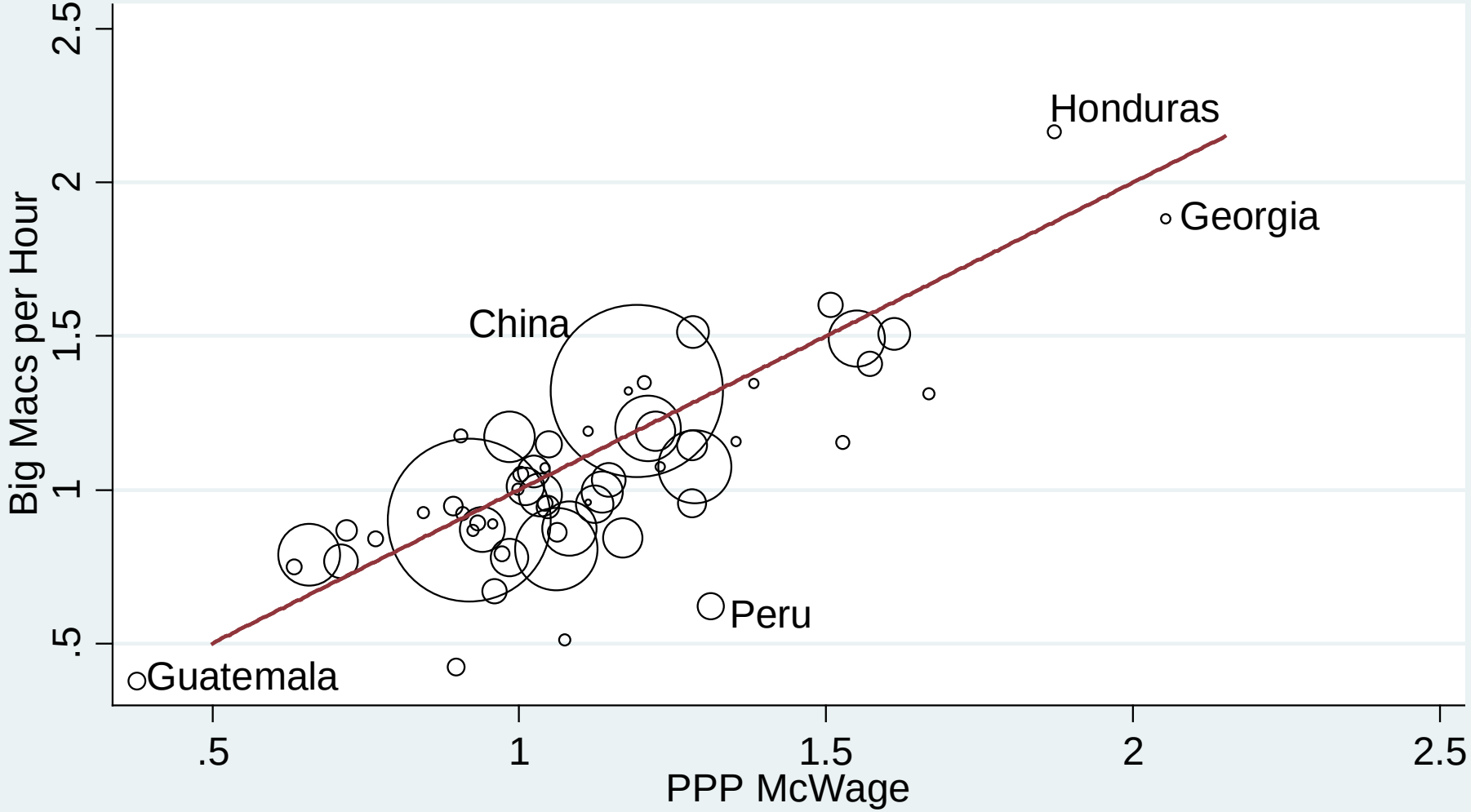
Note: Value 1 corresponds to no change. Weights correspond to population.
McWages in 2005 US$ adjusted by price level of household consumption.
R-squared = 0.52. PPP adjusted from 2011 PWT level using CPI.

Change in PPP McWages vs. change in BMPH between 2000 and 2007



Note: Value 1 corresponds to no change. Weights correspond to population.
McWages in 2005 US$ adjusted by price level of household consumption.
R-squared = 0.35.

Change in PPP McWages vs. change in BMPH between 2007 and 2012

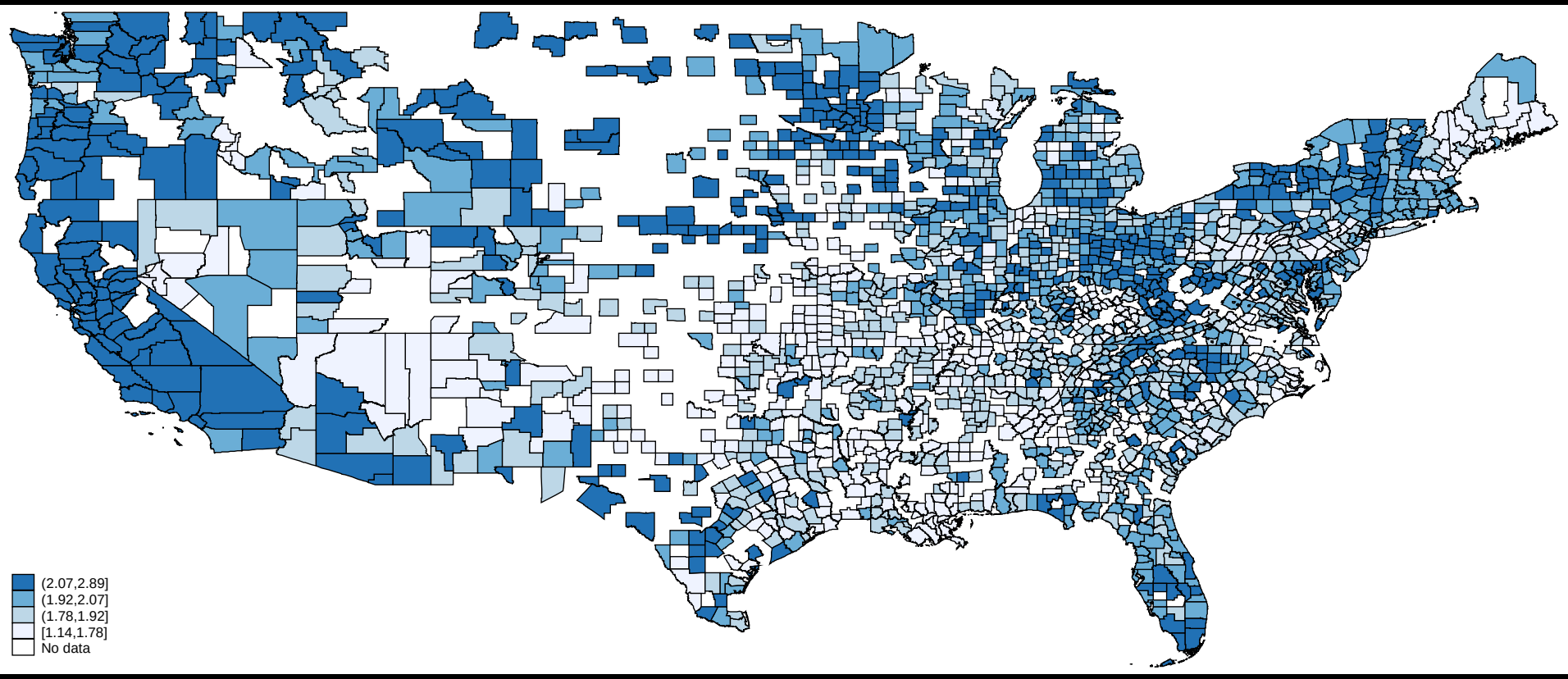


Note: Value 1 corresponds to no change. Weights correspond to population.
McWages in 2005 US$ adjusted by price level of household consumption.
R-squared = 0.64. PPP adjusted from 2011 PWT level using CPI.

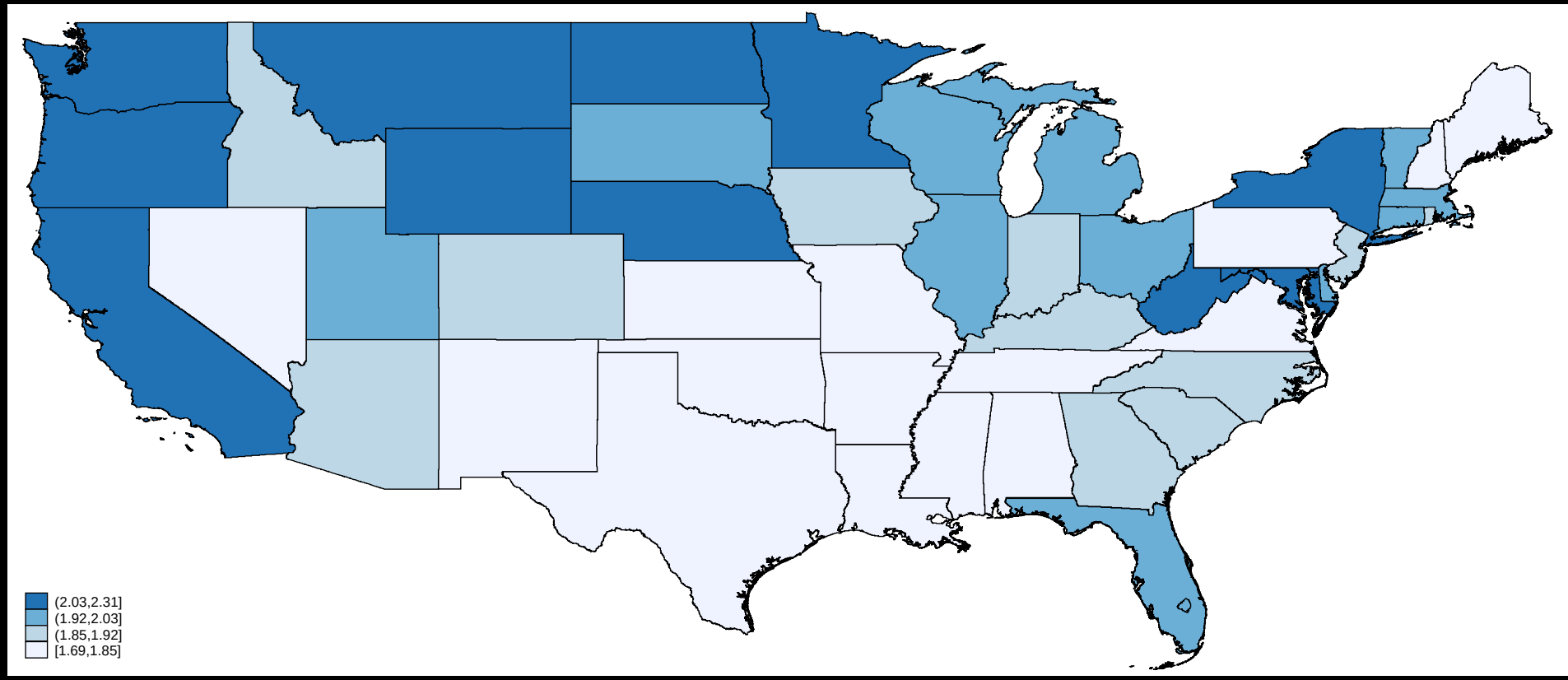
What Do Our DATA Show

1. For real wages across the US.
2. For real wage differences ACROSS Countries.
3. For real wage changes OVER TIME.
4. For the path of world DEVELOPMENT.
5. For the benefits of MIGRATION.

Big Macs per Hour in 2016, County Medians



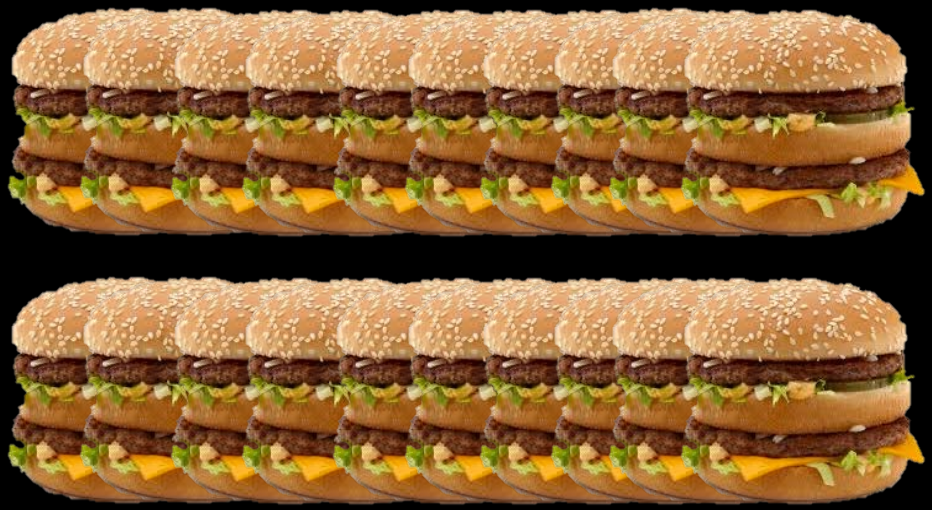
Big Macs per Hour in 2016, State Medians



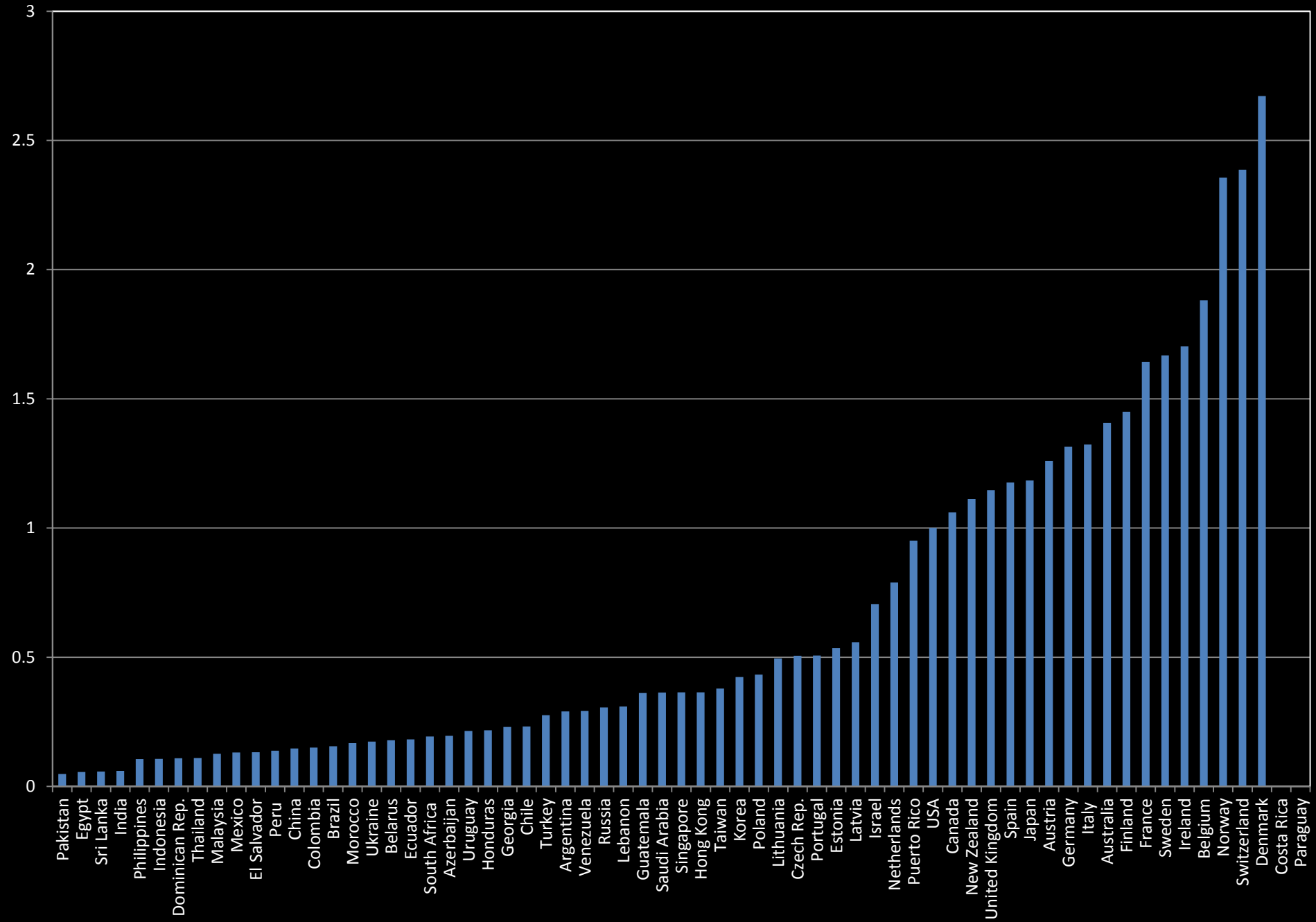
McWAGES, BIG MAC PRICES AND BIG MACS PER HOUR OF WORK (BMPH), 2007

Countries and Economic Regions	McWage	McWage Ratio/US	Big Mac Price	BMPH
U.S.	7.33	1.00	3.04	2.41
Canada	6.80	0.93	3.10	2.19
Russia	2.34	0.32	1.96	1.19
South Africa	1.69	0.23	2.08	0.81
China	0.81	0.11	1.42	0.57
India	0.46	0.06	1.29	0.35
Japan	7.37	1.01	2.39	3.09
The rest of Asia*	1.02	0.14	1.95	0.53
Eastern Europe*	1.81	0.25	2.26	0.80
Western Europe*	9.44	1.29	4.23	2.23
Middle East*	0.98	0.13	2.49	0.39
Latin America*	1.06	0.14	3.05	0.35

Big Macs per Day (BMPH*8) - China vs. US



McWages in 2009, relative to US level



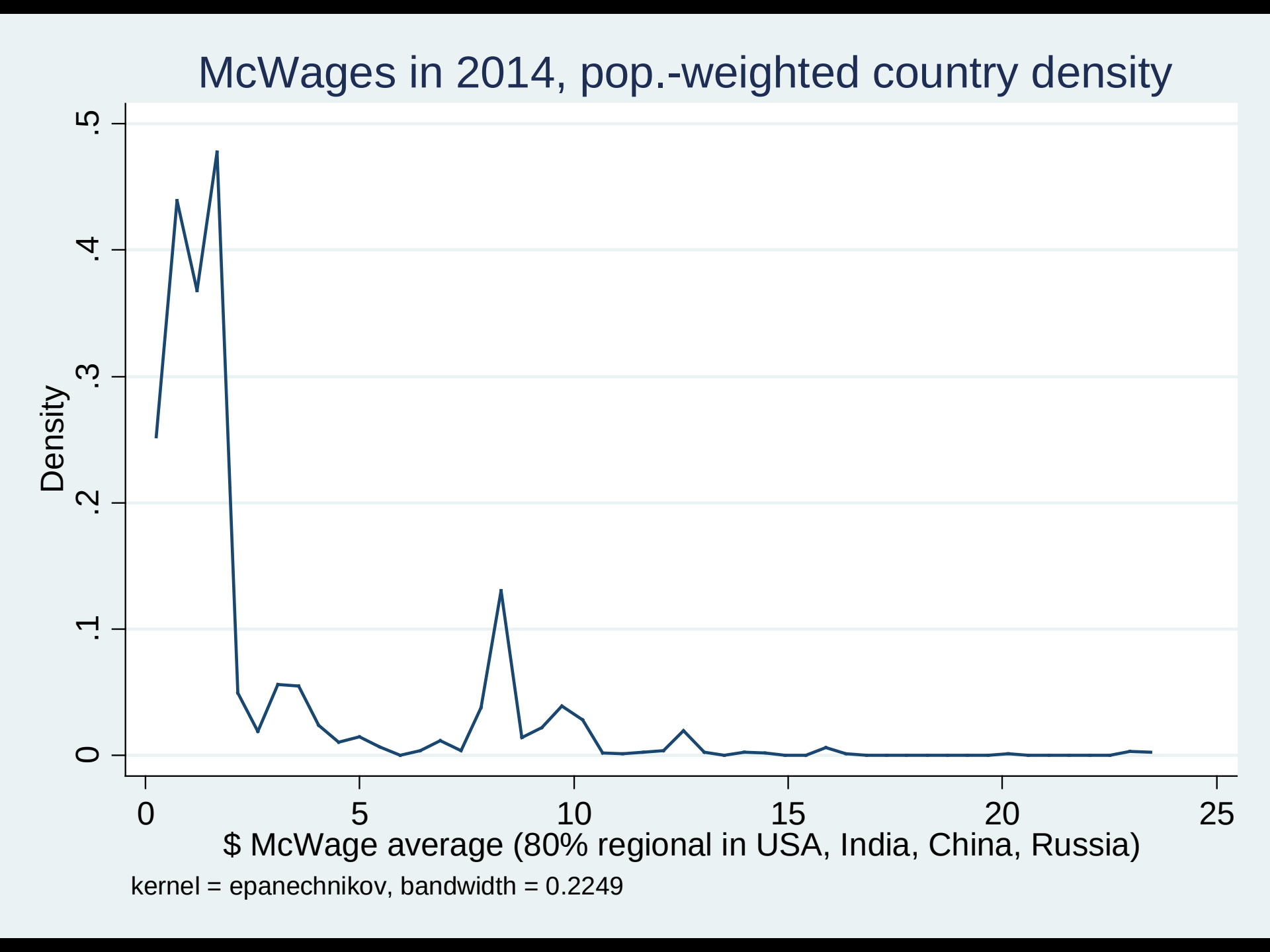
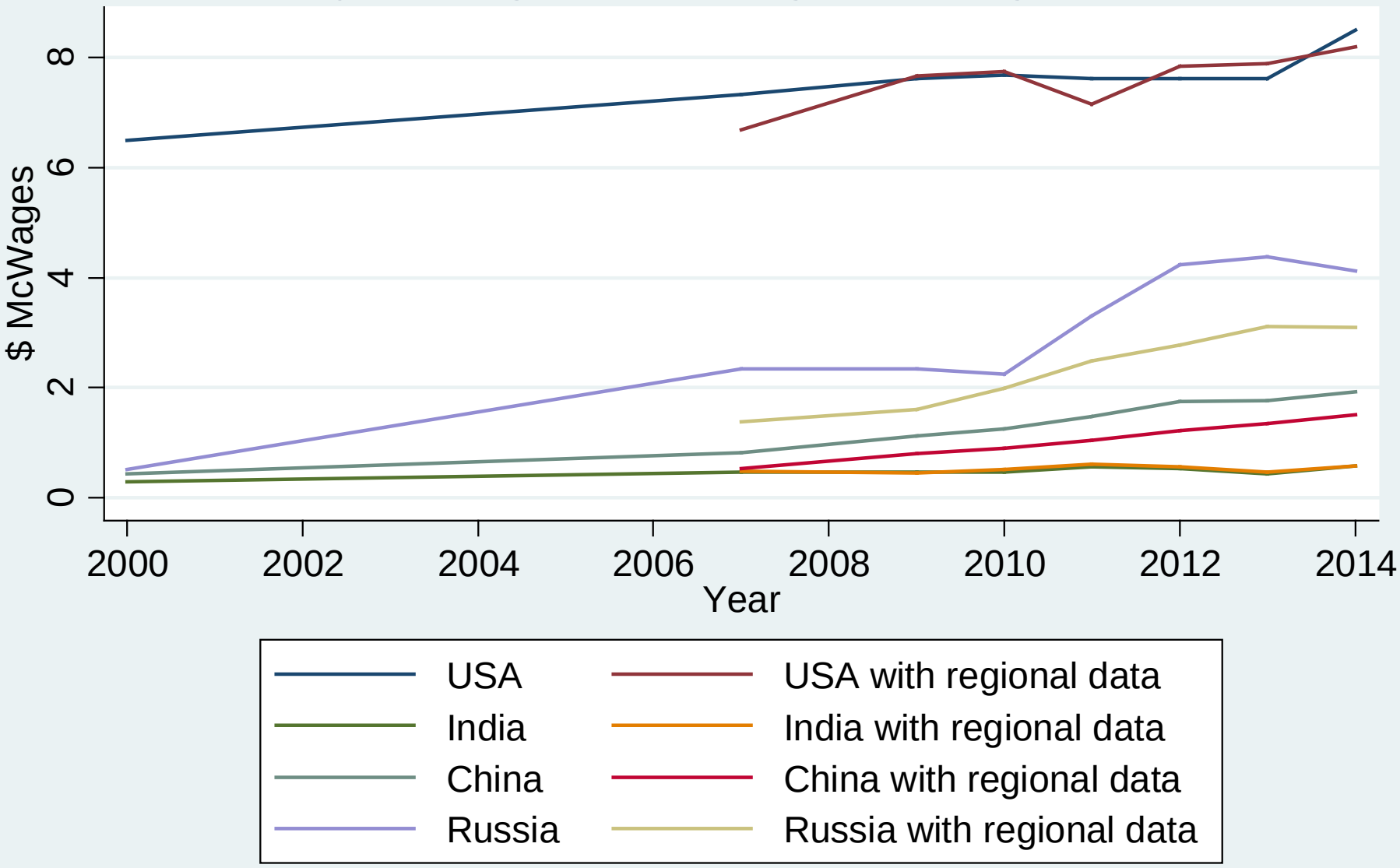

McWages in 2014, pop.-weighted country density
Density
0
.1
.2
.3
.4
.5
0
5
10
15
20
25
$ McWage average (80% regional in USA, India, China, Russia)
kernel = epanechnikov, bandwidth = 0.2249

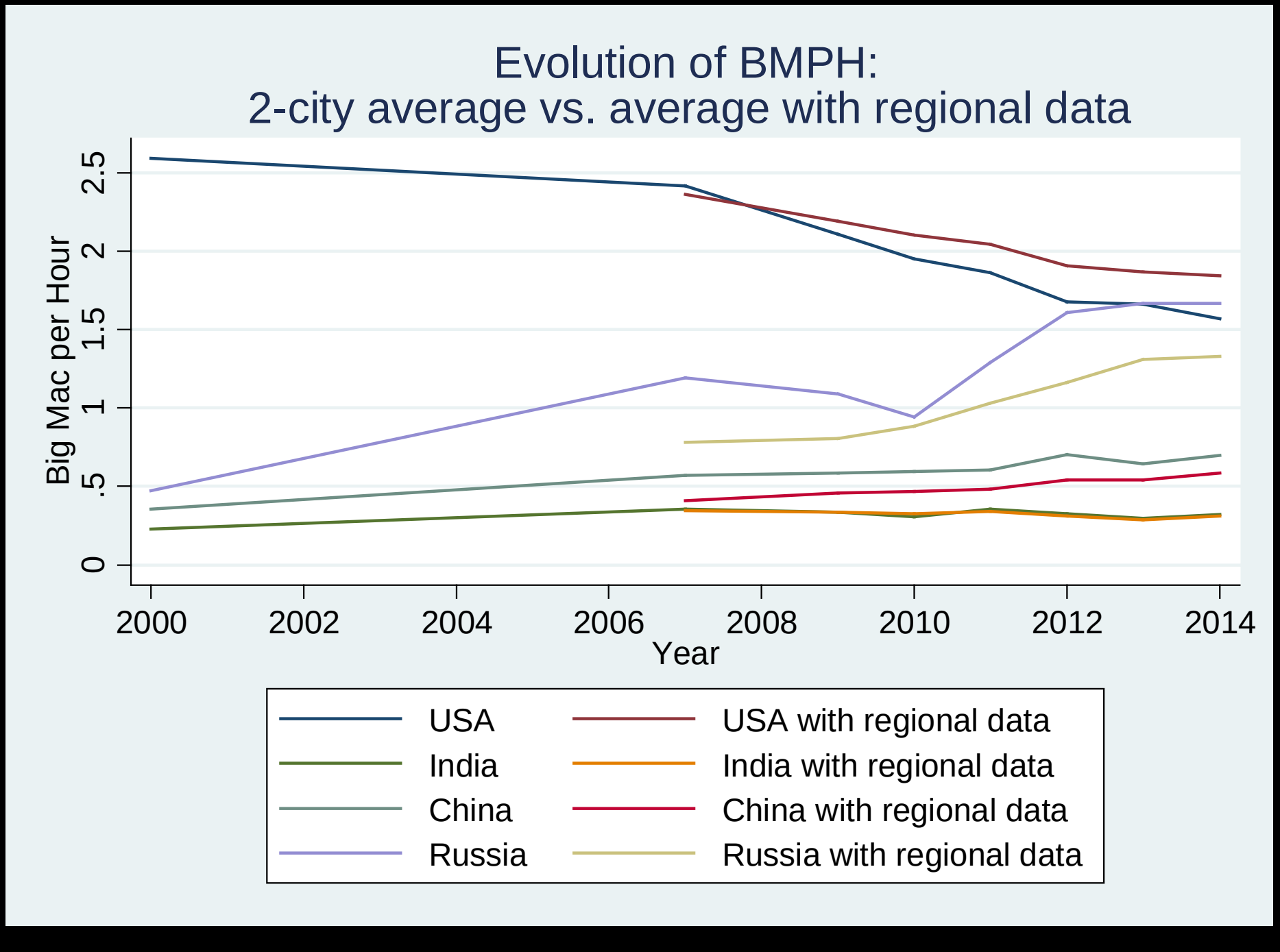
TABLE 5: GROWTH IN McWAGES, BIG MAC PRICES AND BIG MACS PER HOUR OF WORK (BMPH), 2000-2007

	McWage Ratio	McWage Ratio Relative to the U.S	Big Mac Price Ratio	BMPH Ratio
U.S.	1.13	1.00	1.21	0.93
Canada	1.51	1.34	1.66	0.91
Russia	4.63	4.11	1.84	2.52
China	1.92	1.71	1.20	1.60
India	1.57	1.40	1.03	1.53
Japan	0.95	0.85	0.94	1.02

TABLE 6: GROWTH IN McWAGES, BIG MAC PRICES AND BIG MACS PER HOUR OF WORK (BMPH) 2007-2011

	McWage Ratio	Big Mac Price Ratio	BMPH Ratio
U.S.	1.06	1.16	0.91
Canada	1.47	1.56	0.94
Russia	1.78	1.24	1.43
South Africa	0.89	1.29	0.69
China	2.00	1.62	1.24
India	1.36	1.58	0.86
Japan	1.46	2.04	0.72
The rest of Asia*	1.34	1.42	0.94
Eastern Europe*	1.31	1.22	1.08
Western Europe*	1.12	1.19	0.95
Middle East*	1.26	1.26	1.00
Latin America*	1.51	1.45	1.04
Oceania*	1.22	1.39	0.88


Evolution of McWages:
2-city average vs. average with regional data
$ McWages
0
2
4
6
8
2000
2002
2004
2006
2008
2010
2012
2014
Year
USA
India
China
Russia
USA with regional data
India with regional data
China with regional data
Russia with regional data


Evolution of BMPH:
2-city average vs. average with regional data
Big Mac per Hour
0
.5
1
1.5
2
2.5
2000
2002
2004
2006
2008
2010
2012
2014
Year
USA
India
China
Russia
USA with regional data
India with regional data
China with regional data
Russia with regional data

McWages along the Development Path

- Balassa-Samuelson (the Penn effect)
- Convergence, as opposed to regression to mean

Prices with Tradable and Non-Tradable Goods

If a quasi-tradable good is produced with (Cobb-Douglas) technology using non-tradable labor paid wage w_{0i} , and if the tradable good is priced p, then

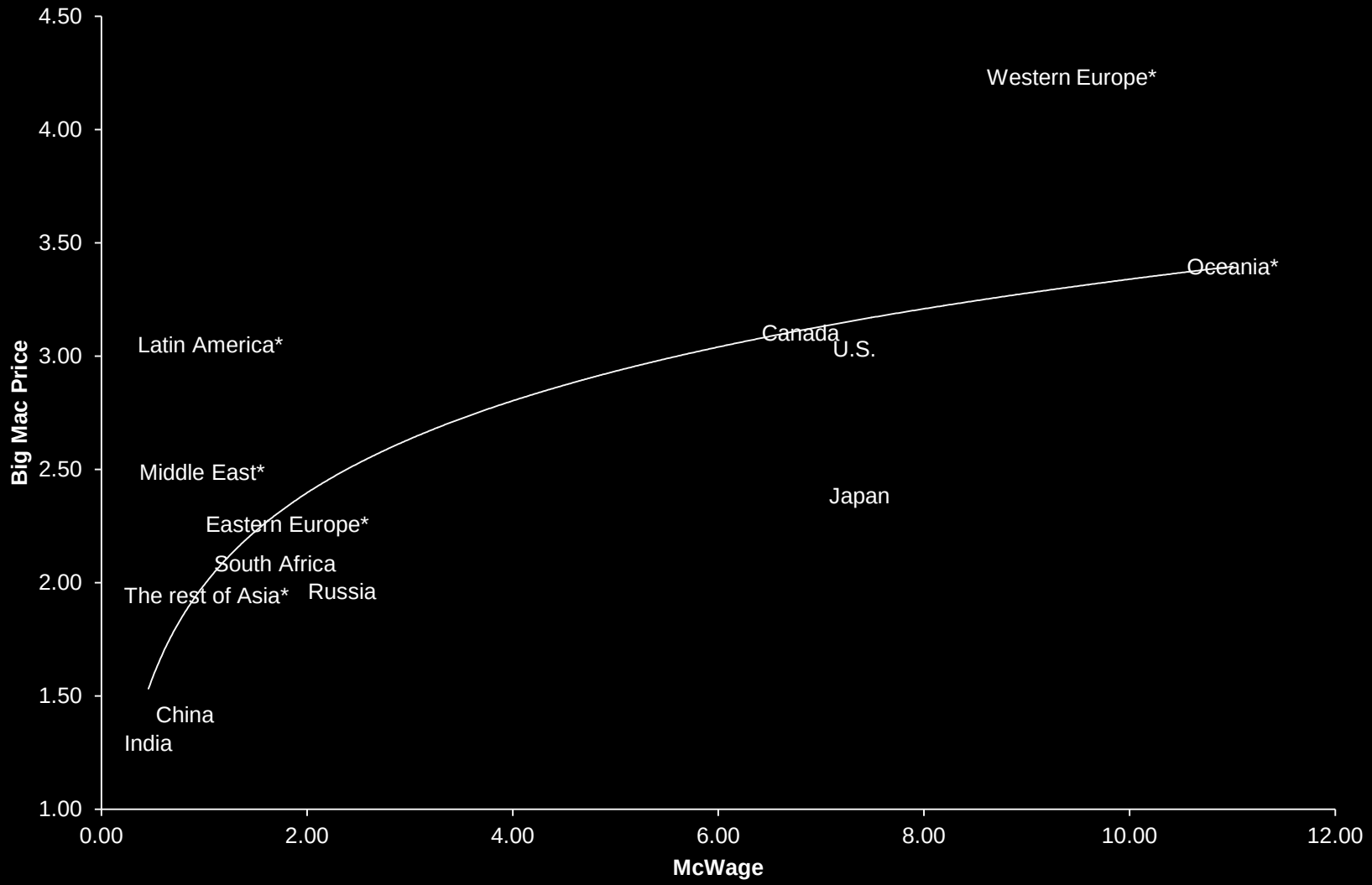
$$p_{ni}=w_{0i}^{a}p^{1-a},$$

describes the price of the quasi-tradable good (p_n) as a concave function of the local wage, where a is the share of the non-tradable in total cost. This is the Balassa-Samuelson-Penn Effect.

A real wage defined as

$$w_{0i}/p_{ni}=(w_{0i}/p)^{1-a},$$

Is a purchasing-power-parity adjusted wage where the weights in the puchasing power basket are a and 1-a, and it is concave function of the real wage measured in tradables.

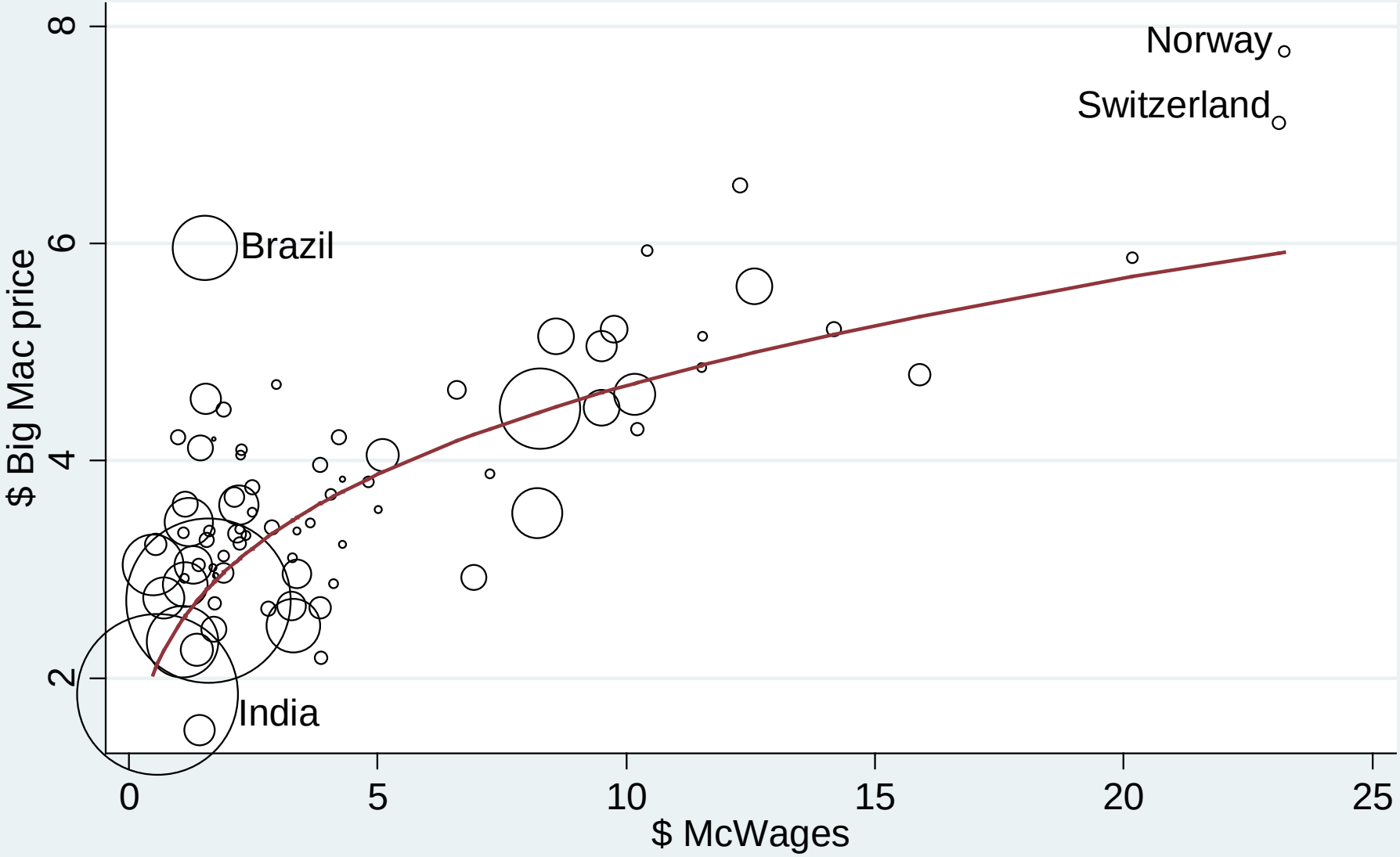


BIG MAC PRICE COMPARED TO THE McWAGE,2007

Note: See Note to Table 3. The regression line is from a log linear regression with slope .586.

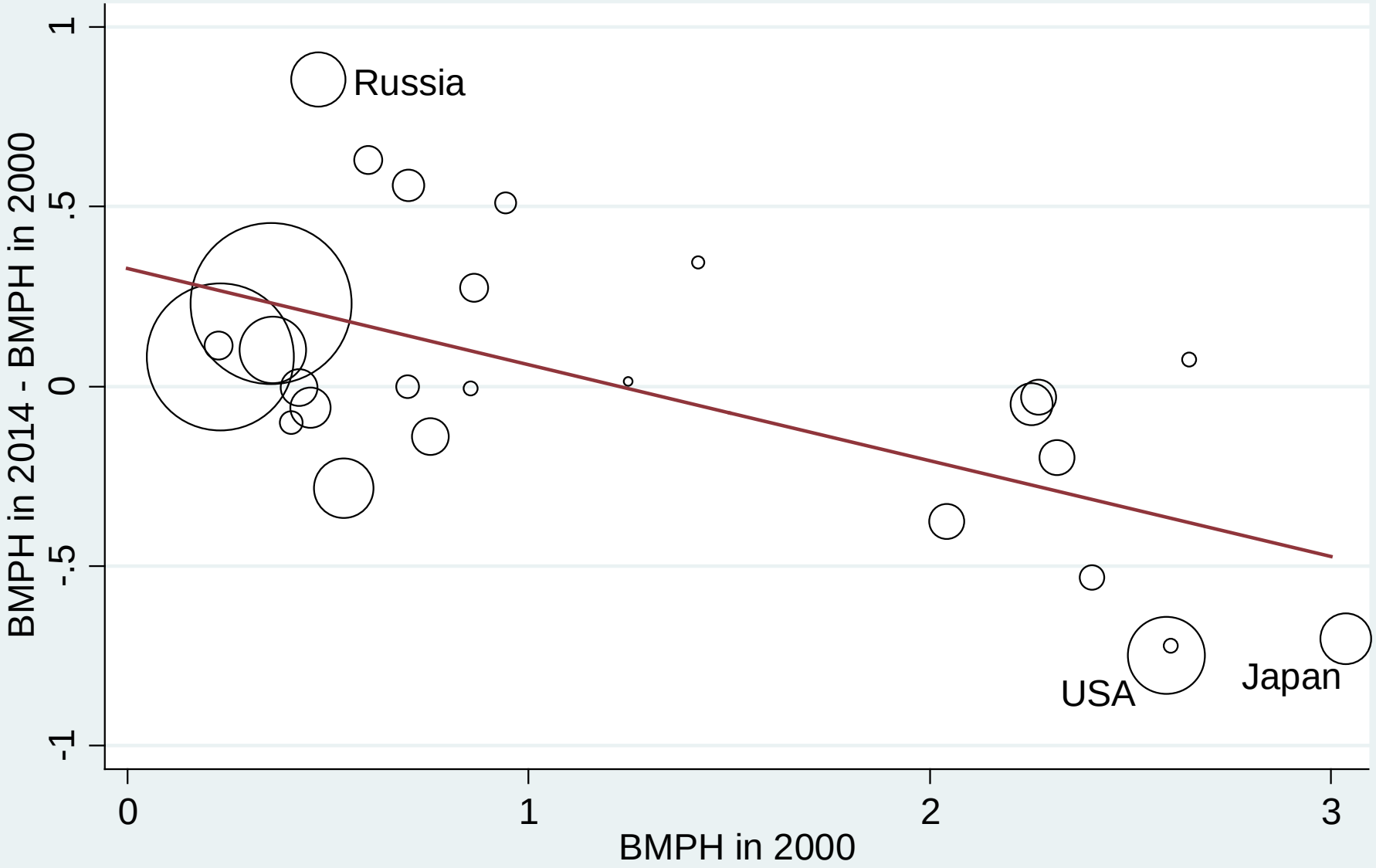
Source: Authors Calculation

McWages vs. Big Mac Prices in 2014



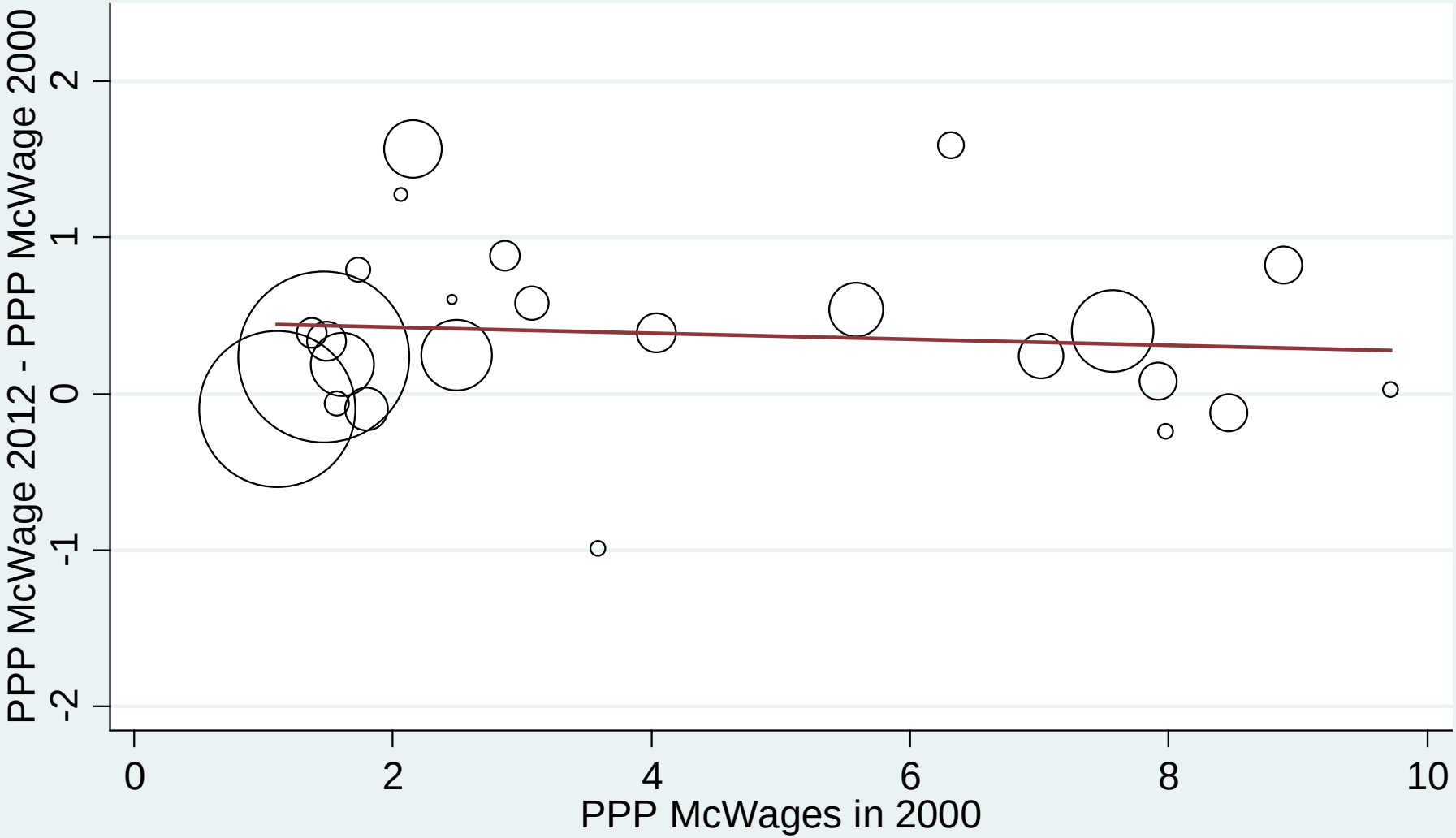
Note: The regression line is from a log linear regression with slope 0.28.
R-squared = 0.57. The regression is weighted by population; Venezuela is excluded.

BMPH vs. change in BMPH between 2000 and 2014



R-squared = 0.39. Coeff. of Var of BMPH in 2000 is 0.74, in 2014 it is 0.60

HH PPP McWages vs change in PPP McWages between 2000 and 2012

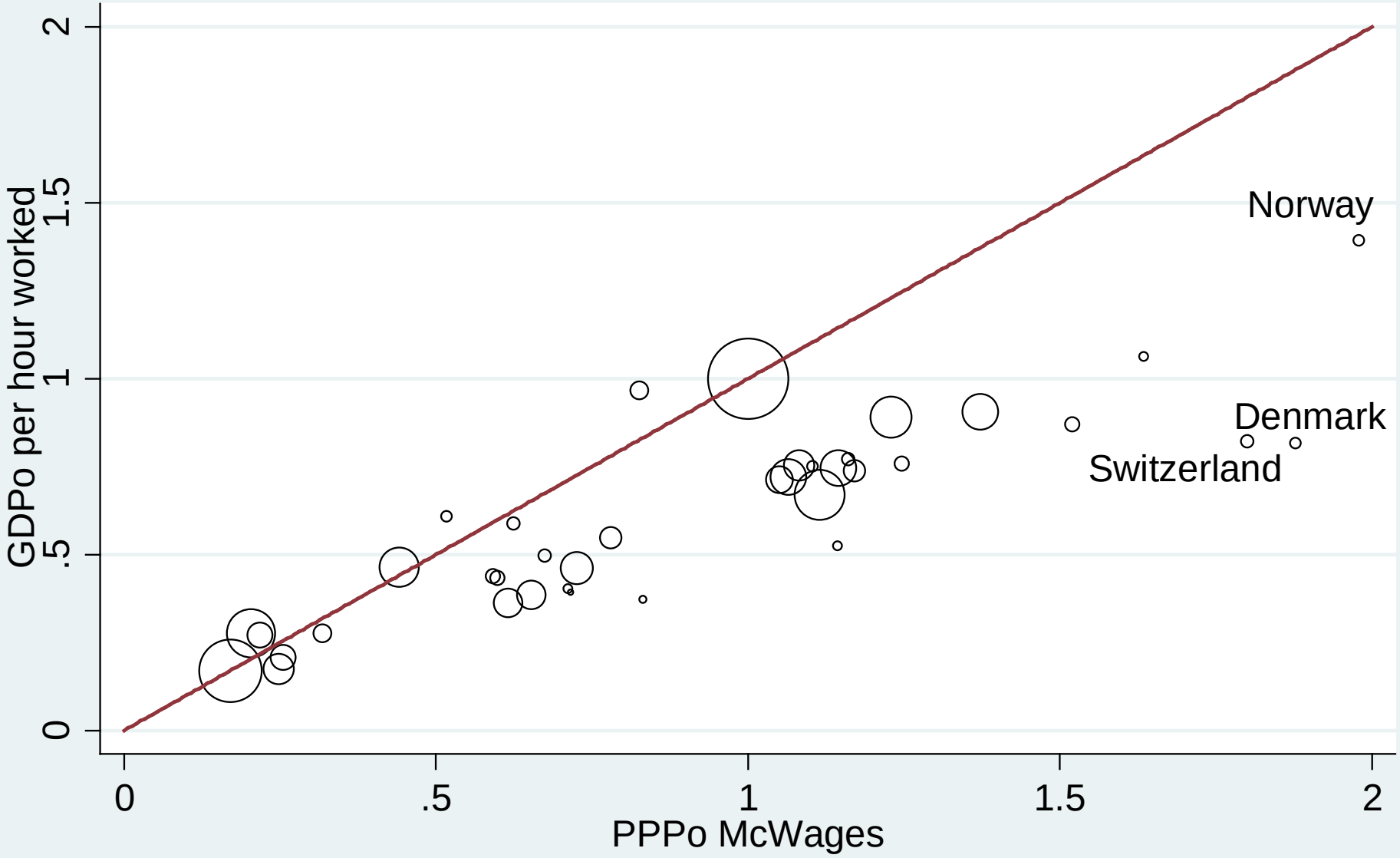


R-squared = 0.03
Coeff. of Var of PPP McWages in 2000 is 0.69, in 2012 it is 0.65

The McWage as Marginal Product of Labor

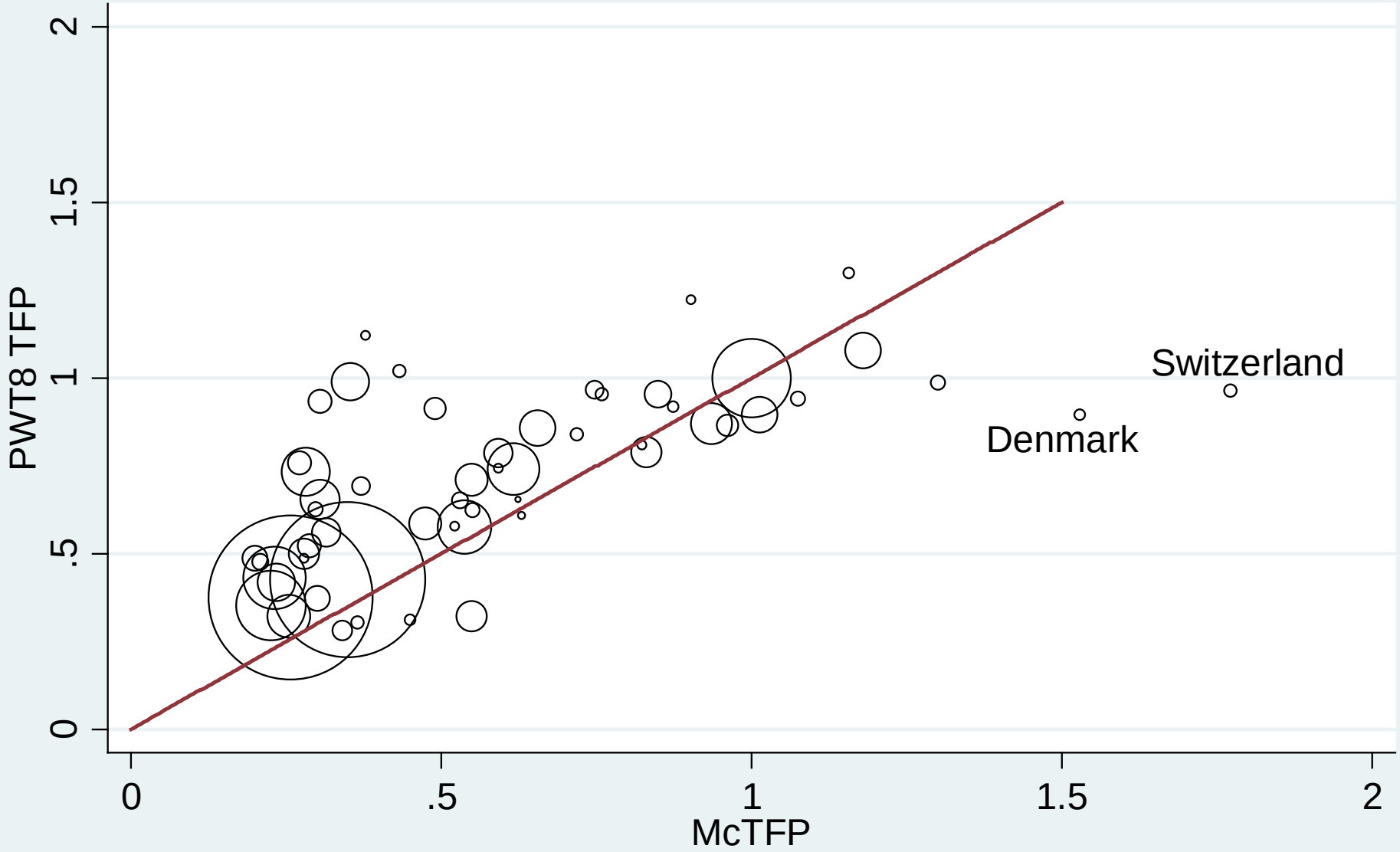
IF workers are paid their MP, McWages, which control for differences in worker skill, can measure Total Factor Productivity

PPPo McWages vs PPPo GDP per hour worked in 2011



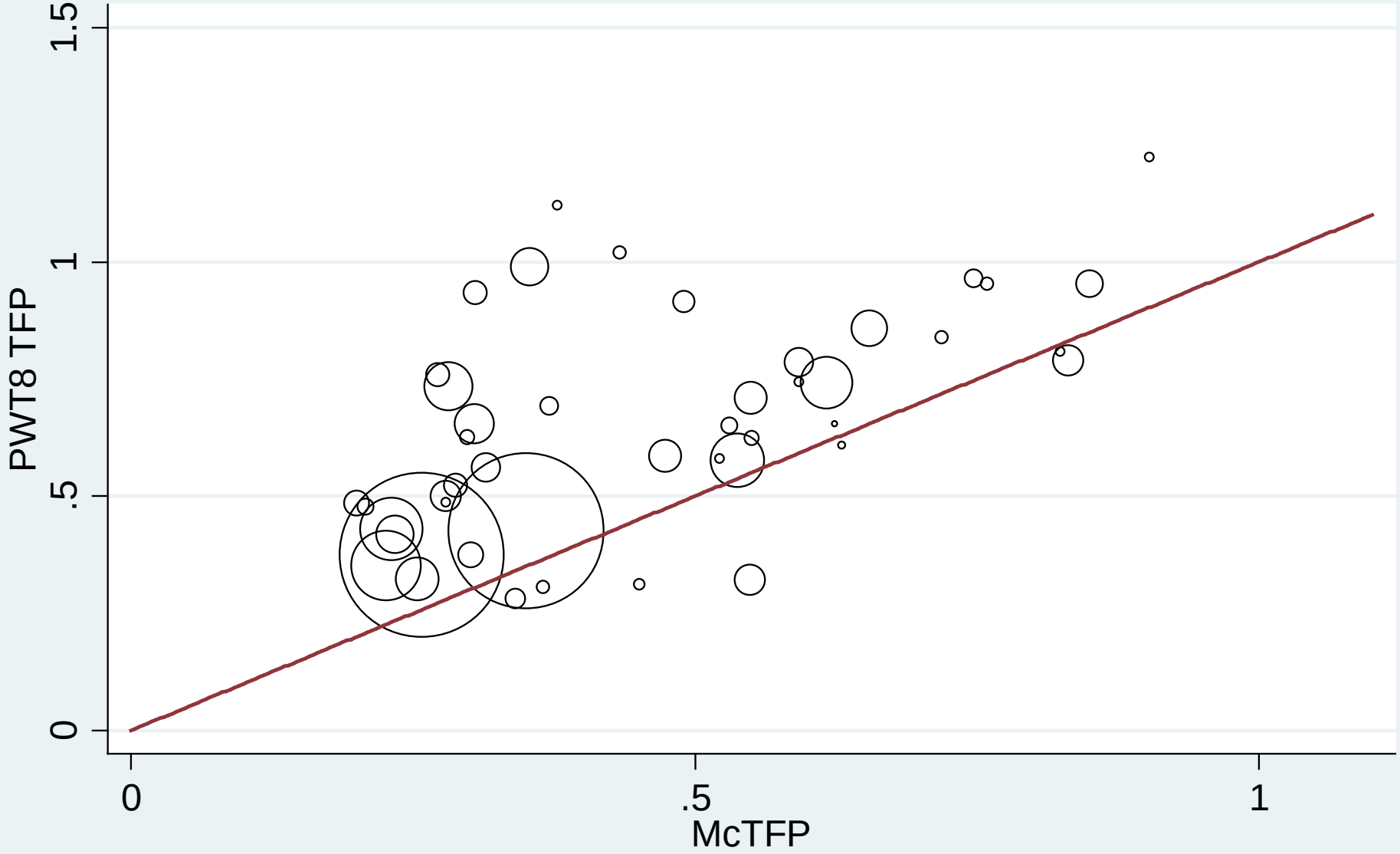
Note: All values relative to the US.
R-squared = 0.74

PWT8 TFP vs McTFP in 2007



Note: All values relative to the US. Weights correspond to population.
McTFP defined in equation (?).

PWT8 TFP vs McTFP below US level in 2007



Note: All values relative to the US. Weights correspond to population.
McTFP defined in equation (?).

Migration and Welfare

Estimates of welfare gains from migration use wages of US immigrants (Clemens, 2011; Kennan, 2013).

These

- are affected by selection
- do not condition on hedonic job qualities
- and skill inputs
- and are available for only a handful of country pairs (42 in Kennan, 2013).

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Migration flows in McWage units

McWage gains observed for 4,000 migration flow country pairs (Adsera and Pytlikova, 2015).

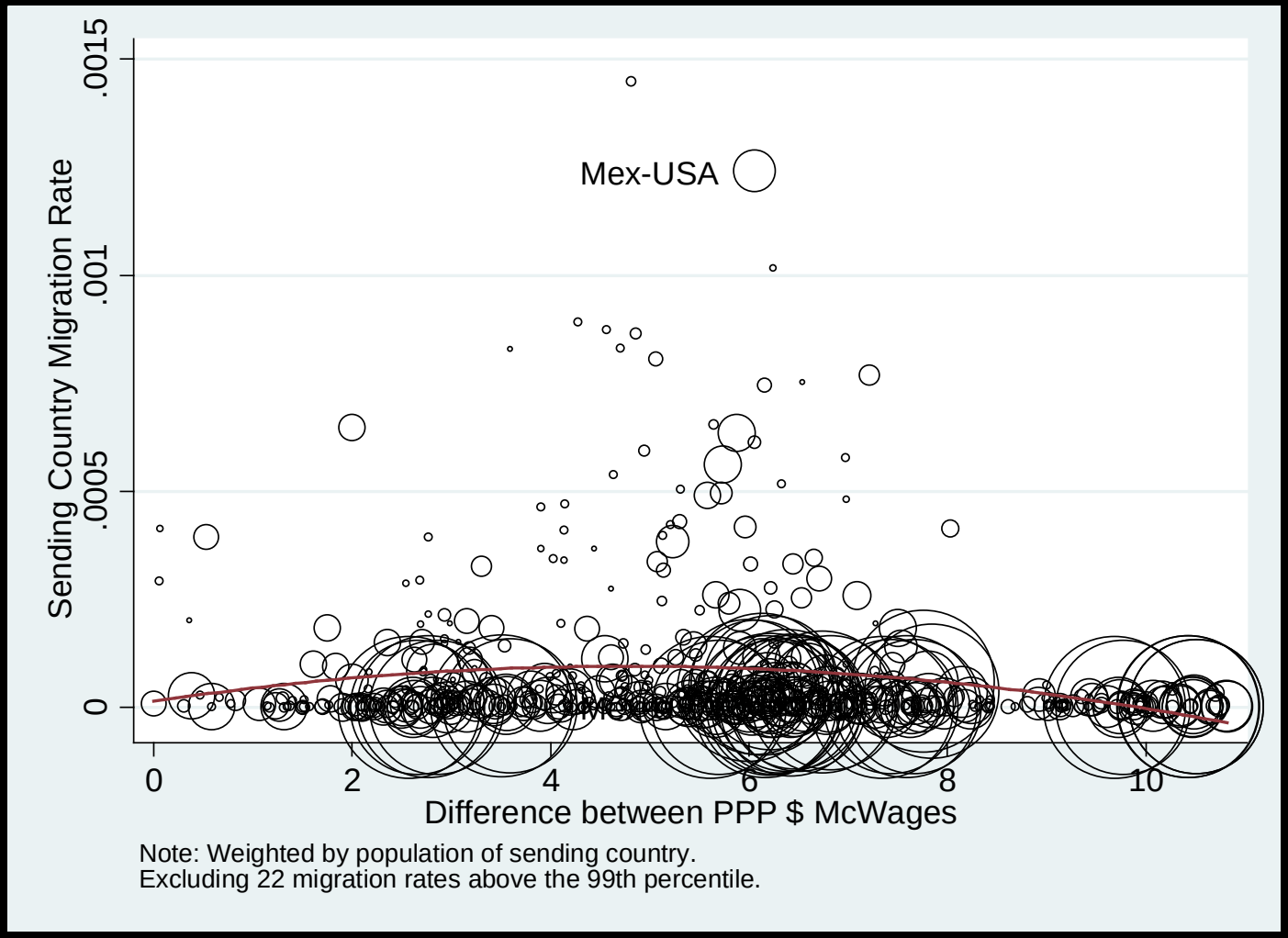

Table 2: PPP $ McWage Gains of Migration by Year

	Number of Migrants	Avg. PPP$ Wage Gain per Migrant	Gain in % Rel. to From Wage	Total PPP$ Wage Gains
2000-2007 panel, 96 country pairs				
2000	841,916	4.97	258%	4,181,509
2007	1,226,742	5.10	275%	6,254,973
Annual growth rate	5.5%	0.4%		5.9%
2007-2010 panel, 535 country pairs				
2007	1,932,711	4.96	261%	9,582,627
2009	1,841,101	5.69	270%	10,471,652
2010	1,824,132	5.71	274%	10,419,940
Annual growth rate	-1.9%	4.8%		2.8%

Notes: The McWage gain for each migrant is the difference between 2005 PPP $ McWages of the corresponding country pair.


500원
맥도날드
McDonald's
맥도날드

Regional Cities

CHINA: Shanghai and Beijing + Quanzhou, Fujian; Foshan, Guangdong; Fuqing, Fujian; Heshan, Guangdong; Jiujiang, Jiangxi; Huaiyin, Jiangsu; Xuancheng, Anhui; Zhuzhou, Hunan; Langfang, Hebei; Fushun, Liaoning; Xi'an, Shaanxi; Kunming, Yunnan

RUSSIA: Moscow and St. Petersburg + Samara; Yaroslavl'; Cheboksari; Nizhnekamsk; Naberezhnie Chelni; Saratov; Voronezh; Rostov-na-Donu; Sochi; Novocherkassk; Kazan'; Ufa; Orenburg

INDIA: Mumbai and Bangalore + Baroda; Dasuya; Ghaziabad; Hyderabad; Kolkata; Meerut; Pune; Kolhapur; Nasik; Chandigarh; Ahmedabad; Chennai; Indore; Surat; Varanasi

USA: New York and Los Angeles + Miami, FL; Chicago, IL; Dayton, OH; Indianapolis, IN; Atlanta, GA; Dothan, AL; Cicero, IL; Grand Junction, CO; Syracuse, NY; San Francisco, CA; New Orleans, LA; Oakland, CA; Oakland, CA; Birmingham, AL; Denver, CO; Houston, TX.