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Purchasing Power Parity – Theory and Practice

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Declaration:

I hereby declare that I am the sole author of the thesis entitled "Purchasing Power Parity – Theory and Practice". I duly marked out all quotations. The used literature and sources are stated in the attached list of references.

In Prague on 13.05.2016

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Abbreviations

CHF – Swiss franc

CPI – Consumer price index

GATT – General Agreement on Tariffs and Trade

GBP – British pound

GDP – Gross domestic product

IMF – International Monetary Fund

OECD – Organization for Economic Co-operation and Development

PPP – Purchasing power parity

USD – United States dollar

WTO – World Trade Organization

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Abstract

The thesis explains the theory of purchasing power parity and related concepts. It shows differences in prices and wages all around the globe and gives theoretical explanation of existing disparities. The goal is to find out how prices differ in reality, where costs of living are the highest or the lowest and what makes some products more or less expensive in different countries.

In order to answer the questions the thesis deals with, the variety of sources was used, starting from economics textbooks, academic journals, literature reviews, the Economist website, a study of UBS 'Prices and Earnings', International Monetary Fund database and others.

Keywords: Purchasing power, the law of one price, exchange rates determination, consumer price index, Big Mac index, price comparison, wage comparison

Introduction

The world from the economic point of view if really diversified. Some countries offer much higher living standards than the others. Doing exactly the same job, employees can get ten times higher salaries in the richest countries in the world, than in those with the lowest incomes. However, it seems to be obvious for all of us, the fact that one's living condition strongly depend on the place he or she lives, for me seems to be a very interesting topic.

Why living in some countries is much more pleasant and easier than in others is a very hard question. It definitely depends on number of factors. Things like cooperation between the inhabitants, certain beliefs and ability to establish institutions that are working well for the common wealth seem to be crucial, but other factors are also meaningful. However it takes decades or even ages to built a nation's wealth, and we can only try to find some particular explanations why some countries are doing well, and some very badly.

Understanding what determines well being of nations is a very interesting topic, but very complex. Being aware of the existing economic differences in the world of today, we either can understand what makes some countries rich and use this knowledge to make the world a better place, or we can try to deepen our knowledge about existing differences. To discover which countries are the best to live, is not an easy task. Purchasing power in different countries is probably not the only reliable indicator in which places living standard is the highest, but it is hard to find a better one. As comparing wage levels denominated in one currency gives us only nominal numbers, but does not show us what we can purchase for these wages. Does it really matter if I earn 10 times more than I would in a neighbor country, if prices there are 20 times lower? Of course, for those who often travel abroad to have with their domestic salaries high purchasing power worldwide, but still, the majority of the people earn and spend most of their money in the place they live.

Presenting purchasing power all over the world is one of the most important parts of this thesis. It is the subject of the second chapter. I have decided to use comparative method, to show the relation between wages and prices worldwide, and to find out in which place the purchasing power is the highest or the lowest. Economic data used in the thesis are from the

Economist's Big Mac Index, a study of UBS Prices and Earnings and gross domestic product statistics. The Big Mac Index show which currencies are undervalued or overvalued against the US dollar, comparing prices of Big Mac worldwide, with its price in the United States of America as a benchmark. The study of UBS Prices and Earnings presents prices, wages and domestic purchasing power in major cities all over the world. The GDP statistics were used to show the relation between nominal GDP and GDP at purchasing power parity in different countries.

Except presenting data linked with purchasing power around the world, the thesis is aimed at explaining the theory related to PPP. The theory of purchasing power parity as a tool used to exchange rates determination is the subject of the first chapter, in which also practical uses of PPP are described. As the second chapter shows in which all the economic data regarding purchasing power worldwide is presented, proves that the theory of PPP usually does not hold, the third, last chapter provides theoretical explanation of that.

There are many reasons why the theory of purchasing power parity does not work in practice. The PPP theory is based on the law of one price, which states that prices of the same goods should be equal worldwide. If they are not, one can simply make profit buying the good in the cheaper place and selling where it has a higher price, what would finally lead to price equalization. As there are many currencies used in the world, the prices should be the same when converted to one currency. However, determining the exchange rate is a very complex topic, and in reality prices are not the only determinant of nominal values of currencies. Moreover, the law of one prices assumes that there is free trade, but the real world is more complicated. Even in free trade areas trade might not be entirely free, and we should not forget about transportation and other costs.

Therefore, the structure of the thesis is divided into three chapters. The first one explains the theory of purchasing power parity, its history, related theories, and shows practical uses of PPP. The second chapter presents the economic data, compares prices, wage and purchasing power in different countries. The subject of the last, third chapter is explanation why the theory usually does not hold.

To sum up, the goal of the thesis is to find the answers for questions like how the theory of purchasing power parity works in practice, and to which extent it is useful to make predictions regarding future exchange rates. Would prices really tend to equalize, if trade were entirely free? If not, why? Do the exchange rates depend on price levels only? If not, what are the other determinants and which currencies can be regarded as over or undervalued? Assuming that some currencies are overvalued in terms of other, what makes these currencies stronger? Is it only a strong economic position of a country that matters? To answer these questions we need both, theoretical background and economic data. The findings are based on the most recent data and knowledge provided by well known and respected authors.

Chapter 1: The theory of purchasing power parity

The first chapter will be dedicated to the theory of purchasing power parity. In the first subchapter the definition of PPP will be given, with two distinguished versions, relative and absolute, description of its assumptions and the law of one price, on which the PPP theory is based on. The second subchapter will show the history of the concept, its origins and how it evolved over the years. In the last, third subchapter, PPP will be presented as a tool used to make comparisons between the countries with examples of organizations using it.

1.1 Assumptions of the purchasing power parity theory

Purchasing power parity

Purchasing power parity is a theory used to determine the exchange rate. It explains the fluctuations of the exchange rate between currencies of two countries by changes in these countries' price levels[1]. Purchasing power parity is also widely used to make more reliable comparisons of economic data between countries, among others real wage and income levels.

According to the theory of purchasing power parity, what determines the exchange rate of a currency, is its purchasing power. It means that an increase in domestic purchasing power of the currency, simply if we can buy more for the same amount of domestic currency than we could before, will result in its proportional appreciation. At the same time, if there is a decrease in currency's purchasing power, its value in terms of a foreign currency will fall down[2]. To explain it in a simple way let us say a basket of the same commodities costs €300 in the euro zone and £250 in the United Kingdom, assuming that the basket measures precisely money's purchasing power both in the UK and the euro area.

[1] Dornbush Rudiger (1985); "Purchasing Power Parity", NBER Working Paper No. 1591

[2] Krugman Paul, Obstfeld Maurice (2003); "International Economics: Theory and Policy", Sixth Edition

$E€/£ = \frac{CB€}{CB£}$ $E€/£ = \frac{€300}{£250} = 1.2$

Where:

- E€/£ is the spot exchange rate
- CB£ represents the price in GBP of the basket sold in the United Kingdom
- CB€ represents its price in euro in the euro zone

We can see that in this case 1 British pound should cost 1.2 euro, but most of all the equation shows clearly how the exchange rate is determined and its dependency on currency's purchasing power. For instance, if the same basket of products after some period of time can be still purchased for £250 in the UK, but in the euro area costs €350, the new exchange rate will be 1.4 euro for 1 pound.

$E€/£ = \frac{€350}{£250} = 1.4$

Although the purchasing power parity may be in contrast with the interest rate parity theory, people assume the exchange rates depend on the actions of investors, therefore the PPP theory still remains one of the most common tools used to make predictions that regard future changes in exchange rates.

The law of one price

The assumption of PPP parity is based on the law of one price. It says that the same good in the foreign market under certain circumstances, for example no trade restrictions and no transportation costs, should have the same prices as in the domestic market[3]. If not, it becomes possible to buy the products in a country where it is cheaper and sell in one where the price is higher, what is an easy way to make a profit. This kind of practice, arbitrage, in the long run would balance the prices. It can be explained by increased supply in the

[3] Larmont Owen A., Thaler Richard H.; "The Law of One Price in Financial Markets", Journal of Economic Perspectives, Volume 17, Number 4 – Fall 2003

country where the good was more expensive. For instance, if in our domestic market some particular product is cheaper than abroad, exporters would sell it in a foreign market, increasing its supply there, what afterwards causes the price to decrease.

In accordance with the law of one price, if we know the price of a particular good in our domestic market, for example a mobile phone and the exchange rate of our home currency, for instance euro in terms of British pound, we can compute the price of the same product abroad. If the mobile phone costs in the euro area €600 and the exchange rate is 1.2 EUR/GBP, than in the United Kingdom it should be sold for £500.

$$\frac{\text{P€}}{\text{E€/£}} = \frac{600}{1.2} = £500$$

Where:

- P€ is the price of the mobile phone in euro in the euro zone

Obviously, the reality is more complicated, and the law of one price does not always hold. It says that if the trade is open sand costless, the same products should be trade at the same relative prices, but usually trade is not fully open and costless. Prices of the same product differ, even within one country, and there are many reasons for that. In practice, transportation of goods is not free, consumers do not have perfect information about the prices in other markets, or that different taxes are imposed in different countries. However, the law of one price, even though in the real life does not always work, is very useful in economics, and helps to understand incentives to trade.

The difference between the law of one price and purchasing power parity is that the first one applies to a single good, while the second one to overall price level. Assuming that price of the same product in different countries should be equal, we can also assume that it makes sense if all the identical goods cost the same in two countries. Hence, instead of one product, we can talk about a basket of goods. To be a reliable indicator of overall price level in the country, basket of goods should contain most often purchased goods by an

average household[4], like food, clothes, housing services, renting and so on. Its price is the sum of prices of each item it contains. So, if all the same products have the same prices in both countries, it should be consistent with the baskets of goods.

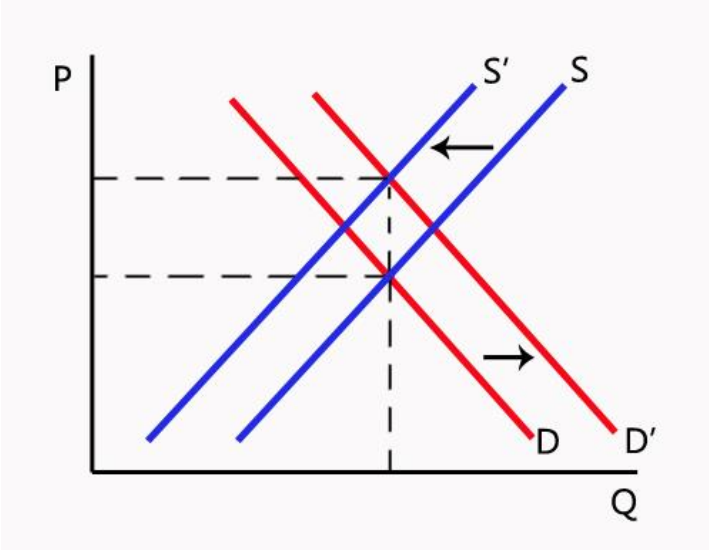
$$\frac{\text{CB€}}{\text{E€/£}} = \text{CB£}$$

Equalization of prices

What happens if the same basket of products in two different countries does not cost the same? Even if the law of one price does not always hold, the general price level in different countries according to the PPP theory should not differ too much anyway. This is explained by the shifts in exchange rates in response to price inequalities across countries[5]. Let us assume that the basket in the euro area (CB€) is cheaper than the identical basket in Great Britain (CB£). According to the theory of purchasing power parity, in this situation demand for products in the euro zone would rise, and in the decrease in the UK. For people who live in the UK it is cheaper to buy euro and afterwards import products from the euro zone, than to purchase the same goods in their home country. In consequence, demand for the European currency increases. At the same time in the foreign exchange market supply of British pounds grows, and the supply of euro goes down. Customers from the euro area do not need pounds, because products in the UK are more expensive for them. Shifts in supply and demand will cause appreciation of euro in terms of pound, and as long as prices are lower in the euro zone, the value of European currency will continue to grow. The graph shows what happens to supply and demand for euro.

[4] "Consumer Price Inflation: The 2015 Basket of Goods and Services", Office for National Statistics (UK)
[5] Krugman Paul, Obstfeld Maurice (2003); "International Economics: Theory and Policy", Sixth Edition

Figure 1: Shifts in supply and demand for euro



If the situation is reversed, and in the euro area the basket of products are more expensive than in the United Kingdom, then demand for euro would diminish, and for British pound increase. This time it is cheaper for the consumers in euro zone to buy British pounds and then import the same products from Great Britain, than to buy it in the domestic market. Appreciation of British pound and depreciation of euro would make the prices equal.

In a situation, in which basket of goods in both countries costs the same, inflation or deflation in one of them can change it. For instance, CB€ costs the same as CB£ evaluated in euro. If there is inflation in the UK, deflation in euro zone or inflation in both, but more rapid in the UK, we will have the same situation as in the previous examples. Again, according to the purchasing power parity theory, it would cause the appreciation of euro and depreciation of British pound, and in consequence equal prices.

Absolute and Relative versions of PPP

Very often two different versions of purchasing power parity are distinguished: absolute and relative. Absolute PPP is the concept that states the exchange rates equal relative price levels. According to relative PPP the percentage change in the exchange rate of two currencies is the same as the percentage change in price levels in these two countries[6]. The difference is therefore that the absolute version is about exchange rates and price levels, while the relative version about their changes. It assumes that the currency's purchasing power remains constant, even if the exchange rate or prices change.

To explain the relative versions of PPP, we can use again the example with different levels of inflation in two countries. If the prices in the UK rise for instance by 10 percent and in the same period in the euro zone by 5 percent, then in accordance with relative we should expect 5 percent depreciation of the British pound against the euro, which would make the relative domestic and foreign purchasing power of two currencies remain the same.

Consumer Price Index

Consumer Price Index (CPI) is a very useful tool, that shows how prices differ year by year. CPI measures changes in prices of goods and services in the market, comparing prices of the basket of goods, in relation to a base year[7]. Its percentage change during a year is the inflation rate. To show only what happens to prices, contents of the basket should remain exactly the same year by year. To compute for example how prices changed between the years 2014 and 2015 we can use the following equation:

$$CPI2015= \frac{CB2015}{CB2014} *100$$

[6] Balassa Bela (1964); "The Purchasing Power Parity Doctrine: A Reappraisal" , Journal of Political Economy, Vol. 72, No. 6

[7] Suranovic Steve (2010); "International Finanace: Theory and Policy"

If the score is higher than 100, it means that prices in 2015 were higher than in 2014. Respectively, if it is lower than 100, it shows that prices in 2015 in comparison with 2014 went down, what is an example of deflation. However, even if the score is above 100, it does not mean that price of every single good in the basket increased, because this shows just the changes in the price of the whole basket. Some part of its contents could even be cheaper than the year before.

1.2 History of the concept

Origins of Purchasing Power Parity

The concept of purchasing power parity has a long and interesting history. Its first trace can be found in the 16th century Spain[8] and in the text of Gerrard de Malynes in 1601 in England. Further statements of PPP were presented in the 18th and at the beginning 19th century by the Swedish, English and French bullionists, people who believed that wealth is defined by the amount of precious metals owned. Later, in the 19th century, the concept was expanded by the famous, classical economists, among them David Ricardo.

PPP in the 20th century

However, it can be said that at the beginning of the 20th century, the theory was already developed and well known, the person who today is regarded as the protagonist of the theory is Gustav Cassel. This Swedish economist expanded the concept furthermore, gave it a name, a formula and supported it empirically. He first published his work on purchasing power parity in 1916, in Economic Journal. The article was appreciated by John Meynard Keynes, who was at the time the editor of the journal. Keynes however could see both advantages and disadvantages in the PPP theory:

[8] Bank of Canada Review: "Purchasing-Power Parity: Definition, Measurment, and Interpretation", Autumn 2002

"This theory does not provide a simple or ready-made measure of the 'true' value of the exchanges. When it is restricted to foreign-trade goods, it is little better than a truism. When it is not so restricted, the conception of purchasing power parity becomes much more interesting, but is no longer an accurate forecaster of the course of the foreign exchange. Thus defined 'purchasing power parity' deserves attention, even though it is not always an accurate forecaster of the foreign exchange. The practical importance of our qualifications must not be exaggerated"[9]

For Gustav Cassel purchasing power parity as a theory of exchange rate determination was uncompromising. However, even he noticed that the theory does not always hold, and that the exchange rates can temporarily diverge from PPP. In 1928 he stated that:

"The fact that the rate of exchange corresponding to Purchasing Power Parity possesses such a remarkable stability in a sufficient reason for regarding Purchasing Power Parity as the fundamental factor determining the rate of exchange and for classifying all other factors that may influence the rate and perhaps make it deviate from the Purchasing Power Parity as factors of secondary importance, most suitably grouped under the head of 'disturbances'."[10]

The disturbances that Cassel distinguished were the actual and expected inflation or deflation, shifts in movements of capital and impediments to international trade. Nevertheless their forces were limited, and could result only in temporary deviation from PPP exchange rates. He also claimed that discussions about under and overvaluation in general, without purchasing power parity concept seems to be pointless.

In the period after the First World War purchasing power parity doctrine was gaining popularity very quickly. The League of Nations and the government of the United States conducted research on PPP. The theory became almost a paradigm and regular micro

[9] Dornbush Rudiger (1985); "Purchasing Power Parity", NBER Working Paper No. 1591
[10] Ibid

economical tool, but still it had some critics. One of them was Jacob Viner, for whom PPP theory was misstated.

After World War II, suspension of trade during the war and need of exchange rate adjustment caused the use of purchasing power parity became more common. Restored interest in the theory continued on for many years after the end of the war, until the 1960s, with its usefulness and advantages appreciated by the famous economists, like Yeager and Haberler. As the factor supporting PPP, both Yeager Haberler pointed high price elasticity in international trade. In 1962, another economist, Hendrik Houthakker, using PPP, showed the overvaluation of US dollar.

A very important moment in development of the theory of purchasing power parity was established in 1964 when two economists, Bela Balassa and Paul Samuelson came up with a statement that permanent deviations from PPP can occur. They explained it by differences in productivity between the countries that result in inequalities in domestic price levels and wages. This observation is known today as the Balssa-Samuelson effect. Sometimes the name Harrod-Balassa-Samuelson effect is also used, as Roy Harrod, an English economist, came up with a similar idea earlier than Balassa and Samuelson did in the 1930s. However also David Ricardo developed the same idea before[11].

Later, in the 1970s and 1980s, the growth of criticism and concerns involving PPP became more visible. Huge fluctuations in nominal exchange rates showed that in reality purchasing power of a currency can have only a small impact on its value. For many of the economists it was at the time very important to find the reasons that can explain the phenomenon of constantly changing exchange rates.

[11] Ibid

1.3 Application of Purchasing Power Parity

PPP as a tool used to compare economic data

Purchasing Power Parity is not just a theory that is used to determine exchange rates, but is also a very useful tool that helps to make more reliable comparisons between countries. How to compare economic data between two countries if they are expressed in two different currencies? The most obvious answer to this question seems to be that we can just use market exchange rate. Let us assume that Gross Domestic Product (GDP) of the United Kingdom is 2000 billion British pounds, GDP of France is 2200 billion Euros, and the exchange rate is 1.2 Euros for one pound. Then the British GDP would be equal to 2400 billion Euros (2000*1.2=2400), which in this case is more than GDP of France. So, can we just simply say that French economy is smaller than British? In nominal numbers for sure yes. However, this kind of comparison for many reasons might not be satisfactory.

One of the reasons is that in reality, exchange rates do not only depend on prices, but are determined in much a more complex way. For this and many other reasons, prices of the same products expressed in different currencies are not equal all over the world. What is interesting for the economists and important while making comparisons is not only value of a certain amount of some currency in terms of other currencies, but what we can actually buy for it, its purchasing power.

To explain it simply we can use the Big Mac Index. It shows the conversion rate, at which a Big Mac would cost the same in domestic and foreign market. Being aware of the fact that the law of one price does not always hold, we can imagine a situation in which Big Mac in the United Kingdom costs £5, and in the euro zone €5, while the exchange rate is 1.2 euros for one British pound. However, in this case one euro in euro zone has the same purchasing power as one British pound in the UK. This way we can also calculate prices of groups of product or even GDP at purchasing power parity. Elimination of the differences in price levels between countries makes it possible to compare volume.

It can be said that PPP converts two different currencies into one, which eliminates differences in nominal prices between the countries, and has the same purchasing power. Without this tool, if we want to compare production level in different countries, we can only see the value of the production, not the volume. If the goods are valued at the same price level, it shows in turn the quantity of services and goods produced.

Uses of PPP

Purchasing power parity as a theory of exchange rate determination in practice works rather poorly. Exchange rates depend on number of factors, and what can be purchased for a unit of a particular currency only partly determines its value in terms of other currencies. However, as it seems to be one of its most well known tasks, we have to mention while talking about the use of purchasing power parity, that it can be, and actually is, used to make predictions and estimate changes in the nominal value of currencies (however only to a certain extent). We can expect, at least in the long run, that prices in different countries should equalize, which would also help us predict or estimate the future values of currencies. So summing up, if for the same products in the domestic market we pay less than we would have to pay abroad, we have reasons to assume that there is a high probability the currency we use to pay for the services and commodities in our home country after some time will gain in value and prices abroad will not be as high for us as they were before.

Very frequently purchasing power parity is also used to compute and compare GDP and GDP per capita between the countries. The second one, although has some disadvantages and does not show all aspects of economic well-being, remains the most important indicator of economic performance and standard of living in a country. GDP at purchasing power parity seems to more relevant to show disparities between the countries than nominal GDP, because exchange rates are changing constantly, while living standard cannot

possibly change that quickly[12]. For example we can imagine a situation, that Swiss franc just in one day, appreciated let us say 5 percent to euro. Does it mean that in one day living the standard increased in Switzerland? Obviously, for Swiss citizens, it would be really hard to notice any difference immediately, except if some of them wanted to purchase a product or service in the euro area.

But how to explain why exchange rates are changing and do not always reflect their purchasing power, what makes using them not the best way to see actual differences while comparing countries' GDP? The value of currency, its supply and demand in reality hugely depend on, among the others, governments policy, interest rates or capital flows. Also currency speculation can influence the exchange rate significantly. Moreover, not all the good and services can be traded internationally. Let's assume there are two countries with exactly the same volume of production of all the products in the economy. For some reasons, the currency of the first one appreciated against the currency of the second one, and is now much more expensive, while the level of production in both countries remains the same. Comparing nominal GDP shows us now, that the first country is more developed, which would be misleading.

However, even if two countries share the same currency, for example member states of the European Union do, it does not make purchasing power parities a useless tool. It still can be used if we want to compare the condition of the economies of these countries. The same currency does not mean the price level has to be equal, and very often it is not. In this case we do not have to use PPP to convert prices into a common currency, but uniform price level is still essential if we want to appraise for instance the actual volume of production.

Comparisons of GDP at purchasing power parity are often made by international organizations, like Organization for Economic Co-operation and Development (OECD), the International Monetary Fund, the United Nations, the World Bank and Eurostat. The main goal is to present economic condition and performance of a country, that can be used for

[12] World Bank website, "GDP ranking, PPP based". Available at: http://data.worldbank.org/data-catalog/GDP-PPP-based-table

instance to analyze policy. Information about purchasing power parity in different countries might be also extremely useful for private companies while for example preparing a strategy to enter a new market, for analysis that involve prices, sales or production costs. Expats moving abroad might use them in salary negotiations. In the European Union PPP is particularly important. A large part of the budget of the European Union is spent to reduce the disparities between the member states. GDP per capita converted in purchasing power parity is used to allocate the Structural Funds.

Usually GDP at purchasing power parity of low-income countries is closer to GDP of high-income countries, then if expressed in nominal numbers. Often the gap between them narrows significantly. It can be explained by lower price level in less developed states. For instance nominal GDP of the Czech Republic is much lower than nominal GDP of Belgium, using an example of countries with similar number of inhabitants. However, when we compare GDP at PPP of these countries, the difference is not as huge, and more accurately shows, among the others, disparities in living standard between the Czech Republic and Belgium. It is even possible, that among two countries, one can have higher nominal GDP, and the second one higher GDP at PPP. As a result of this, the rankings of countries with highest nominal GDP can be distinctive from rankings with GDP at purchasing power parity.

Sometimes, using purchasing power parity is the only way to examine the economic growth of a country. As GDP is usually measured in foreign currency, which almost always is US dollar. We can imagine a situation, that a country is doing very well, developing really fast, its production is rising, as well as wages of the employees, with relatively low inflation rate. Living standard is getting better, what should be noticed while showing its GDP growth. However, let's say that at the same time its currency in a certain period strongly depreciated against US dollar, in which the statistics are presented. In this case, if the depreciation was higher than the economic growth, then comparing nominal GDP of this country expressed in US dollar to its position a few years ago, would make us think it actually was in recession, what is not true. Unless we compare changes of GDP at purchasing power and see the real situation.

This example seems to be very unlikely to happen in real life. Why would a currency of a country that is developing very quickly depreciate? However, a similar situation can definitely happen. In reality currencies of countries which economies are in good conditions and are developing are sometimes loosing values despite their good economic performance. It can be caused by many reasons. For example, if the predictions about the world economy are negative, like they were during the last financial crisis, for many investors it does not matter that they can get much higher rate of return in developing markets. What they search for is safety, which means they would rather keep their money in stable, developed markets like Japan, Germany or Switzerland, and not for instance in BRICS countries (Brazil, Russia, India, China and South Africa), what would increase demand for currencies from the first group making them appreciate and decrease the demand for currencies from the second group, making their values go down. Very often a loss of confidence for the investors would have a relatively strong negative effect on developing a country's economy, but at the same time lower value of the currency makes for the others import of the products from the developing market more affordable, what can be good for its further development.

Another indicator that requires volume comparisons based on PPP is the level of labor productivity. Relative productivity can help to estimate future profitability in a particular market, its competitiveness and perspectives for its economy. It also enables us to compare volumes, not only values. Comparing just the final value of manufactured goods in terms of foreign currency does not show us clearly the relation between inputs and outputs.

Purchasing Power Parity measures is also used to derive comparative price levels or ratio between current exchange rate and the conversion rate at which prices would be the same in domestic and foreign market. When both of them are equal, prices abroad are the same as in our home country. If the value of our home currency in terms of foreign currency exceeds the value it would have at purchasing power parity, it means that one unit of this currency buys more abroad than domestically. We can use again the example with Big Mac, which costs 5 pounds in the UK and 5 Euros in the euro area. Let's say the exchange rate is still

1.2 euro for a British pound. However, according to the purchasing power, the exchange rate should be one euro for one pound. In this case, one unit of British currency buys more in the euro zone than at home. It is even easier to see the difference between the actual exchange rate and the conversion rate at which the same products cost the same at home and abroad, if we compare high-income with low-income countries, because usually higher income per capita goes hand in hand with higher price level.

The Eurostat-OECD PPP Program

What can be the best way to present how useful purchasing power parity is to examine how it is used in practice by some of the international organizations. OECD in cooperation with the Eurostat, in the early 1980s introduced a program, which purpose was to compare gross domestic products of member countries of the OECD and the European Union. This remains the main goal, however the program was extended and now includes also these countries that only applied to join the European Union or OECD and those that have programs of technical cooperation in statistics with OECD and Eurostat. To be able to compare both the price and volume levels of GDP, OECD and Eurostat express it in a common currency at uniform price level. This is achieved by using purchasing power parities.

The countries that take part in the program present the price and expenditure data. To compare them, Eurostat and OECD have to ensure that all the participants use the same methodology and make sure the gathered data is reliable. After OECD and Eurostat has to compute PPPs with the validated data presented by the countries, and derive the measures it can be compared with. The measures also have to be submitted and explained to the users[13].

While making comparisons it is extremely important to conduct it properly and to avoid certain moves that can cause the results to be misleading and the price levels in particular countries over or under estimated. Data about prices has to be for products that can be

[13] Eurostat-OECD Methodological Manual on Purchasing Power Parities, 2012 Edition

compared, that are, at least to a certain extent, similar with for instance similar technical parameters and are used to fulfill the same needs. Otherwise, it is not clear what is the reason of different price. If the products are not very similar, the difference in price can be explained not only by higher or lower price level, but also by different quality. What is also important, the data has to be for products that really represent the expenditures, that are widely used and show actual consumers' patterns.

The process of purchasing power parities calculation requires the cooperation between OECD, Eurostat and the National Statistical Institutes of countries that are participating. Each of them have their own responsibilities. Eurostat calculates and validates the PPPs for countries that participate in annual comparisons and OECD for those that participate in the three-yearly joint comparisons and are not done by Eurostat. As regards the National Statistical Institutes, their task is to provide all the required data with prices in accordance with the time schedule, as well as reports about the methods and sources they used. They are also, along with Eurostat and OECD responsible for data update. Responsibility for the quality of the results is shared.

The frequency of results publication depends on the country. Eurostat publish every year the results that include 37 countries, through its public data base. Joint comparisons of Eurostat and OECD are not as frequent, and are conducted every three years. These cover 47 countries and are published in OECD public database. Purchasing power parities for the participating countries are expressed in PPS and OECD dollars, which are the artificial reference currency units. PPS are artificial euros that have the same purchasing power in the whole European Union. In other words PPS reflects the average price level in the member countries. OECD dollar, on the other hand, is the artificial US dollar, with the same purchasing power in all the states that are members of OECD[14].

[14] Ibid

Uses of PPP by the International Monetary Fund

The International Monetary Fund has been using GDP at purchasing power parity in its "World Economic Outlook" since 1993. Recently, it is also used while making decisions regarded distribution of quotas for IMF's members. The use of PPPs in the work of IMF is actually essential, helping the organization to have a general overlook at the economic situation of the countries.

In the World Economic Outlook, a review of world economy made by the International Monetary Fund, purchasing power parity is used to present the development of countries. The nominal GDP of a country is divided by the PPP exchange rate. Nominal GDP in domestic currency is divided by its PPP relative to the United States. PPP based weights are also used by the IMF for example to compute global consumer price indices as a percentage of GDP.

The subscription of quota, which as was already mentioned is determined with help of PPPs, is extremely important for the member countries. It defines the required financial input, that the country is obliged to provide, the amount of financing it can receive from the IMF, and the power of its vote in decisions of IMF. The weight of GDP in quota calculation is 50 percent, that is measured with an average data for the previous three years as a mixture of nominal GDP, and GDP based on PPP. However, the one that is based on the market exchange rates has weight of 60% and on purchasing power parity exchange rate only 40 percent, the fact that in the calculations not only nominal GDP, but also GDP at purchasing power parity is taken into account, increases the representation of less developed countries, that because of relatively low price levels has GDP at PPP higher than nominal. Except GDP, what is also included in the formula used to calculate quotas, openness of the economy, variability and international reserves[15].

[15] Silver Mick; "IMF Applications of Purchasing Power Parity Estimates", IMF Working Paper, November 2010

Chapter 2: How prices differ in reality

In the real world prices differ between the countries significantly. Everybody who travels abroad from time to time know that from his or her own experience. Usually, what might not be very surprising, we can expect higher prices in the countries or cities where wage level is high, and less expensive products and services in regions that are not doing very well from the economic point of view. Although it is not always the truth, we can say that in fact in rich countries prices are higher than in poor countries is kind of a general rule. It seems to be obvious for all of us, that travelling to some countries or regions might be much more costly than travelling to others, which are known for affordable price level. The question arises as to, how is that possible, if we remember of the law of one price and the theory of purchasing power parity. According to those concepts, prices cannot differ. If they do, one can simply make profits buying goods in the market where they are cheaper, and sell where their price is higher.

In this case, it is worth reminding, that the main goal of the theory of purchasing power parity, the law of one price, and many other economic theories is to help understanding the rules and forces the economies are driven by, not to describe the reality. In today's world, most of the economists would agree with the statement, that the PPP theory does not always hold. The fact that for the same amount of money in different regions we can buy more or less of the same good, at first sight might seem incomprehensible, but we are rather familiar with it. There are many reason for that. The goal of this chapter however is not to explain why in reality the theory of purchasing power parity does not always hold (the third chapter will be dedicated to this issue), but to present the actual disparities in prices across the world.

2.1 The Big Mac Index

2.1.1 Characteristics and application

The Big Mac Index was introduced by "The Economist" in 1986 as an indicator that shows whether the currencies are undervalued or overvalued. It is an informal tool used to measure the purchasing power parity between the currencies and is based on the PPP theory[16]. The index is published for five currencies: US dollar, Euro, Chinese renminbi, Japanese yen and British pound. The Big Mac index simply compares the prices of Big Mac sandwich from McDonald's, one of the most basic, universal and common products in different countries. For example, if Big Mac costs $5 in the United States and $4 in South Korea, the raw index indicates the undervaluation of the South Korean won, what is visible at first sight. Usually, the reference currency is the US dollar, and the prices of Big Mac in different countries are presented in comparison with the price of Big Mac in the USA. The index includes a raw version and adjusted for GDP per capita - adjusted index. However all the data in this study come from the raw index, as it is much more widely used.

The value of a currency relative to Big Mac purchasing power parity can be calculated with a simple formula.

Let:

- Pct = the domestic price of Big Mac in a local currency
- c = a variable standing for country
- t = a variable standing for year
- P*t = the price of Big Mac in the United States in US dollars
- Sct the spot exchange rate between US dollar and a local currency we use as an example, defined as the amount of units of the local currency that has to be paid for 1 US dollar.

[16] "Interactive currency-comparison tool: The Big Mac index", The Economist, 7th January 2016. Available at: http://www.economist.com/content/big-mac-index

In this case to calculate the purchasing power parity of a local currency based on price of Big Mac, the following equation can be used:

$$Rct = \frac{Pct/P*t}{Sct}$$

The result shows if the local currency is overvalued or undervalued. Simply, if the score is more than 1, the currency is overvalued, and if it is less than 1, the currency is undervalued[17]. To see it clearly we can use an example with real numbers. Assuming that the price of Big Mac in Switzerland is 6 Swiss francs and in the USA it is 4 US dollars, while the exchange rate is 1.5 Swiss franc for 1 US dollar, we can easily calculate that in this particular example Swiss franc is neither overvalued nor undervalued, as the result of the given equation is 1.

$$Rct = \frac{6/4}{1.5} = 1$$

Using another example, let us assume that the price of Big Mac in Switzerland and United States remains the same and is respectively CHF 6 and 4 US dollars, but the exchange rate now is 1 Swiss franc for 1 US dollar. In this case the result is greater than 1, what means that Swiss franc is overvalued.

$$Rct = \frac{6/4}{1} = 1.5$$

But why was a hamburger from the most popular fast food chain chosen to be used in the comparison? According to the inventors of the index, it was an appropriate choice, as it is not only widespread, but also produced locally, in a country where it is sold, with the ingredients very often coming from the local markets. It means that the sandwich is not traded among the countries, trade does not therefore affect its price. The Big Mac can even be perceived as kind of a specific basket of products (pakko), referring to a consumer price index, which is based on a market basket. The sandwich sold in McDonald's consists

[17] Li Liang Ong; "Burgernomics: The Economics of the Big Mac Standard", Department of Accounting & Finance, University of Western Australia, Discussion Paper 95-16, November 1995

indeed of quite a number of products, like lettuce, onions, pickles, cheese, special sauce, beef patties and bun. Prices of all of them, together with other factors, like labor costs and rental price, determine the final price of a Big Mac in a given country. It is worth to notice, that even if only one factor is significantly more expensive or cheaper in a domestic market than abroad, like for instance labor force, than the price of the final product will reflect it.

Another reason the Big Mac was chosen to form an index that uses its prices as the benchmark, is that it is made using the same receipt and ingredients all over the world, with size and nutritional value being only slightly different. The sandwich is almost the same in all the countries where it is sold, only with few exceptions. For instance in India, in response to local eating habits, beef patties were replaced with the chicken ones. The name of the sandwich in turn is not Big Mac, but "Maharaja Mac". In Islamic countries Big Mac is sold with halal beef and in Israel with kosher beef.

It is obviously possible to find products with similar characteristics, but the Big Mac, thanks to its world-wide recognizability, seems to be in many cases better than the alternatives. Its advantage is primarily simplicity, making it understandable for an average person, even though using it to make comparisons of purchasing power parity between the currencies also has its drawbacks and is often criticized.

2.1.2 Criticism and limitations

While the drawbacks of the Big Mac Index as a reliable measurement of purchasing power parity across the globe are often mentioned, it is important to remember, that even the authors of the index and publishers of „The Economist" magazine take note that it should not be treated very seriously[18]. Nevertheless, even with all its limitations, it has gained popularity among economists, being cited in a number of textbooks and publications in economics.

[18] "Interactive currency-comparison tool: The Big Mac index", The Economist, 7th January 2016. Available at: http://www.economist.com/content/big-mac-index

Pointing out the limitations of the index, we should be aware of the fact that the purchasing power parity theory applies basically to tradable goods. It is widely believed, that if we take into account the non-traded goods, the theory does no longer hold. Bearing this in mind, the question arises whether Big Mac is the proper benchmark, as it is a product which final price depends to a great extent on cost of non-traded factors like rental price, which in some countries like Japan or Singapore may be much higher than elsewhere. Economists suggest therefore, that the price of a sandwich cannot be equal all around the world, because it must take into account production costs and disposable incomes of people from different countries and regions.

So is Big Mac an example of tradable or non-tradable good? Probably it is hard to clearly answer this question. Nonetheless some researchers have tried. Li Lian Ong, the author of publications about the Big Mac Index, estimates that non-tradables, mostly services, account for about 93 per cent of the price of Big Mac. One can agree or not with the result of her calculation, but there is no doubt tradables are only minor components of the price of the hamburger[19].

The price of Big Mac can be distorted be different labor costs and different prices for renting properties in which McDonald's can be opened, but also other factors, like taxes, which in some countries can be extremely high and in some very low or even not being imposed at all. Tax burden is very high for instance in Denmark or Norway, and very low for example in Saudi Arabia. Another issue is the position of McDonald's in different countries, which is indeed not exactly the same everywhere, both in terms of competitive advantage and local demand. As regards competitors of McDonald's, in some countries they can have very weak position, and in some, like the United States, the competition might be very strong, with many fast-food chains offering similar products. Obviously in countries where McDonald's has a monopolistic position, it can use a totally different pricing strategy than in those where it has to compete with other fast-food restaurants. In terms of local demand, it can be determined by many drivers. Eating habits seriously diverge between the regions. It seems enough to mention that in some countries burgers

[19] Li Liang Ong (2003); "The Big Mac Index; Applications of Purchasing Power Parity"

from McDonald's are perceived in general as junk food, and in others as rarity. All of that can reinforce the departure from purchasing power parity for currencies of those countries in the Big Mac index.

The weakness of the index is also in its vulnerability to potential political pressure and manipulation. The price of Big Mac can be, at least to a certain extent, influenced by the governments not always in a transparent way. This can be the case especially in the countries suffering from economic perturbations, that want to hide their problems for instance for political reasons. As the Big Mac index has gained a strong position as an indicator showing economic performance of a country, manipulating it may seem to be an easy way to convince the investors that the economic condition of a country is better than it is actually. It maybe sounds unbelievable , but it is believed that it has actually happened. In 2012 the government of Argentina was accused of forcing McDonald's to sell Big Macs at lower prices.

2.1.3 Big Mac in currency crises

The prices of Big Mac from around the world to be comparable, have to be expressed in US dollars. The exchange rate determination is a very complex topic. The value of a currency depends on many factors and sometimes can change rapidly. The case of a very quick, significant depreciation can be called currency crisis. It can be caused by many reasons, but the point is the prices in the country that suffers from the currency crisis, if converted to other currencies, are much lower than they used to be before. So for example, if the currency of our home country suddenly falls by 20 per cent against the US dollar, the same will be the drop in price of Big Mac denominated in USD.

According to the purchasing power parity, the exchange rate between two currencies is determined by the price levels in the two countries. The prices of the same commodities, if converted to a common currency, should be equal. Otherwise, the exchange rate is not in equilibrium. As was discussed before, the exchange rate determination in reality is much more complex, but definitely the price level has a great impact on it. The Big Mac index

shows if the exchange rate is in equilibrium or not. If it is not, than one currency can be overvalued or undervalued. Many economists believe that an overvalued currency indicates the risk of a currency crisis. The Big Mac index can be therefore helpful to predict the potential currency crisis[20].

The table below can help us to examine whether the Big Mac index is useful to make predictions about the future currency crises. Could the index help to predict recent currency crises, like the Mexican crisis in 1994, the Asian crisis in 1997, the Russian crisis in 1998, the Brazilian crisis in 1999, and the Argentine crisis in 2002? The table shows the exchange rate, Big Mac prices, and the purchasing power parity measure for each currency relative to the US dollar prior to the crisis and in the first survey after the crisis.

Figure 2: Currency Crises and the Big Mac

	Survey prior to crisis				Survey after crisis			
Country	Exchange rate	U.S. price Big Mac	Local price Big Mac	PPP	Exchange rate	U.S. price Big Mac	Local price Big Mac	PPP
Mexico	3.36	2.30	8.1	105	6.37	2.32	10.9	74
Thailand	26.1	2.42	46.7	74	40	2.56	52	51
Malaysia	2.5	2.42	3.87	64	3.72	2.56	4.3	45
Singapore	1.44	2.42	3	86	1.62	2.56	3	72
South Korea	894	2.42	2300	106	1474	2.56	2600	69
Taiwan	27.6	2.42	68	102	33	2.56	68	80
Russia	5.999	2.56	12	78	24.7	2.43	33.5	56
Brazil	1.14	2.56	3.1	106	1.73	2.43	2.95	70
Argentina	1.0	2.54	2.5	98	3.13	2.49	2.5	32

Source: The Economist

The table shows that only in four countries: Mexico, South Korea, Taiwan and Brazil, the local currency was overvalued before the crisis. In any case it was not much above parity. Most overvalued was the South Korean won, but only by 6 per cent. In other countries currencies were undervalued, in case of Malaysia even by 36 per cent. Argentine peso together with Taiwanese dollar came the closest to the parity, with the PPP 98 and 102 respectively. The Big Mac index therefore did not indicate the risk of currency crisis

[20] Pakko Michael R., Pollard Patricia S.; "Burgernomics: A Big Mac Guide to Purchasing Power Parity", Federal Reserve Bank of St. Louis, November/December 2003

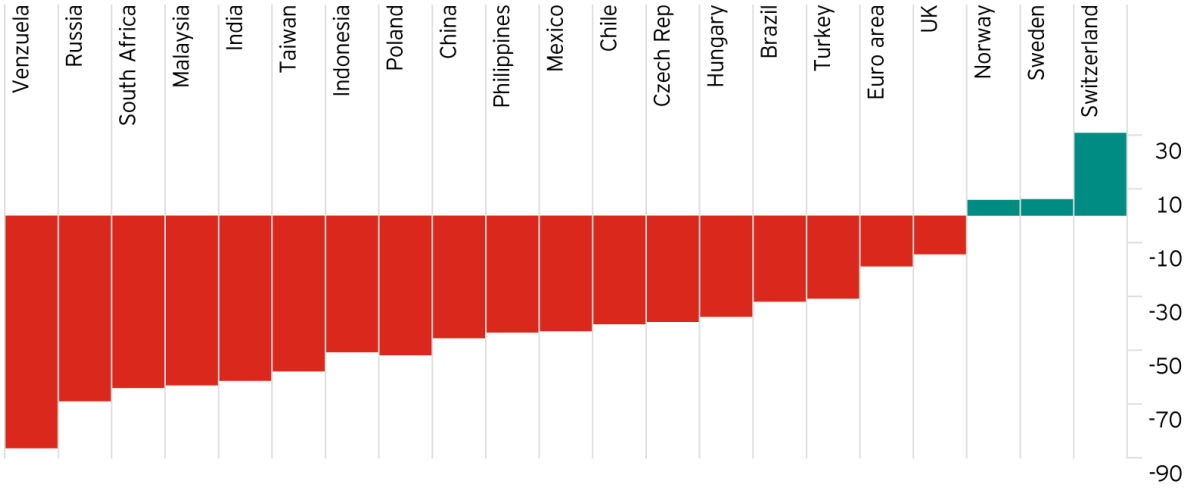
eruption in any of these cases. As none of the currencies were strongly overvalued before the crises, it seemed there was no reason for a quick depreciation of any of them.

After the crises we can observe certain adjustment of prices to new exchange rates. The prices of Big Mac in local currencies were in most of the countries higher than prior to crises. They remained the same only in Singapore, Taiwan and Argentina. However, in countries where the prices of Big Mac went up, the increase was not large enough to maintain the same PPP as was before the crises. In the first survey after the crisis each currency was undervalued against the US dollar, even those that were overvalued before.

2.1.4 2016 Big Mac Index

The figure below shows the measure of currencies undervaluation and overvaluation in chosen economies (for the complete list see appendix 1). The first noticeable thing is that only three countries have overvalued currencies: Norway, Sweden and Switzerland. Among these three, only Swiss franc is significantly overvalued, by approximately 30 per cent. The vast majority of the currencies is strongly undervalued.

Figure 3: The Big Mac Index 2016



Source: The Economist

From the 2016 edition of the Big Mac Index we can conclude, that the US dollar has a very strong position. Definitely, the global economic and political situation has an impact on it. To see if this situation, when most of the currencies are undervalued against the US dollar, is unique and caused for example by some specific reasons, or is rather common, with the strong position of the American currency over the years, we can compare the data from 2016 with the data from the previous years.

2.1.5 Big Mac index in the previous years

Comparing the data from 2016 with the data from 2015, 2014 and 2013 (see appendix 2, 3 and 4), we can conclude, that in general, the US dollar is expensive in terms of other currencies. However, the year 2016 was exceptionally good for the American currency. The situation in which only three currencies are overvalued against the US dollar is rather unique. In 2013 for example, 13 currencies in the index were overvalued with respect to US dollar, and in 2014 it was 11.

The exchange rates are changing constantly. The position of one currency in the index might change dramatically. The best example of this is Venezuela, which in 2016 survey had the most undervalued currency from the listed countries, but it 2013 Venezuelan bolivar was on the other side of the list, as the most overvalued currency. However the case of Venezuela is very specific, as it is not a classic free market economy, this example shows how unstable the exchange rates can be in today's world. Anyhow, some overall observations can be made. It seems that, generally speaking, some currencies are constantly undervalued. Some, on the other hand, have very strong position over the years, what means they are overvalued or only slightly undervalued against the US dollar. Countries with strongly undervalued currencies are mostly in Eastern Europe and Asia. Those that have expensive currencies, mostly in Western Europe, especially in Scandinavia.

2.2 UBS – Prices and Earnings

Prices and Earnings is an extensive study published every three years by UBS. It compares purchasing power in various major cities around the globe and contains analyses of changes in inflation and exchange rates. The first edition was published in 1971. The latest one, from 2015, covers 71 cities.

2.2.1 2015 edition

Prices and earnings 2015 – „Do I earn enough for the life I want?" presents purchasing power around the world, which in the study is divided into eight regions: Africa, Asia, Eastern Europe, Middle East, North America, Oceania, South America and Western Europe. Among the 71 cities which the study covers, 23 are in Western Europe, 12 in Asia and Eastern Europe each, 7 in North America, 6 in South America as well as in the Middle East, 3 in Africa, while the fewest, only 2, in Oceania.

In the preface of 2015 edition, the authors describe briefly recent economic events. They mention the decision of the Swiss National Bank from January 2015 to discontinue the minimum exchange rate of 1.20 Swiss franc per euro as a reason to significant appreciation of Swiss currency, which made the cities of Zurich and Geneva more expensive comparing to the previous study. The depreciation of Japanese yen and the Euro against the US dollar, on the other hand, made life in Tokyo and cities within the euro zone less expensive than before.

Methodology

The survey was conducted between the end of March and the end of April 2015, and contains the data on prices of 122 goods and services, as well as wages for 15 professions in 71 cities around the world. Initially, the survey was supposed to contain 72 cities, but Caracas had to be removed, due to the complicated economic and political situation, with

rapid inflation in Venezuela. All prices and earnings were converted to a common currency, the US dollar, with the average exchange rates from the period when the data was being collected.

However, the habits and preferences of people around the world are different, to compare somehow their purchasing power a standardized basket of products and services is needed. The basket used in the survey is based on the monthly consumption habits of a three person family from Europe and contains 122 goods and services. The authors of the report assumed that this family consumes for instance approximately 15 kilos of vegetables per month, and buys a personal computer every two and a half years. In case the products were not available somewhere, similar local substitutes were used. In regard to wages, they are calculated dividing gross annual salaries by annual number of working hours. The results were also used to compute domestic purchasing power. They were divided by the price of the basket of goods in respective cities.

The study was divided into three main sections. The first one, overview, describes the overall disparities between the cities in price levels, wages and purchasing power, with New York City as a benchmark, (New York City was used as a benchmark also in other parts of the study). It also shows the working time required to buy a specific product or service in a particular city. The second part, price comparison, presents in detail prices of products and services grouped into different categories, like food, housing, public transport or restaurants and hotels. The last part provides detailed wage comparison, with hourly pay, taxes, vacation days, etc.

Overview

The price level ranking (see appendix 5) shows the most expensive cities in 2015 ranking are Zurich, Geneva, New York City and Oslo, respectively. The city with the lowest prices is Kiev. Istanbul, Doha and Lyon are in the middle of the ranking. If the rents are included, than the city with the highest overall price level is New York City, and the cheapest one, Sofia. The only city with higher renting prices than New York City is Hong Kong.

As regards wage levels (see appendix 6), employees get the highest salaries in Zurich, Geneva and Luxembourg. Kiev is again at the bottom of the list, together with Jakarta and Nairobi. Salaries in these cities are approximately 19 times lower than in those from the top of the list. Hong Kong, Tel Aviv, Seoul and Barcelona are in the middle of the ranking, with wages roughly two times lower than in New York City, but seven times higher than in Kiev, Jakarta or Nairobi.

If net wages are taken into account, many cities go down in the ranking in comparison with New York City. Tax deduction is especially high in European cities like Copenhagen, Brussels or Milan. Copenhagen for instance, if gross wages are compared, is very close to New York City in the ranking, but in case of net wages, they are almost two times lower in Copenhagen than in New York City. Doha, Manama and Dubai are the cities with low deduction.

Domestic purchasing power is less diversified than price levels or wages. Many cities in the ranking have similar position to New York City, with the score close to 100 (New York City level). Comparing purchasing power of net hourly wage, Luxembourg is in the first position. People there have 10 times higher purchasing power than people living in Jakarta, which is the last in the ranking. However, if compare purchasing power of net annual income, Zurich is again in the first position.

The table below summarizes the overview, showing the cities which are the highest and the lowest in the three rankings: wage level, price level and domestic purchasing power.

Figure 4: Prices and Earnings 2015 edition, summary

Price level	Wage level	Domestic purchasing power
Highest **Zurich** 131.3	Highest **Zurich** 108.7	Highest **Zurich** 135.1
Lowest **Kiev** 6.1	Lowest **Kiev** 38.1	Lowest **Jakarta** 14.6

Source: UBS

The next part of the overview presents working time required to buy certain products in each city. These products are: Big Mac, 1 kilo of bread, 1 kilo of rice and an iPhone 6. Working time required to buy first three is expressed in minutes, and the last one, iPhone 6 in hours. This ranking shows very visibly how huge are the economic disparities in the world. The time people have to work to buy the same products in the richest and the poorest cities varies greatly. For instance an average worker in Zurich needs only 11 minutes to earn enough money for a Big Mac, while employees in Nairobi, to buy exactly the same sandwich need to work almost 3 hours, which is nearly 16 times longer. The difference is even greater, when we compare working time required to purchase iPhone 6 in these two cities. Employees in Nairobi need to work 23 times more to buy it.

Figure 5: Working time required to buy:

Product/City	**Zurich**	**London**	**Warsaw**	**Mumbai**	**Nairobi**
1 iPhone 6	20.6 hrs	41.2 hrs	141.6 hrs	349.5 hrs	468 hrs
1 Big Mac	11 min	12 min	25 min	40 min	173 min
1 kg of bread	5 min	6 min	20 min	27 min	44 min
1 kg of rice	5 min	16 min	24 min	49 min	62 min

Source: UBS

Price comparison

Assuming that total expenditure on goods and services shows the average cost of living, its noticeable that the prices between the surveyed cities differ significantly. The cost of living in the most expensive city, Zurich, is 185 per cent higher than in Kiev, which is the least expensive. Obviously, it does not mean that each product or service in Zurich is almost 20 times more expensive than in Kiev. Prices of some commodities might be similar world-wide, or at least diverge less than the others. Bearing in mind that the law of one price says the same product will eventually have the same price wherever it is sold, but only if there is no trade barrier, it does not seem to be very surprising that the study shows the non-tradable goods and services in general are more diversified than prices of tradable items, that can be easily traded. For example the price of a haircut is 20 times higher in Oslo than in Jakarta, where it is the most expensive and respectively the cheapest. In case of tradable goods, the price difference is not as high. For instance 1 kilo of rice costs 'only' 7 times more in New York City, where it is the most expensive, than in Sao Paulo, where it has the lowest price.

It is not always easy to compare prices of food in different cities or countries, as the items are not exactly the same all over the world. In some cases therefore close substitute were used. For the purpose of the study a basket of 39 food products was created. Its average world-wide price is around 400 US dollars, in New York City it costs 632 USD. The basket is the most expensive in Zurich with the price of 738 USD, what is 16.8 per cent more than the price in New York City, and the least expensive in Kiev, where it costs 166 USD. The single products however, can vary in prices even more. While the basket of 39 food products is four and a half times more expensive in Zurich than in Kiev, the difference between the price of meat in these two cities is much higher. To buy the same amount of meat consumers in Zurich have to pay on average 10 times more than consumers in Kiev.

The price of clothes also vary significantly. Those compared in the survey are mostly official, suitable for a business meeting, as they are similar world-wide. In this ranking, the most expensive city is Geneva, with prices more than 28 per cent higher than in New York City. In turn, clothes are sold with the lowest prices in Rio de Janeiro or Manila. What

distinguishes this ranking from the previous one is that in many cities clothes are more expensive than in Zurich, and at the same time in many cities they are less expensive than in Kiev.

To compare the prices of household appliances, the authors of the study created a basket of goods that includes: refrigerator, vacuum cleaner, frying pan and a hairdryer. The basket was the most expensive in Tokyo and Zurich, with the prices 1,580 and 1,540 USD, respectively. The same products in Kuala Lumpur had the price of 410 USD, which is almost four times less. The global average price for the basket was 785 US dollars, and in New York City it cost 890 dollars.

The comparison of prices of home electronics differs from the previous rankings. The first thing noticeable, is that the prices of the basket which includes products like an unlocked iPhone 6, a personal computer, a television or a digital camera, are very similar in all the 71 cities. The average price of the basket is 3,530 US dollars, and prices in each city are relatively close to this number. In the most expensive city it costs only 40 percent more than in the cheapest one. This can be explained by the fact, that these kinds of products are easy to transport. For instance for many consumers it is probably not a huge problem to go abroad and buy an iPhone 6 or a digital camera if it is less expensive than in their domestic market. TV sets, that are also in the basket, but due to their larger size are not that easy to transport, vary in prices more.

In regards to housing, prices for rent vary greatly. It is hard to imagine less tradable goods than properties. It seems understandable that in general in cities with higher wages, as well as in really big agglomerations renting prices are higher. In Hong Kong and New York City renting a flat is the most expensive, while it is relatively cheap in cities like Bucharest or Sofia.

On average a single ticket for public transport costs 1.60 USD world-wide. In Copenhagen for instance, the price is three times higher, while in Buenos Aires around three times lower. In this ranking in general, the cities with high wage level, have also relatively

expensive public transport. Zurich, Geneva and Oslo are the most expensive, and Kiev is the cheapest.

Dining out is the most expensive in Tokyo. The price of dinner for two is the same as for six diners in Mumbai. Restaurants are also very costly in Oslo, Zurich and Geneva. As regards hotels, they are often more expensive in big cities, which are popular tourist destinations. In New York City, a double room in a five-star hotel costs 590 US dollars per night, while the world-wide average price of the same standard room is 300 USD. One of the cities with the prices of five-star hotels much higher than the average is Kiev, with 380 US dollars per night. It might be astonishing, as if we compare it with prices of other products and services, which in Kiev are one of the cheapest.

To compare the overall prices of services, for the purpose of this study a basket of 27 services was created. It contains, among others, a haircut, internet fees, one hour of household help or a ticket to a sport event. The basket was the most expensive in Zurich (996 USD), the cheapest in Mumbai (194 USD) and its average global price was 490 US dollars. Services were also much above the average price in Geneva and Oslo, and much below in Kiev and New Delhi. Haircuts might be a good example of a service which prices varies greatly around the world. The different prices are also between women's haircuts and men's haircuts. On average, women have to pay 40 per cent more, however in some cities the disparity is much smaller.

Figure 6: Haircut prices

Woman's haircut	Man's haircut
Highest **Oslo** USD 95.04	Highest **Oslo** USD 77.72
Lowest **Jakarta** USD 4.63	Lowest **Jakarta** USD 4.50

Source: UBS

In the last part of the prices comparison the authors calculated how much does the two days city break for two cost in each city, assuming that an average visitor, among other things, stays overnight in a first-class hotel, has two diners with a bottle of wine in a restaurant, buys two tickets for public transport, rents a car and sends a postcard. Travelling to and from the city was not included. Zurich, New York City and Geneva were the most expensive destinations, each with the price of above 1000 US dollars, while to visit an average city from the list, 615 US dollars was enough. Bucharest (260 USD), Sofia (300 USD) and Mumbai (300 USD) were the least expensive destinations.

Wage comparison

The wage comparison covers fifteen professions in different sectors. Wage level is very diversified between the countries and cities. Zurich and Geneva are the cities with the highest gross wages. Employees in Kiev on the other hand, receive the lowest salaries among the 71 cities UBS compares, which are more than 20 times less than in the largest Swiss cities. All deductions, including taxes and social security contributions, differ significantly. In Copenhagen for instance, taxes are very high. However, in cities like Dubai or Doha, workers do not have to worry that the state will collect a great part of their

wages. Comparing net wages, employees in Zurich and Geneva still have the highest incomes.

In most of the countries, social security payments and taxes are imposed. The money is needed to finance the national budgets. Some countries, like the United Arab Emirates, Bahrain and Qatar finance their budgets by selling the raw materials, mostly oil, and therefore do not need to have their income tax systems. In Argentina, Colombia and Peru taxes are imposed only on foreign citizens and high earners. Hence, in Bogota, Buenos Aires, Doha, Dubai, Lima and Manama, there are no recorded income taxes. Copenhagen in turn was the city with the highest income taxes, at around 45 per cent, while average world-wide tax was around 13 per cent.

2.2.2 2012 edition

2012 edition of Prices and Earnings "A comparison of purchasing power around the globe" will help to present how prices had changed over time. A brief summary of the previous edition seems to be sufficient, as the main point is to figure out what were the main differences between the rankings of price comparison, wage comparison and domestic purchasing power in 2012 and 2015.

Methodology used in the 2012 edition was almost the same as used in 2015 edition. The study compares prices, wages and domestic purchasing power in 72 cities (all the cities from 2015 edition, plus Caracas, Venezuela). Baskets of goods and services in comparison with 2015 edition were virtually identical. Some products that were used in 2015 however, in 2012 were not yet available on the market. That was for instance the case of the iPhone 6. As it was introduced in 2014, two years after the study was conducted, in 2012 edition the previous model (iPhone 4S) was used.

Comparing the results from 2012 with those from 2015, what is visible at first sight, is that Kiev is not the city with the lowest prices in the ranking (to see the comparison of prices and wages from UBS Prices and earnings 2012 edition, see appendices 7 and 8). The

Ukrainian capital is not even at the bottom of the list; 14 cities were cheaper than Kiev. Zurich is also not the most expensive city, but it took the second position. Both differences can be explained by the fluctuating exchange rate. Depreciation of Ukraine's hryvnia due to the conflict in eastern Ukraine made Kiev drop in the ranking. Appreciation of Swiss franc on the other hand, due to the decision of the Swiss National Bank to no longer hold a fixed exchange rate with the euro, made Zurich and Geneva even more expensive for foreign visitors.

Figure 7: Prices and Earnings 2012 edition, summary

Price level	Wage level	Domestic purchasing power
Highest **Oslo** 116.0	Highest **Zurich** 131.1	Highest **Zurich** 110.6
Lowest **Delhi** 33.1	Lowest **Delhi** 7.6	Lowest **Jakarta** 16.7

Source: UBS

2.3 Gross domestic product statistics

Economic performance of different countries is often being compared, for many reason. There are a lot of indicators showing condition of an economy, like unemployment rate, inflation rate, public debt, reserves of gold and foreign currencies, percentage of population below poverty line and others. However, the most common and widely used is gross domestic product (GDP) or GDP per capita. Very often the adjustment for purchasing power parity is being applied. As the exchange rates are constantly fluctuating, it helps to avoid a situation in which a country's GDP changes only because its currency appreciated or depreciated, what was explained more in detail in the first chapter.

The table below shows GDP per capita of 10 world's largest economies in 2015 in nominal numbers and adjusted by purchasing power parity. Comparing the data, we can come to the conclusion, that, however some exceptions exist, generally the countries with lower GDP per capita, have their GDP in PPP much higher than real GDP, while GDP in PPP of highly developed countries is similar to their nominal GDP.

Figure 8: GDP per capita (nominal and at PPP) in 10 world's biggest economies

	GDP per capita (nominal) in USD	**GDP per capita (PPP) in USD**
United States	55805	55805
China	7990	14107
Japan	32486	38054
Germany	40997	46893
United Kingdom	43771	41159
France	37675	41181
India	1617	6162
Italy	29867	35708
Brazil	8670	15615

Source: International Monetary Fund

2.4 Findings

Comparing prices and wages all over the world, it is noticeable, that in general in countries in which wage level is high, price level is also high. This might not be very surprising, as prices of products and services are to a certain extent determined by local purchasing power and what local customers are able to pay for them. People who have more money to spend, usually value their time more than those with lower salaries, and are eager to spend more money on goods and services that would help them to save some time.

It does not however mean, that in so called rich countries every single product is more expensive than in countries with lower GDP per capita. Some exceptions obviously occur. For instance, what 'Prices and Earnings' study shows, prices of electronic equipment, especially portable products, are almost equal all around the world, as are easily tradable. What is interesting, prices of home electronic appliances, like refrigerators or ovens, vary significantly, as it is much more difficult to transport it because of its bigger seize.

In general easily tradable goods have similar prices around the globe, while goods which are hard to transport for individuals, like for instance food (according to its limited expiration date) or furniture (according to its relatively big size) differ in prices more significantly. What can be an exception to the, is the price of clothes. Prices of clothes are not the same in all the countries, even if we compare exactly the same products. It might be surprising, as clothes are easy tradable: it does not seem to be a problem to go abroad to buy for example a coat, which in our domestic market is much more expensive. Probably many people use the opportunity to buy cheaper clothes while traveling abroad, but for most of us clothes are not expensive enough to search for better offers in a foreign market. It is different when it comes to more expensive products, like mobile phones or computers. If an iPhone is much cheaper abroad, most of the people would rather buy it abroad.

The difference in prices of non-tradable goods might be enormous between rich and poor countries, but the biggest difference is in prices of services. The same service, like for instance a haircut, can be even 20 times more expensive in highly developed countries like Switzerland or Norway, than in countries with very low income per capita, like Ukraine or

Indonesia. This rule seems to be understandable, as for people who live in a developed country it simply requires too much to go abroad every time they want to go to a hairdresser or do their laundry. With their high salaries, they can also easily afford to pay higher prices in their local markets.

In less developed countries on the other hand, if services cost the same as in Norway or Switzerland, almost nobody would be able to purchase them. With lower overall wage level, companies in less developed countries pay less their employees, usually pay lower rental prices, hence they can offer much lower prices for their services. Supply has to meet demand.

Lower overall price level in less developed countries can be also seen while comparing statistics with gross domestic product at purchasing power parity. In general, countries with lower incomes have GDP at PPP higher than nominal, while in case of highly developed countries these two numbers are more or less similar. As GDP at PPP is adjusted to price levels, it is rather understandable that countries with lower income, that have lower prices, present better economic performance if domestic price levels are taken into account. With lower domestic prices, people can afford more than they would if all the products and services cost the same as in the United Stated, which is a benchmark.

Comparing prices all around the world, it is also important to add, that they depend to a great extent on exchange rates, which very often fluctuate significantly, and do not simply reflect their purchasing power, but often are a result of political issues. Appreciation of Swiss franc against other main currencies in January 2015, after the Swiss National Bank decided not to hold the fixed exchange rate between the Swiss franc and the euro anymore, made Switzerland more expensive than it was before. On the other hand, depreciation of Ukrainian hryvnia due to the conflict in the Eastern part of the country, resulted in strong decrease in price level in Ukraine.

Chapter 3: Problems with the purchasing power parity

As shown in the second chapter, prices, even of the same products, very often differ significantly around the world. Purchasing power parity theory tells us, that if there are no trade barriers, price levels in two different countries if converted to one currency, should be equal. In this chapter it will be described, among other things, what trade barriers exist in reality. It will be also explained theoretically, why, even if there are no barriers to trade, prices still differ in some cases. In general, this chapter is dedicated to theoretical explanation why the purchasing power parity theory does not always hold.

3.1 Exchange rates determination

Changes in the value of currencies have strong impact on societies and people's well being. For an individual, if his or her domestic currency depreciates, at first it simply means that its purchasing power abroad is lower than before. For instance, a student from Ukraine who studies in the United Kingdom and receives scholarship in Ukrainian hryvnia, after the currency from his home country depreciates against the British pound, would not be able to afford the same amount of products and services as before depreciation of Ukrainian hryvnia. However, from the perspective of many Ukrainian companies that sell their products abroad, depreciation of hryvnia would result in their increased competitiveness. Due to the fact that Ukrainian products are now cheaper, demand for them is on the rise, so balance of trade in Ukraine would increase. On the other hand, if hryvnia appreciates, for the Ukrainian student it is cheaper in the UK, but import from Ukraine is more expensive abroad, hence balance of trade of Ukraine in this case would be lower.

Obviously, further aftermath of currency appreciation and depreciation might be more complicated and not that obvious at first sight. Let us assume that currency of our home country depreciates against all main currencies. For us it is now more expensive to go on holidays abroad. Except this, depreciation of our home currency increases demand for products from our country abroad, as they are cheaper. Thanks to this the economy is

growing and local companies are expanding internationally, hire more workers and in the long run start paying them higher wages. However, as many products being sold in our domestic market are imported, their prices increase, as now it is more expensive to buy foreign products, causing inflation to increase. That scenario seem to be likely to happen, but in most of the cases, aftermath of changes in rates of exchange between currencies are very difficult to predict, especially in the long run.

It is very hard to answer the question how changes in currencies value can influence our daily life. There is no doubt however, that they concern all of us. Exchange rates might be influenced by many forces. Sometimes it is really hard to understand why they have changed, even for those who know the economic rules that stand behind exchange rates determination. Economics provide us tools and theories that explain the fluctuations in exchange rates, however in reality value of currencies is such a complex issue, that taking into account single aspect is not sufficient. We should use all information available and consider as many variables as we can, but we will still be unable to predict the exact future exchange rates.

Purchasing power parity is a theory used in economics to determine exchange rates. Therefore, at first we should mention that the exchange rates depend on differentials in inflation between countries, or simply on differentials in price levels. However, PPP is not the only theory being used for the purpose of exchange rates determination. In the real world, a nominal value of a currency does not only depend on what we can buy for a certain amount of this currency, but also on many other factors. Among these factors are trust of investors to the government of the country that issued the currency, or interest rates they can expect on investments in bonds denominated in that currency. Generally, demand for a particular currency determines its price.

Interest rate parity

Interest rate parity is, together with purchasing power parity, one of the most popular theories used in international finance to determine exchange rates and explain why they fluctuate. It is important to notice, that in the real world most of the international currency trade is made for investment purpose[21]. Investors sell or buy currencies to invest them, and they have to decide which currency gives them both high profit and safety. Rate of return on assets denominated in a particular currency usually determines demand for this currency, but of course in reality investors also want to be sure, the probability they will receive their money back is as high as possible, and that this money will not depreciate. It explains why many developed economies maintain lower interest rates than central banks in emerging markets; currencies of developed countries are usually more safe and stable.

The main assumption of the interest rate parity theory states that investors' actions are motivated by differences in rate of return on assets between countries determine changes in spot exchange rates[22]. While the purchasing power parity theory is based on behavior of exporters and importers, the interest rate parity theory is based on behavior of investors in financial markets. For instance, if investors from Europe can get higher profit on bonds in US dollar than in euro, they would buy dollar, selling Euros at the same time. Increased demand for USD would make it appreciate and decreased demand for euro would make it depreciate.

Let us assume that rate of return is the same on deposits in US dollar and euro, assuming at the same time that they are equally safe. In this case, investors do not have any incentive to buy or sell any of the two currency, as they can expect the same profits keeping their investments in a currency they already have. We can write it in a following way:

RoR$=RoR€

[21] Suranovic Steven (2010); International Finance: Theory and Policy

[22] Chinn Menzie D.; "Interest Rate Parity", Public Affairs 854, University of Wisconsin-Madison, Spring 2007

Where:

- RoR$ is the rate of return on assets in US dollar
- RoR€ is the rate of return on assets in euro

If the rate of return on deposits in US dollar changes, and now was higher, than investors would prefer to keep their deposits rather in US dollar than in euro. It would cause depreciation of euro and appreciation of USD. However, what also matters for investors, is the future, expected exchange rate. Let us imagine that an investor from Europe wants to buy bonds on which he will get highest possible rate of return, choosing between bonds in Euros and US dollars. Even if they can have higher rate of return on assets in US dollar, if the dollar is expected to depreciate significantly, they would not be as eager to invest in assets in American currency. As after he wants to exchange US dollars for Euros, with cheaper dollar he would be exchanged for a lower amount of Euros. In this case maybe it would be better for him to keep his assets in Euros, even with lower rate of return. Obviously, one cannot simply predict future exchange rates, but taking into account our expectations and assuming that still the rate of return on investments in both currencies is equal, the following formula can be used:

$$i\$ = i€ + (1 + i€)\ \frac{Ee\$/€ - E\$/€}{E\$/€}$$

Where:

- i$ is the interest rate on deposits in US dollar
- i€ is the interest rate on deposits in euro
- E$/€ is the spot exchange rate
- Ee$/€ is expected exchange rate

We can also assume that the rate of return on assets in dollar is the interest rate on deposit in dollar, and so on with euro and other currencies.

RoR$=i$

Risk level

Therefore, the interest rate parity theory explains what would happened with the exchange rate if a central bank in one country decided to increase or decrease interest rates. This approach is different than in the theory purchasing power parity, but one does not exclude another. Determination of exchange rates is a very complex issue. There is no doubt that price level in particular country influence its currency rate of exchange in terms of other currencies, but at the same time interest rates and rate of return on assets in this country's currency also have strong impact on value of that currency.

However, it is by no means exhaustive, because exchange rates are dependent on many other factors. As was already mentioned, trust of investors is also important, as they would less likely buy a currency that is not stable and in which keeping assets is very risky. Of course, some investors would decide to invest in that currency anyway, as more risk usually means that the potential profits might be higher, but in general people tend to keep their savings in safer and more reliable assets.

Higher demand for stable, safe currency result in their higher prices, while lower demand for so called risky currencies to a certain extent lead to their depreciation. There are many reasons why some currencies are regarded as more risky, and some as very safe. Factors like political stability of a country and exposure to foreign threats, which can be understood in many different ways, play a major role. A great majority of investors would prefer to keep Swiss franc as a currency issued by Switzerland, which is very rich, highly developed country, with a stable governance and no threat of military invasion, than in Ukrainian hryvnia. Ukraine's government is regarded by international community as rather unstable, there is a war in the eastern part of the country, so the Ukrainian currency for many might not seem stable.

Balance of trade

As in case of all goods, supply and demand determine the price of a currency. Many factors can have impact of both supply and demand of a particular currency. One of them is international trade and country's balance of payment. If a country imports more than exports, it has a deficit in a current account. Because it spends money on foreign products and services, it needs foreign currencies to pay for them. The country gets foreign currency from international trade, selling domestic products and services abroad. However, if export is lower than import, the money the country earned in foreign market is not enough to pay for everything it buys from foreign trade partners. The country simply needs more foreign currencies than it receives, so it borrows or buys them. Increased demand for foreign currencies results in depreciation of domestic currency[23].

Changes in competitiveness

As discussed before, depreciation of our domestic currency make our products more competitive abroad, as they are cheaper for foreign customers. If the currency appreciates, than our products are more expensive, hence less competitive. However, in the long run price is not the only determinant of a country's competitive advantage. In the real world, especially in the long term, competitiveness depends strongly on ability to create innovation. New technologies open new opportunities. We can use an example of the Silicon Valley and companies like Apple or Google, that owe their economic success to their innovative technologies. Those countries that are not able to adapt to new technologies and stick to old industries, are often left far behind. Products they export are getting outdated, their export suffer, what leads to trade deficits, and thus to currency depreciation.

[23] Investopedia: "6 Factors That Influence Exchange Rates". Available at: http://www.investopedia.com/articles/basics/04/050704.asp

Except all mentioned determinants, there are also others. So many forces can influence exchange rates, that pointing all of them seems to be almost impossible. It is sufficient to mention, that even a natural disaster or an accident such as oil spin can make a currency appreciate or depreciate. So to sum up, in reality purchasing power parity theory explains movements of exchange rates only partly, as they are much more complex issue, determined also by factors other than differentials in inflation rates or price levels.

3.2 Balassa-Samuelson effect

The Balassa-Samuelson effect is a model that explains why prices differ around the world, therefore why purchasing power parity theory does not always hold. It assumes that different price levels between countries are a result of differentials in productivity in these countries. Quick growth in the productivity in an economy will be followed by higher inflation or appreciation of its currency[24].

The theory of purchasing power parity states that price levels should be the same in different countries around the globe. If the same product is more expensive in one country than in another, one can simply make profit buying it in the place where it is cheaper and selling after where he or she can get a higher price for this product. However, as was shown in the second chapter, prices are very often higher in developed countries. Balassa-Samuelson effect explains why nominal price level, expressed in one currency, can be higher in countries with high productivity per capita, than in countries where productivity is much lower.

The differences in prices may result from the fact that an increase in productivity of non-tradable goods, like services, is usually slower than in case of tradable goods. For instance it might be more difficult to shorten the time a hairdresser needs to cut hair of his or her client, than to invent a technology that would enable us to produce wooden furniture a little

[24] MacDonald Ronald, Ricci Luca; "PPP and the Balassa Samuelson Effect: The Role of the Distribution Sector", IMF Working Paper, March 2001

bit faster, or even to improve the production of specific parts used in car industry. An increase of productivity in industrial production or manufacturing result in increase of wages in this sector of economy. In case wages in one sector of economy are much higher than in other, workers would simply prefer to work in the one in which they could get higher salaries. However, in service sectors employees are still needed. Wage pressure in service sector is rising, what in the long term leads to increase of wages also in this sector. As wages in service sector and sector of non-tradable goods went up, but the productivity has not changed or increased only slightly, the only way to finance higher salaries in these sectors is an increase of prices of services and non-tradable goods. Their prices can be increased, as there is no foreign competition that would put pressure to maintain them at lower level.

All of these make rich, developed countries, with high productivity more expensive places live. The overall price level is higher in these countries mainly because of much higher prices of services and non-tradable goods, what can be seen in the 'Prices and Earnings' studies of UBS. Prices of commodities that are easy to trade are less differentiated, but not equal, as still some transportation or other costs occur.

3.3 Barriers to trade

The law of one price states that price of the same good should be equal, if there are no barriers to trade. In the real world however, entirely free trade occur very rarely. Trade barriers like tariffs or quotas are one issue, but even in free trade zones some obstacles to trade occur. Pointing barriers to trade, we can divide them into two groups. The first one are targeted actions of governments, which are usually aimed at supporting domestic producers and companies, and at the same time making access to domestic markets more difficult for foreign competitors. These can be either tariff barriers or non-tariff barriers. Barriers to trade can be also understood in another way, as all the obstacles people would have to buy and sell products in different locations, that do not have to be linked with policy of any country.

The World Trade Organization (WTO) deals with issues related to regulation of trade and its liberalization. This international organization, headquartered in Geneva, on 1st January 1995 replaced General Agreement on Tariffs and Trade (GATT). The WTO has 162 members states, including all major world's economies. There is no doubt that the WTO makes the international trade more transparent and provides a forum for negotiations, but most of its members still try to protect their markets using different trade policies.

Tariffs

A tariff is a fee collected when commodities are crossing customs borders. It is one of the oldest and most widely used trade policies. The great majority of tariffs being currently used in international economy, are import tariffs, which are levied on the imported goods. Most often, their aim is at supporting domestic production. Reducing import of certain products, governments try to reinforce domestic companies that produce local substitutes of imported goods. In the past, tariffs used to be also an important source of incomes for states. Currently, tariffs play this role too, but mostly in case of less developed countries. Export tariffs are used much more rarely. They also can be substitute for taxes, especially in developing economies. For instance, if a country makes most of its profits on export of coffee beans or some raw materials in general, imposing an export tariff on them might be an easier solution to collect money, than developing a tax system from scratch. Another trade policy, recently rather rarely used, is a transit duty, which is a fee levied on products passing through a custom area on the way to another country[25].

Tariffs can have several forms. Most widely used are ad valorem tariffs. They are calculated as a percentage value of a product. Another type of tariff is specific tariff. In this case, rates of duty are defined in terms of amount per unit, for instance one euro per kilogram of coffee beans. Mixed tariffs are combination of both, specific and ad valorem.

[25] Budnikowski Adam (2001); [International Trade Relations] (In Polish)

They are expressed as a percentage value of a product, plus additional fee, like for instance one euro per kilogram. The name can be also used in case either an ad valorem or specific tariff is used, depending on which brings higher revenues.

Tariff rates in most of the countries are diversified, and are not equal for all imported goods. Very often they depend on the country of origin. Tariffs levied on commodities from one country might be higher or lower than those levied on commodities from different countries, even if the products are exactly the same. States that are members of free trade areas do not impose tariffs on other co-members.

The influence of tariffs on economies is hard to asses. For foreign producers that want to export their products to a country that has levied tariffs, they are most often harmful, as their products are more expensive in that country, hence less competitive. For local consumers in that country, tariffs imposed on foreign commodities simply mean they would have to pay higher prices for imported goods. Also domestic goods might be more expensive for the consumers. As a result of lack of foreign competition local manufacturers can sell their products with higher prices, than in case they would have to compete with companies from abroad. Therefore, the local companies benefit from import tariffs levied by their government. As foreign products are more pricy in the domestic market, it is easier for them to compete with foreign producers, at least in their country of origin.

Non-tariff barriers to trade

Tariffs are not the only trade policy used by governments. Most of the countries use also other policies that are not tariffs, but have very similar goal, which is usually either to protect domestic market from foreign competition, or to support domestic producer in international expansion. Sometimes they are also aimed at protection of the environment or public health.

Import or export quotas are among most commonly used non-tariff barriers. They are quantitative restrictions on import or export of certain products. It means that only a certain

amount of foreign products can be sold in a domestic market, or limited amount of domestic products can be sold abroad. To provide an example, let us imagine a situation in which the government of a country would allow only 5000 foreign manufactured cars to be sold in the local market. The main goal of this kind of import quota would be to support domestic car producers[26].

Other than quotas, countries commonly apply licenses. In this non-tariff tool, governments issue permits for import or export of certain commodities. This policy might help to avoid tensions between the countries, than can be caused by imposing quotas or normal tariff. Licensing can have different forms. Often licenses simply permit a particular company unrestricted access to a market, but there are also used more specific ones.

Both quotas and licenses are often criticized, as unjustified restrictions of free competition. The situation looks different, when both sides, exporters and importers, agree to reduce trade. Voluntary export restraints are agreements between the importing and exporting countries, in which the exporting one makes commitments it will limit its export. Usually it is the importing country that tries to make an agreement, to reduce import of some particular commodities, either to support local producers, to protect the social health, or for other reasons. The question might arise, why would the exporting country agree to limit its export? We can imagine that sometimes it may result from political interest, and that for exporting countries more important than increasing sales abroad can be maintaining good political relations.

The obstacle that exporting countries might have to access some markets can also be local technical or sanitary and phytosanitary standards. These norms usually describe what kind of products are allowed to be sold in the domestic market and specify their characteristics. For instance, a country can forbid import of cars that exceed its pollution limits. Another example can be a total ban on the import of genetically modified food.

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[26] Ibid

Most of the previously mentioned policies were focused on limitation of import. Export subsidies are aimed at encouraging of export of domestically produced commodities. This is usually achieved through financial support for local producers, that can have different forms, like for instance direct payments or discounted loans. Subsidizing local production can also be aimed at making local companies more competitive in comparison with foreign producers that operate in the domestic market.

There are so many ways to limit export or import it is hard to list all of them. The ways above mentioned are not all of them, but the ones used most often. As we can see, tariffs are just one of dozens of trade policies a government of a country can use when it wants to reduce the amount of imported, or sometimes exported, commodities. Most frequently, as usually it is simply economically viable, countries try to export more and import less goods, what they can achieve through a proper trade policy.

Other reasons of differences in prices

Even if there are no legal barriers to trade, it is not as easy to buy a product in a location where it is cheaper and sell where it has a higher price, as it might seem at first sight. To start we should mention that some transportation costs usually occur. If transport is not free, than a good should be cheaper in the exporting country and more expensive in the importing one. It is understandable, that for a company it is less costly to sell its products near a factory in which they were manufactured, that for instance in a location 2000 kilometers away, as the products have to be shipped there[27].

Another issue is that even those goods that at first sight seem to be fully tradable, contain non-tradable inputs. These can be for example higher rental prices owners of shops or restaurants have to pay in more expensive locations. Let us imagine there are two shops selling exactly the same winter coats. One is located in Zurich, the second one in Kiev. As

[27] Suranovic Steven (2010); "International Finance: Theory and Policy"

to rent the same selling space is much more expensive in Zurich, even assuming all other costs are equal, the coats in Zurich should have higher price.

The law of one price assumes also that individuals have perfect information about prices of products in all markets. Without this knowledge it would be impossible to make profits with arbitrage. In reality however, people simply do not know all price discrepancies. Assuming that even if a group of traders know the differences in prices of some products, they might not be able to achieve the scale of trade that would equalize the prices of these products, due to limited availability of capital.

As we can see, there is number of barriers and obstacles that foreclose free trade, hence the assumption of the law of one price, that prices of the same products should be the same, but only in case there are no barriers to trade, is rarely fulfilled. Even in free trade areas, with no legal trade barriers, other aspects, like for instance transportation costs, preclude arbitrage. The assumption of the theory is definitely reasonable, however the reality is in most of the cases, not only in economics but actually all areas, so complicated, that it is very hard to describe it and explain using a simple theory.

The complexity of human culture is another issue that seems to make the real world much more complicated and unpredictable than described in the law of one price. We should not forget about cultural differences, which are sometimes hidden and not very clear. For instance, the widespread belief that people would always prefer to pay lower prices is sometimes not true. In some cultures it is common to pay higher prices for the same products to show-off, and in some social groups, especially upper class, individuals would not buy certain products as they are for 'normal people'. This kind of consumer behaviors was described in economics as the Veblen good and the snob effect. The Veblen goods are commodities for which demand rises with a higher price, and are most often luxury goods[28]. The snob effect on the other hand, describes a situation in which demand for certain products among people with higher incomes would decrease as a result of higher demand for the same goods by households with lower incomes. Therefore, even if we

[28] Investopedia: “Veblen Good”. Available at: http://www.investopedia.com/terms/v/veblen-good.asp

assume there are no barriers to trade at all, the complexity of human behavior and economic choices make the law of one price and purchasing power parity theory less accurate in describing reality.

Conclusion

The research conducted above purchasing power around the world, indicates in which countries living standards can be regarded as the highest, and in which as the lowest. Therefore, in developed western countries, especially in Switzerland, countries in Scandinavia or in the United States of America, even if the prices of everyday use products and services are relatively high, employees with their wages can afford much more than in less developed countries. Among countries with the lowest purchasing power we can mention some African nations, or less developed regions of Asia, as well as Ukraine, which suffers because of the very strong depreciation of the national currency, hryvnia, as a result of, among the others, the military action in the eastern part of the country.

In regards the purchasing power parity as a theory of exchange rates determination, the thesis presents data which shows it does not work in practice, and that in reality the exchange rates do not depend only on price levels. However, the real prices of the same product might diverge significantly around the world, is probably known to most of us. In the third chapter, most probable explanations of that are presented. Among the reasons why prices can still diverge, even if theoretically arbitrage would equalize prices, we can mention the complexity of exchange rates determination. The interest rate parity theory explains it very well, showing that currencies are traded by investors who are searching for profits, and what determine their decisions whether to buy or sell particular currency is the rate of return they can expect to have on deposits in this currency.

Except the fact that exchange rates determination is more complex than it seems to be at first sight, we should also bear in mind that the real free trade occurs very rarely. Not only many countries impose tariffs on imported goods, but they can also use number of other trade policies that reduce import or export. However, even in a situation when governments act not to disturb but to facilitate trade, there are still some obstacles to simply buy a product in the location where it is cheaper, and sell where it is more expensive. Transportation costs can for instance increase the prices in the locations far from the place

the product was manufactured. Non-tradable inputs, like renting prices, that are rarely equal in different countries or cities, also have the impact on the final price of a product.

To sum up, the thesis was dedicated to explain theory related to purchasing power parity, including theoretical explanations why it does not always hold. The second aim was to present and analyze economic data to find out in which countries people have higher purchasing power, which currencies are overvalued and which undervalued and to discover how price levels are diverged. The data used shows, that in general prices level depends on economic development of a country. Usually, in countries with lower incomes prices are also lower, and countries where incomes are higher goods are more expensive. As prices of some products that are easy tradable diverge less, prices of services are much more diversified.

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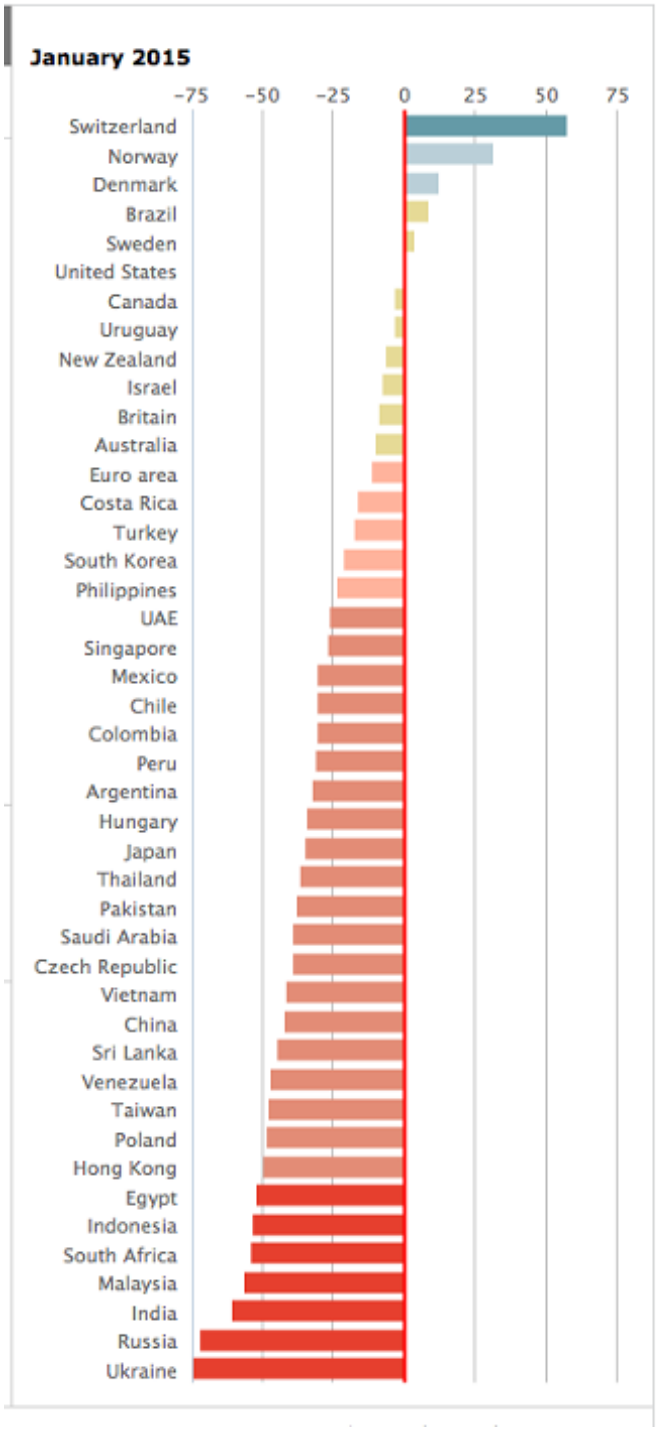
Appendices:

Appendix 1: The Big Mac Index 2016 (full version)

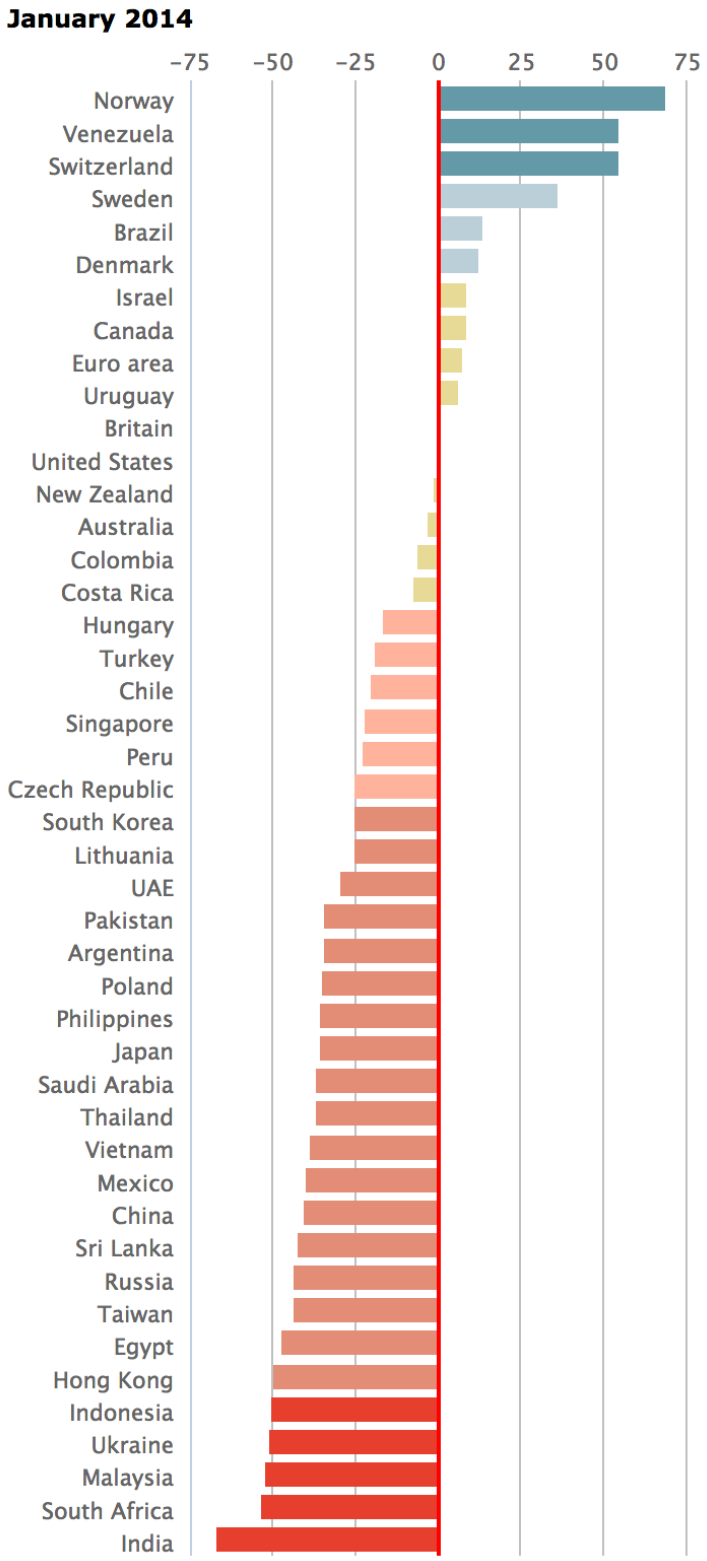
Source: The Economist

Appendix 2: The Big Mac Index 2015



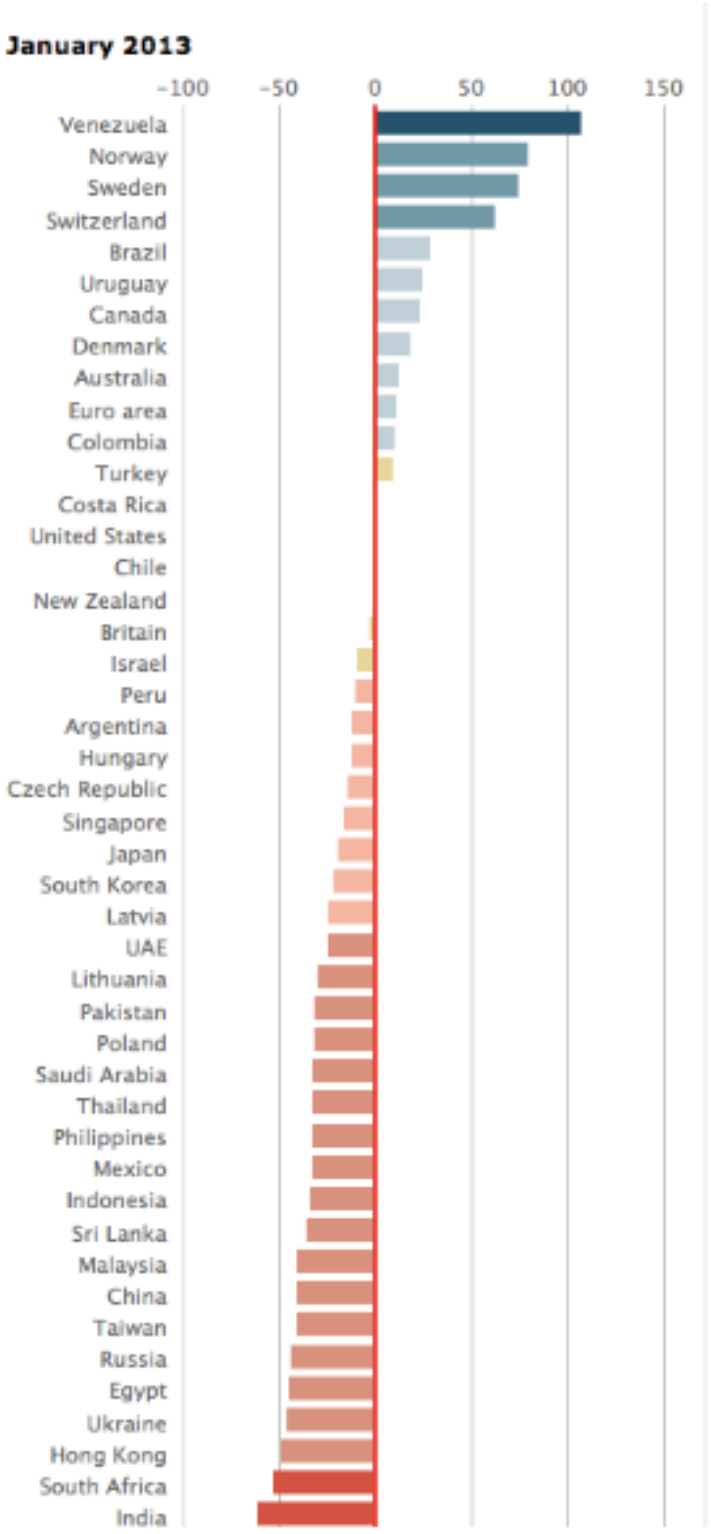
Source: The Economist

Appendix 3: The Big Mac Index 2014



Source: The Economist

Appendix 4: The Big Mac Index 2013



Source: The Economist

Appendix 5: Prices and Earnings 2015 edition - Price levels

Price levels

Cities[1]	Excl. rent	Incl. rent
Zurich	108.7	92.6
Geneva	106.1	91.8
New York City	100.0	100.0
Oslo	92.9	79.9
Copenhagen	88.0	74.3
London	84.7	79.5
Chicago	83.5	76.7
Tokyo	83.1	70.6
Auckland	82.8	67.6
Sydney	80.5	72.5
Seoul	79.2	64.2
Toronto	78.1	63.7
Milan	77.9	64.5
Stockholm	76.9	62.8
Montreal	76.2	58.9
Miami	76.1	67.7
Los Angeles	76.0	67.4
Helsinki	74.3	63.2
Hong Kong	72.9	76.8
Paris	72.6	63.8
Luxembourg	72.3	66.1
Tel Aviv	72.0	61.4
Dubai	71.1	66.1
Buenos Aires	70.4	56.1
Dublin	70.3	63.1
Taipei	67.3	62.7
Brussels	67.2	57.3
Rome	67.1	57.1
Manama	66.6	55.4
Frankfurt	65.8	55.1
Munich	65.5	56.1
Vienna	65.4	53.4
Amsterdam	65.3	55.5
Shanghai	64.9	54.3
Istanbul	64.8	53.0
Doha	64.8	61.4
Lyon	64.8	51.2
Berlin	63.3	51.3
Barcelona	63.2	50.5
Beijing	61.4	53.2
Madrid	60.6	50.4
Nicosia	60.3	48.4
Sao Paulo	59.4	49.5
Athens	58.9	47.5
Rio de Janeiro	57.9	49.2
Bangkok	57.5	46.4
Lisbon	55.5	45.3
Mexico City	54.7	46.2
Tallinn	54.4	44.0
Ljubljana	54.0	44.0
Bogotá	53.6	43.7
Jakarta	53.3	41.6
Bratislava	53.3	42.6
Santiago de Chile	52.8	44.0
Lima	52.2	42.8
Kuala Lumpur	52.0	41.2
Moscow	51.9	45.2
Manila	51.3	41.1
Vilnius	50.9	40.9
Nairobi	50.3	40.5
Warsaw	48.8	39.6
Cairo	48.1	38.7
Budapest	47.6	38.6
Johannesburg	46.6	40.5
Riga	45.8	37.1
Prague	45.6	36.4
New Delhi	45.5	36.9
Mumbai	44.9	37.2
Bucharest	43.8	34.5
Sofia	39.0	30.0
Kiev	38.1	30.3

Source: UBS

Appendix 6: Prices and Earnings 2015 edition - Wage levels

Wage levels

Cities[1]	Gross	Net
Zurich	131.3	141.8
Geneva	130.1	135.2
Luxembourg	106.4	97.1
New York City	100.0	100.0
Miami	92.4	92.9
Copenhagen	92.2	56.8
Sydney	89.8	83.9
Oslo	87.7	80.4
Los Angeles	87.5	88.2
Chicago	85.2	84.5
Montreal	77.4	78.2
Stockholm	76.0	63.7
London	75.5	72.3
Brussels	72.8	61.1
Toronto	71.4	69.5
Tokyo	70.1	66.5
Auckland	70.0	68.6
Dublin	68.8	64.3
Vienna	68.5	69.7
Helsinki	67.8	62.8
Munich	67.7	68.2
Frankfurt	66.6	67.1
Amsterdam	65.3	53.3
Berlin	64.0	64.5
Paris	62.8	67.1
Rome	60.0	54.2
Nicosia	59.1	64.4
Milan	58.7	53.1
Lyon	58.6	62.8
Barcelona	51.7	46.8
Madrid	50.9	46.2
Hong Kong	49.4	51.3
Tel Aviv	46.5	47.3
Seoul	45.9	50.2
Manama	45.7	53.1
Dubai	40.4	46.9
Taipei	35.1	38.8
Sao Paulo	34.7	38.8
Ljubljana	33.6	32.7
Johannesburg	32.8	30.7
Doha	32.2	37.4
Lisbon	31.9	32.0
Athens	29.8	28.2
Bratislava	28.4	27.6
Rio de Janeiro	26.8	30.3
Istanbul	26.5	26.0
Tallinn	26.1	24.2
Warsaw	23.2	22.4
Santiago de Chile	23.1	25.1
Buenos Aires	22.6	26.3
Vilnius	21.5	21.2
Moscow	21.3	21.5
Prague	20.0	20.3
Riga	18.1	17.1
Shanghai	18.1	19.2
Kuala Lumpur	17.8	20.2
Bogotá	17.5	20.3
Bangkok	16.8	18.9
Lima	16.3	18.9
Budapest	15.8	16.0
Bucharest	14.1	14.2
Beijing	13.4	14.5
Mexico City	12.2	13.0
Sofia	11.4	12.1
Manila	9.4	9.2
Mumbai	8.3	9.1
Cairo	8.2	8.8
New Delhi	7.6	8.5
Nairobi	6.5	6.5
Jakarta	6.2	6.8
Kiev	6.1	6.1

Source: UBS

Appendix 7: Prices and Earnings 2012 edition - Price levels

Price levels

City [1]	Excl. rent New York = 100	Incl. rent New York = 100
Oslo	116.0	104.5
Zurich	110.1	102.5
Tokyo	108.9	100.0
Geneva	106.5	96.8
Copenhagen	100.9	88.8
New York	100	100
Luxembourg	94.4	85.4
Stockholm	91.9	81.7
Caracas	91.0	85.3
London	87.3	83.0
Helsinki	86.5	82.3
Frankfurt	86.4	77.2
Munich	84.6	75.1
Paris	83.9	77.5
Sydney	83.6	77.8
Montreal	81.8	73.7
Vienna	81.3	72.0
Milan	79.6	72.1
Rome	79.1	73.8
Chicago	79.0	72.8
Lyon	78.4	68.8
Dubai	78.1	77.2
Amsterdam	77.0	69.0
Miami	77.0	70.7
Auckland	76.7	67.7
Dublin	76.2	69.7
Los Angeles	75.8	68.6
Brussels	75.8	68.7
Tel Aviv	75.4	68.4
Barcelona	74.7	65.6
Toronto	74.3	67.2
Hong Kong	73.1	75.2
Berlin	72.3	64.1
Istanbul	71.5	65.5
Madrid	69.6	61.6
Doha	68.6	66.9
Seoul	67.8	66.3
Lisbon	67.4	60.1

Athens	66.1	58.1
Moscow	66.1	61.2
Nicosia	63.9	56.9
Taipei	63.8	57.9
Ljubljana	63.3	55.1
São Paulo	61.7	56.1
Rio de Janeiro	61.2	55.5
Beijing	60.3	51.8
Tallinn	58.2	50.1
Budapest	56.7	50.3
Shanghai	56.1	49.6
Bangkok	55.3	48.1
Buenos Aires	55.0	47.6
Riga	54.5	47.1
Prague	54.3	48.0
Manama	54.0	49.5
Bratislava	53.9	47.0
Jakarta	53.7	48.6
Warsaw	53.7	47.9
Kiev	53.1	46.8
Bogotá	53.1	46.9
Santiago de Chile	52.8	47.6
Johannesburg	52.1	47.2
Kuala Lumpur	52.0	46.1
Mexico City	51.2	45.7
Vilnius	50.8	43.5
Lima	50.8	44.4
Nairobi	48.6	43.7
Cairo	42.4	36.2
Sofia	42.3	36.4
Manila	41.5	35.8
Bucharest	39.8	34.7
Mumbai	34.1	31.0
Delhi	33.1	29.4

Source: UBS

Appendix 8: Prices and Earnings 2012 edition - Wage levels

Wage levels

City[1]	Gross New York = 100	Net New York = 100
Zurich	131.1	132.4
Geneva	123.6	119.2
Copenhagen	123.1	93.4
Oslo	119.1	97.4
Luxembourg	105.4	109.7
New York	100	100
Sydney	94.1	98.0
Tokyo	92.4	90.4
Munich	91.5	76.0
Frankfurt	88.2	78.1
Los Angeles	86.3	80.9
Chicago	83.3	80.6
Stockholm	82.9	78.1
Miami	81.8	79.9
Brussels	81.5	59.5
Helsinki	80.2	74.2
Vienna	80.2	70.8
London	79.5	75.2
Berlin	79.2	70.1
Amsterdam	78.3	69.4
Paris	78.1	73.6
Dublin	77.7	78.8
Toronto	76.8	68.6
Montreal	76.2	66.2
Milan	70.3	61.5
Lyon	64.2	64.7
Nicosia	60.8	68.5
Auckland	59.8	63.5
Barcelona	59.6	58.7
Madrid	57.0	57.9
Rome	55.1	48.2
Seoul	54.8	50.2
Dubai	49.6	64.2
Lisbon	44.0	42.6
Tel Aviv	43.0	43.5
Hong Kong	42.8	49.8
Johannesburg	41.5	38.9
Athens	41.4	40.0
Ljubljana	36.4	32.0

Taipei	33.3	39.3
Manama	30.5	38.8
Moscow	30.4	33.8
São Paulo	30.1	30.5
Tallinn	28.0	28.3
Istanbul	27.9	28.2
Bratislava	27.7	27.3
Rio de Janeiro	27.2	27.5
Doha	26.6	34.4
Prague	24.5	25.1
Riga	24.2	21.4
Warsaw	23.8	21.9
Buenos Aires	23.6	25.4
Santiago de Chile	22.6	21.5
Bogotá	22.3	22.0
Lima	22.2	23.1
Vilnius	21.7	21.2
Kuala Lumpur	21.5	22.0
Shanghai	20.9	21.6
Budapest	20.1	18.1
Caracas	20.0	23.4
Beijing	17.0	18.0
Bucharest	14.8	13.5
Bangkok	14.6	17.4
Sofia	13.8	13.6
Mexico City	13.7	15.1
Cairo	11.0	12.1
Kiev	10.5	11.2
Nairobi	10.4	10.2
Mumbai	8.5	9.3
Manila	8.0	8.1
Jakarta	7.9	9.2
Delhi	7.6	8.3

Source: UBS