International Wage Projections to 2040

What do these trends mean for UK business?

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Foreword – why real wage trends matter

Movements in wages have a two-sided impact on economies. On the one hand, higher wages mean higher costs for manufacturers and others, but on the other hand they boost the purchasing power of workers and so stimulate consumer spending. Because of these dual effects, wage growth is a complex topic that has important potential implications for business strategy.

Growth in real wages (i.e. wages adjusted for inflation) is especially important as a measure of changing production costs for businesses and living standards for workers. For example, in a year where nominal wages increase by 5% but consumer price inflation is 6%, businesses will benefit from relatively cheaper labour costs. But living standards for their employees will deteriorate as prices rise faster than wages, so squeesing real consumer spending power.

The global financial crisis of 2008-09 led to unemployment rates around the world rising, especially in advanced economies. In the decade since the crisis, labour markets have gradually recovered, but the relatively easy availability of labour has meant that real wages fell for a number of years in the UK and some other advanced economies. At the same time, real wages have been rising in emerging economies like China, where growth has held up much better during and since the financial crisis.

More recently, unemployment has fallen to low levels in the UK, which has led to some recovery in real wages. But real wage growth still remains higher in most emerging economies, so the wage gap between those countries and the UK has narrowed. For businesses in the UK, a key question is how far this narrowing will continue over the coming years and decades and what that implies for business strategy in relation to the location of production facilities, target markets for exports and other strategic choices such as outsourcing and automation.

Following our 2013 report 'Global Wage Projections to 2030', this updated edition looks to project real wages for 21 countries up to 2040, with a particular focus on the implications of these trends for UK businesses. Please contact us if you have any questions or comments on this study, or if you would like to discuss how it applies to your organisation.

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It is important to stress that future trends in real wage growth and real exchange rates are uncertain, so readers are advised to interpret our projections as indications of likely broad trends, rather than being precise point forecasts. The specific projections presented in this report are inevitably subject to significant margins of error.

We chose to end our analysis at 2040 as relatively few businesses will look beyond this time horizon in making location decisions. Full details of our methodology are contained in the technical appendix.

1

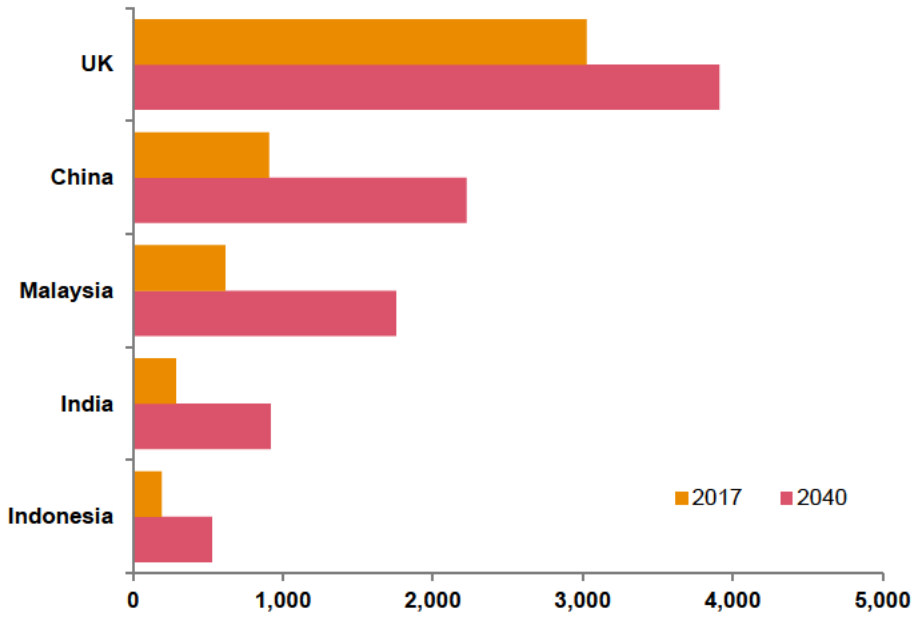
Key findings

Wages in emerging markets will continue to converge with those in the UK over the next 20 years, but a significant wage gap will remain even in 2040. These trends have important implications for UK decisions on investment and export locations

Average wages around the world are expected to rise in the period to 2040. A combination of real exchange rate appreciation and productivity growth could see **India** record the **fastest real wage growth** up to 2040 in US dollar terms, ahead of other emerging economies such as **Malaysia, Indonesia** and **China.**

However, the convergence between real wages in emerging markets and in the UK will be far from complete by 2040. In that year, UK real wages could still be more than **twice** as high as in **Malaysia, four times** as high as in **India** and almost **ten times** higher than in the Philippines.

Average wage per month (in constant 2017 $)



Sources: ILO, BLS, IMF, OECD, various government sources, PwC analysis

1

Emerging markets will continue to offer affordable sources of labour for UK businesses, even by 2040

Locating manufacturing and other labour-intensive business processes in emerging markets in Asia and elsewhere is likely to remain an attractive, cost-saving option for UK businesses in the next 20 years, even as wages in developing countries rise.

2

Narrower wage differentials could see UK firms move production locations

Wage gaps will narrow significantly in some emerging markets (such as China) but remain much wider in others (such as India and Indonesia). This could result in UK companies moving factories and offices between countries or, in some cases, replacing workers with automated processes.

3

Higher wages will turn traditional manufacturing locations into potential UK export destinations

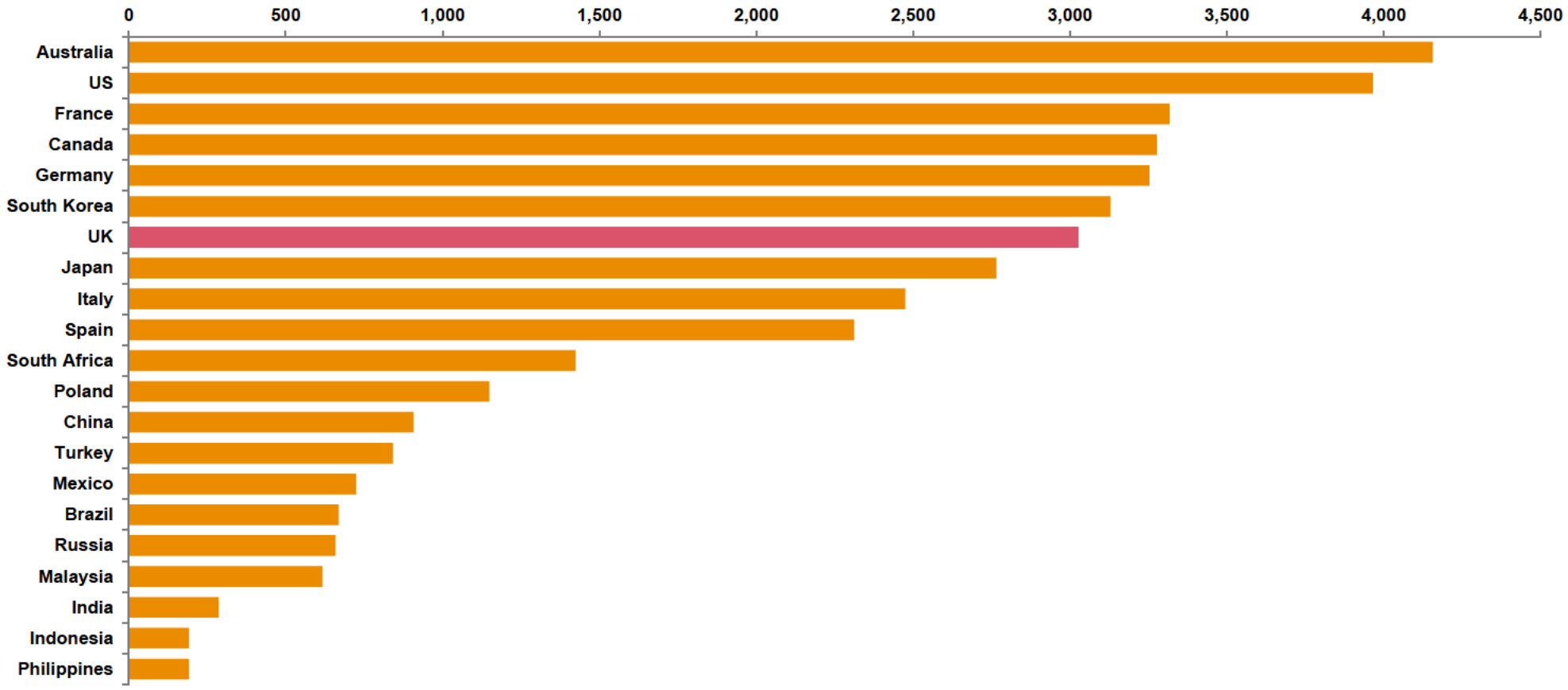
By 2040 we expect income, as measured by GDP per capita, to have risen dramatically in many emerging economies. UK firms will find these countries increasingly attractive as consumer markets, in addition to being destinations for outsourcing.

2

The results

In 2017, UK wages were significantly higher than those in all emerging markets in our study, offering potential cost savings for firms that have relocated factories and other business processes to emerging economies like China and India

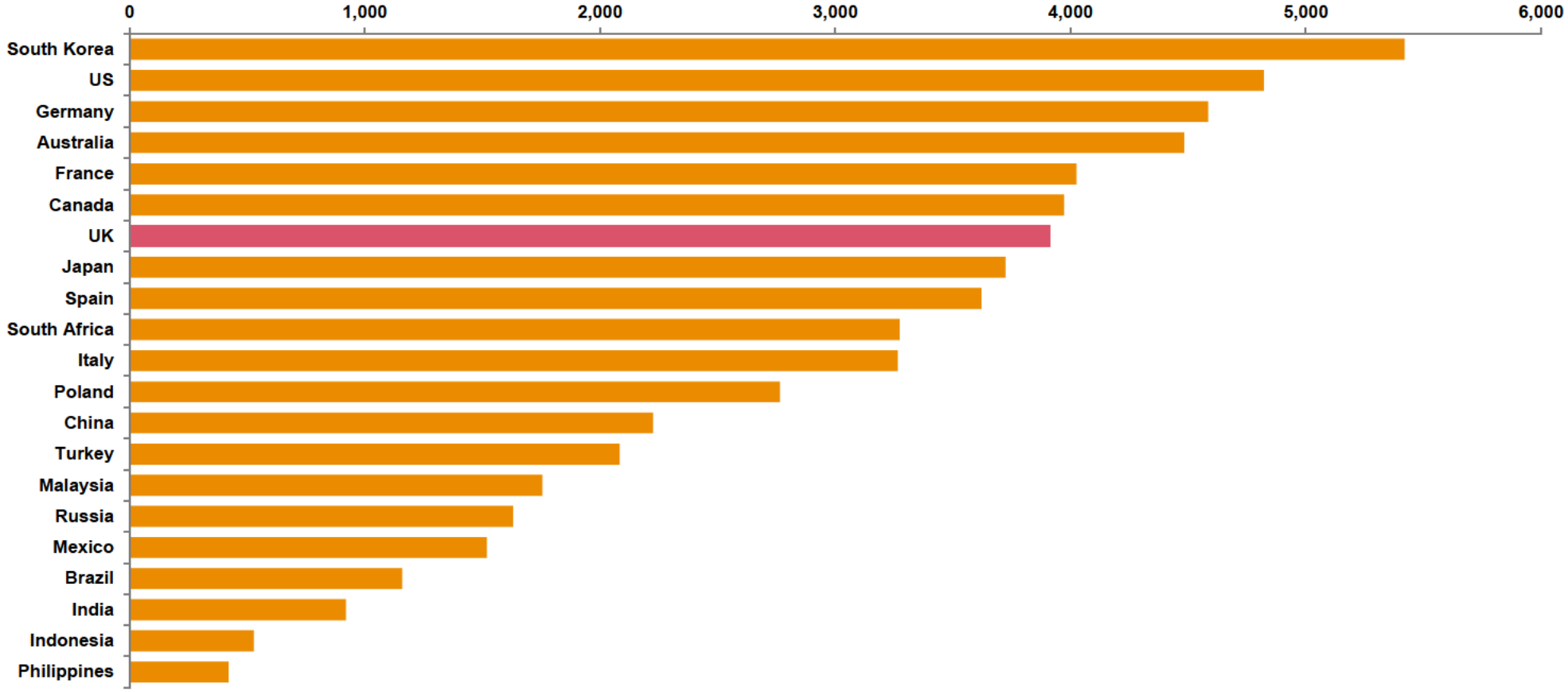
Average wage per month in 2017 (in US$)



Sources: ILO, BLS, IMF, OECD, various government sources, PwC analysis based on translating local wage levels into $ terms using market exchange rates

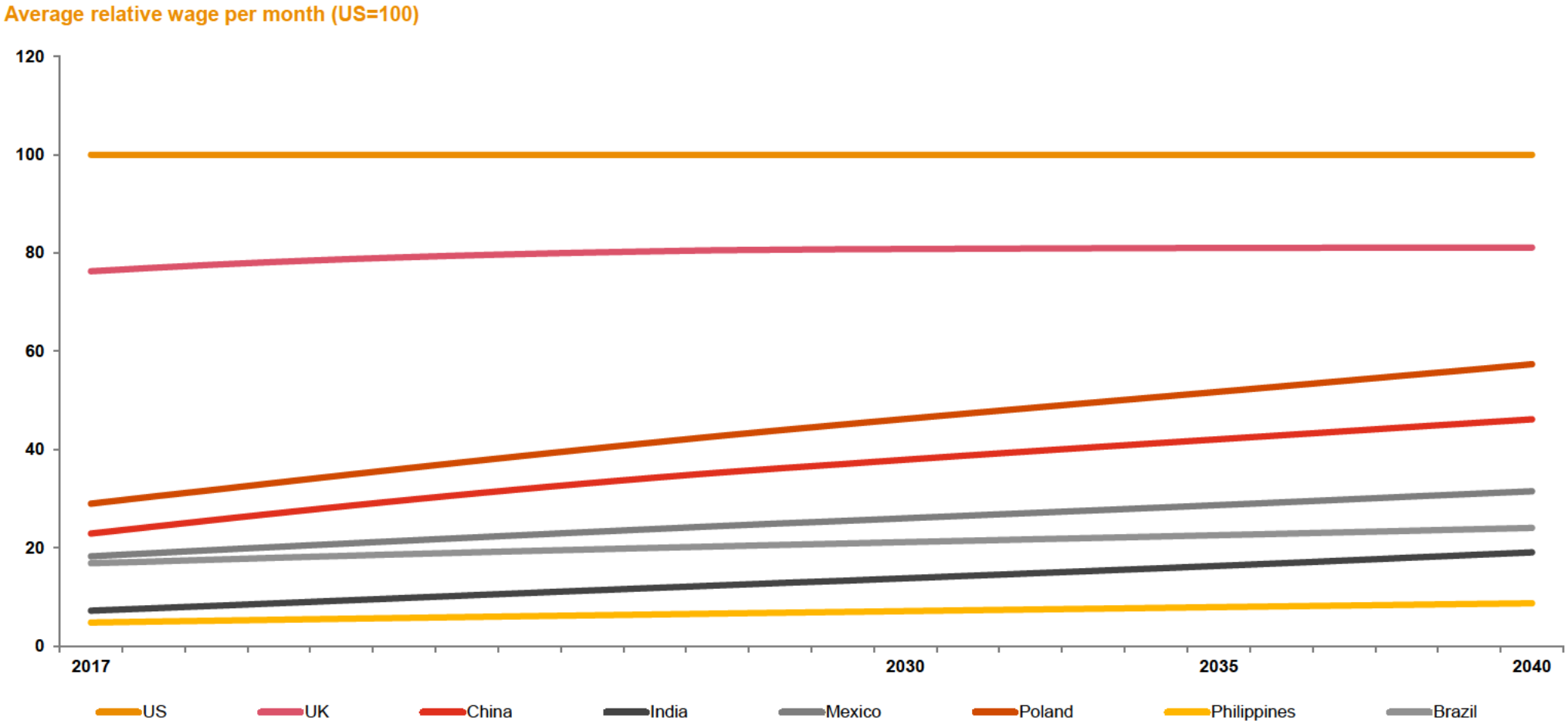
By 2040, our projections suggest that the wage differentials between the UK and emerging markets will have narrowed, but will still remain significant in most cases

Average wage per month in 2040 (in constant 2017 US$)



Sources: ILO, BLS, IMF, OECD, various government sources, PwC analysis of projected wages in 2040 in constant 2017 US dollars (adjusted for inflation using the US GDP deflator)

The fastest rate of convergence with UK wage levels among emerging markets is likely to be seen in Poland and China. This reflects both relative real wage growth and estimated real exchange rate appreciation for emerging market currencies (vs US $)



Sources: ILO, BLS, IMF, OECD, various government sources, PwC analysis

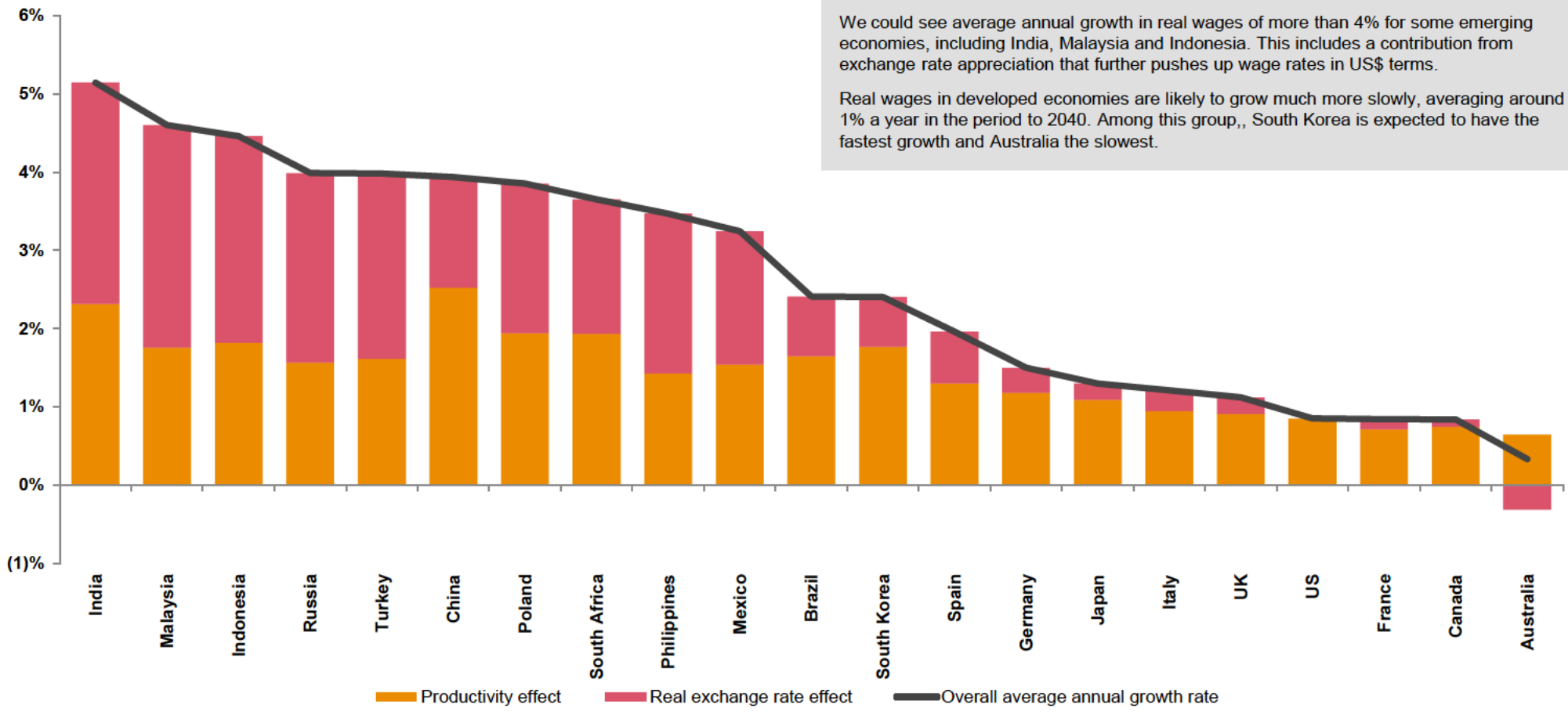
By 2040, Polish wages could be equivalent to around 70% of those in the UK, but average salaries in the Philippines may still be only around 10% of UK levels

Relative average monthly wages compared with UK average wage levels (index, UK=100)

Country	2017	2030	2040
US	131	124	123
Germany	108	114	117
South Korea	103	127	139
UK	**100**	**100**	**100**
Spain	76	86	93
Poland	38	57	71
China	30	47	57
Mexico	24	32	39
Brazil	22	26	30
India	9	17	24
Philippines	6	9	11

We expect real wage growth to be faster in emerging economies due to a combination of higher productivity growth and real exchange rate appreciation

Average annual growth in monthly wages 2017–40



We could see average annual growth in real wages of more than 4% for some emerging economies, including India, Malaysia and Indonesia. This includes a contribution from exchange rate appreciation that further pushes up wage rates in US$ terms.

Real wages in developed economies are likely to grow much more slowly, averaging around 1% a year in the period to 2040. Among this group,, South Korea is expected to have the fastest growth and Australia the slowest.

Sources: ILO, BLS, OECD, various government sources, PwC analysis.

3

Implications for UK business

Emerging markets are expected to continue to offer relatively affordable source of labour for UK businesses even in 2040, but the cost gap will narrow over time

Relative average wages in emerging markets are likely to rise in the two decades to 2040, but the pace of **convergence** with developed economies will be **relatively slow.** Even by 2040, average monthly wages in China will be well below those in the UK and other G7 economies.

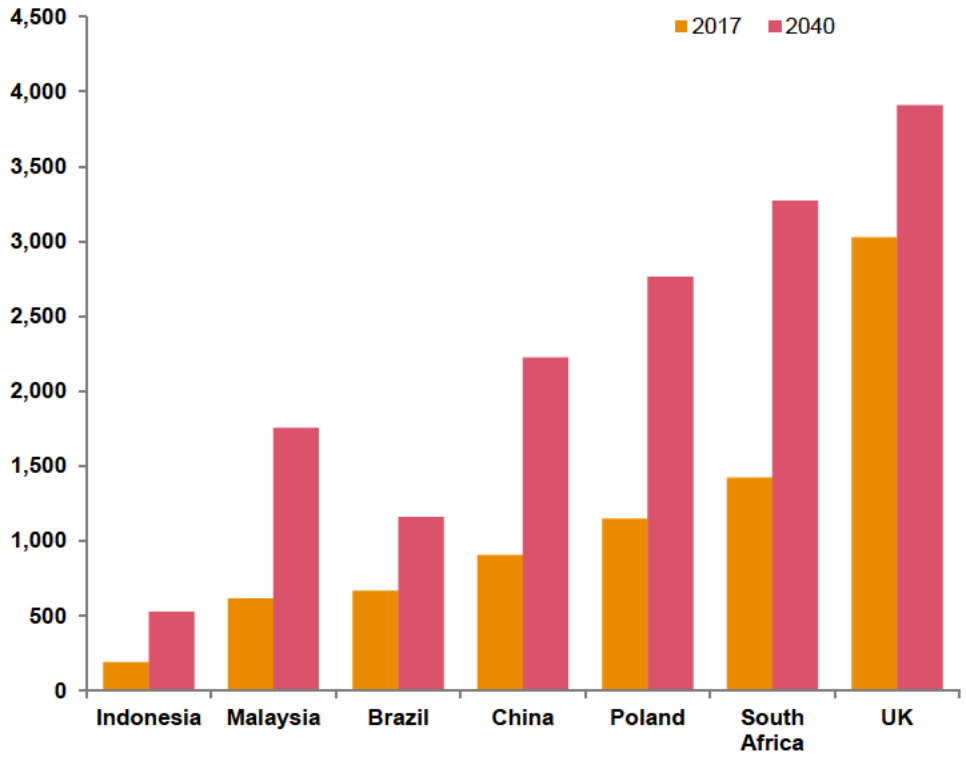
This means that **locating manufacturing and other labour-intensive business processes** to emerging markets will remain an attractive, cost-saving option for UK businesses in the next two decades. But potential cost savings will be less than in past decades in China, so relocating to lower cost Asian economies may look attractive.

China's average monthly wage will rise from 30% of that in the UK in 2017, but may still be less than 60% of UK levels in 2040

However, the value of these savings will continue to reduce as all major emerging markets will see relative wages rise over the next 20 years. This means that the relative benefit for UK firms from using overseas labour will diminish (unless offset by productivity gains for those particular workers, but this may not be the case unless there is also additional capital investment).

Major emerging markets will see wages rise between 2017 and 2040

Average wage per month (in constant 2017 US$)



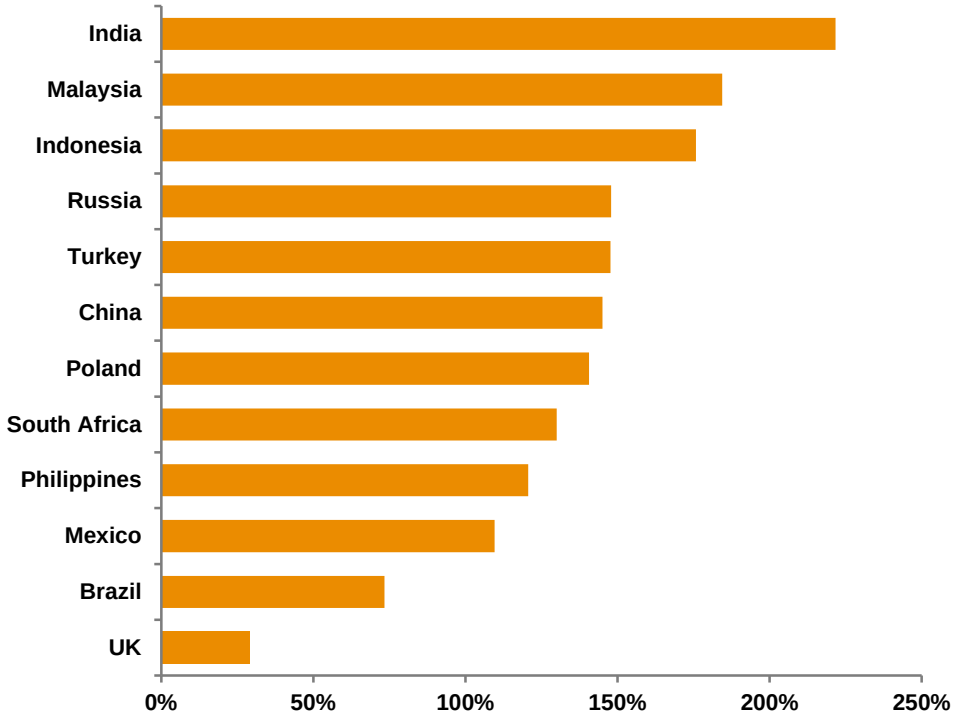
Source: PwC analysis

Narrower wage differentials between emerging markets and the UK could see UK firms switch production locations and have increased incentive to automate some processes

Emerging markets with relatively lower relative wages could become more attractive production locations.

Real growth in average wages from 2017 to 2040 is likely to vary widely among emerging markets, owing to different trends in **real exchange rates** and different rates of **labour productivity growth.** Changes in the pace of wage growth are likely to affect **UK business decisions** about where to locate offshore resources (though other factors will also be important).

Total % change in average monthly real wages, 2017-40



Source: PwC analysis

Automation could become an alternative to outsourcing low-end manufacturing and simple business processing tasks in the period to 2040

Our report, Will robots really steal our jobs?, suggests that **30% of jobs in OECD** group of advanced economies have the potential to be automated by the mid-2030s (although not all of these will be automated in practice).

This potential automation level rises to **45% in manufacturing,** an area particularly associated with outsourcing.

The proportion **reaches 60%** when focusing on **manufacturing jobs** performed by workers with **low educational attainment.**

This data suggests that the falling cost and widespread adoption of automation could begin to replace outsourcing as a business strategy in the next 20 years. Higher relative wages would be offset by higher productivity in this case, but it could also affect location decisions if it was easier to automation production in some countries than others (e.g. due to differences in trade union power and variations in labour regulations across countries).

Rising real wage levels in emerging markets will generate stronger consumer buying power, turning low cost manufacturing locations into potential major UK export destinations

Higher wages in emerging markets will boost the spending power of consumers in these economies in the coming years.

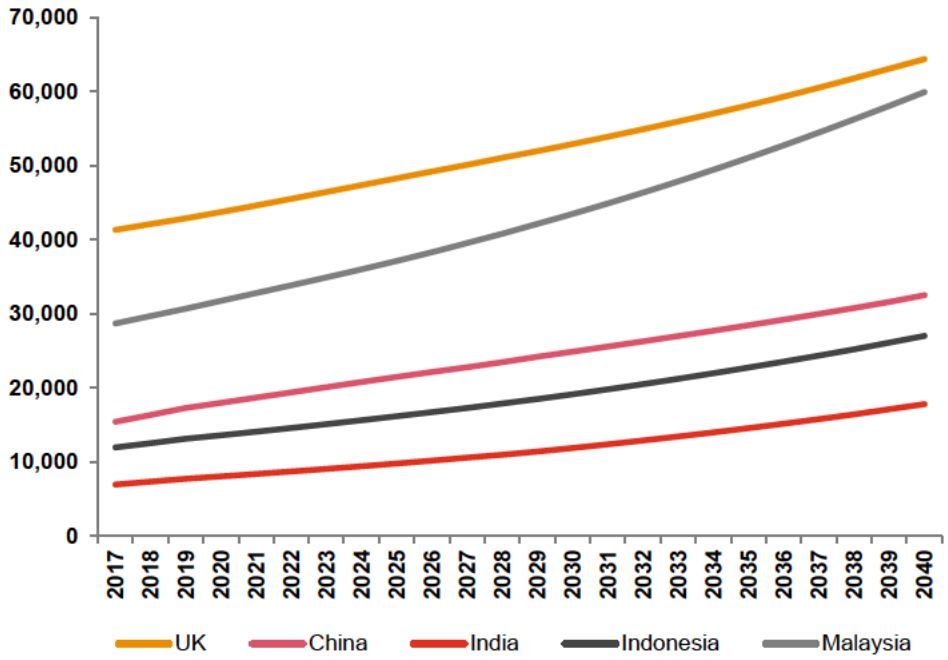
By 2040 we expect income, as measured by GDP per capita, to have risen dramatically in many emerging economies, transforming traditional manufacturing hubs into big consumer markets.

Firms in the UK and other G7 economies will be considering these countries as not only manufacturing locations, but export destinations in their own right.

The UK's trade relationships will also come under scrutiny following the completion of its withdrawal from the EU and the establishment of new trade agreements. At present, UK exports to a number of major emerging markets are small relative to those to other advanced economies (see chart below).

Real GDP per head is set to rise steadily in many emerging markets to 2040

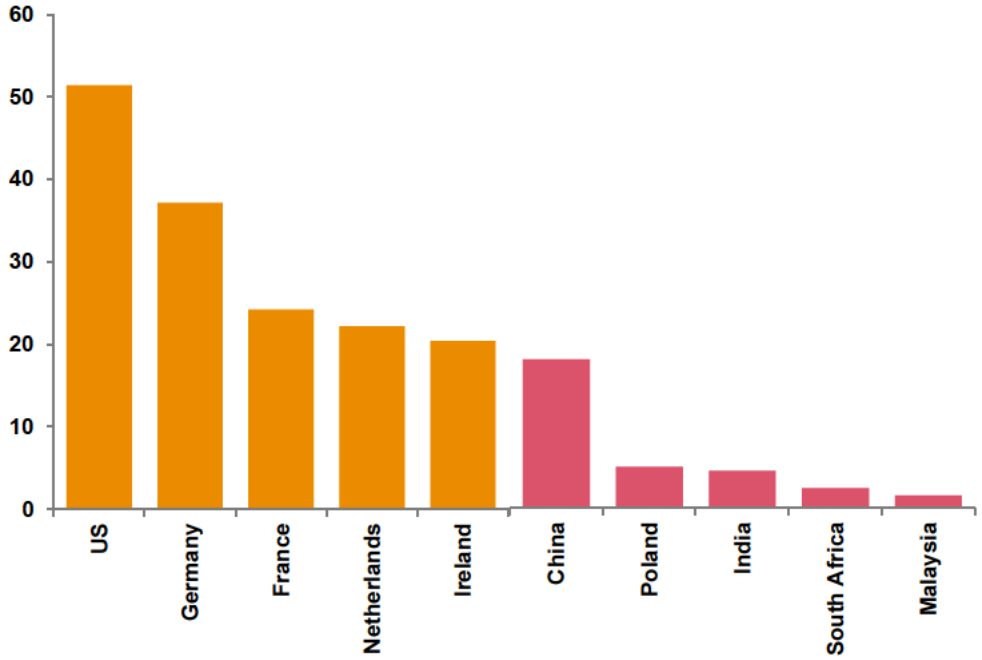
GDP per capita (PPP, in constant 2017 US$)



Source: World in 2050

UK exports to other advanced economies dwarf those to emerging markets, but this could change

UK exports, 2017 (£bn)



Source: ONS

Relative labour costs are one important factor when deciding on business locations, but UK companies should also consider ease of doing business and wider measures of country competitiveness in different countries

Country	Ease of Doing Business Ranking 2018 (1=most business-friendly regulations)
New Zealand	1
South Korea	4
UK	7
Poland	27
Spain	28
Mexico	49
China	78
India	100
Brazil	125
Philippines	113

Source: World Bank Ease of Doing Business Index

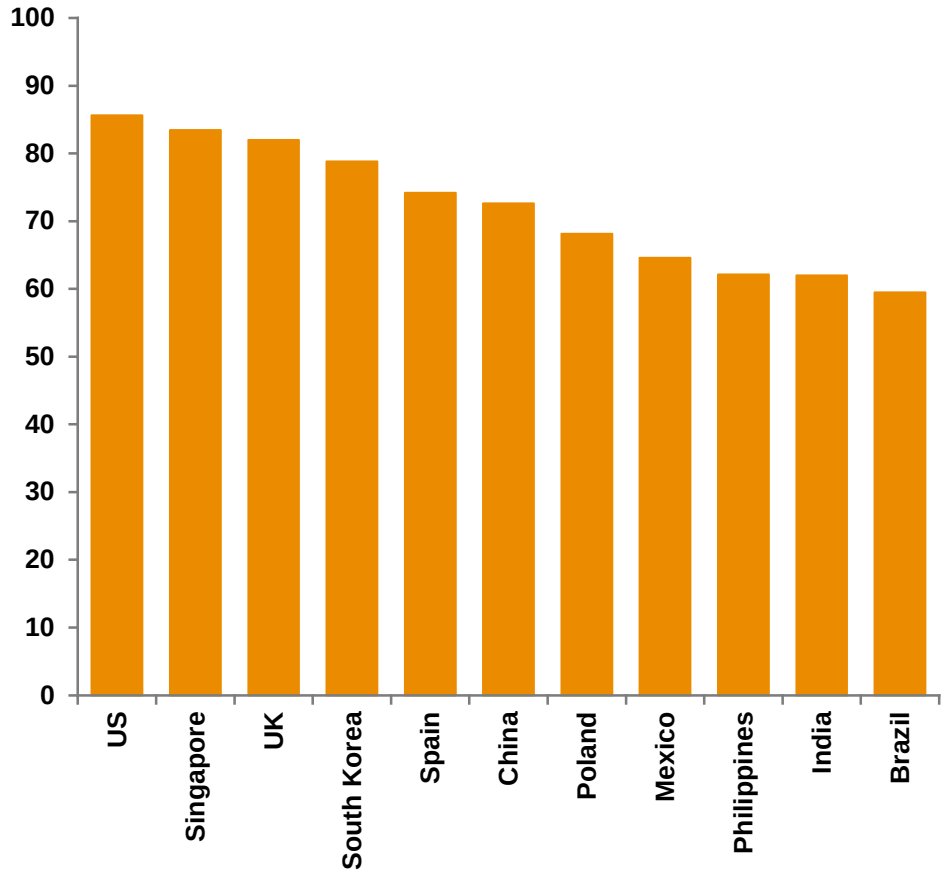
Poland is expected to have some of the highest wages among emerging markets by 2040, but it combines those with an impressive Doing Business score and a competitiveness rating equal to **Spain.**

Mexico is expected to remain among the cheaper countries from which to hire workers, and its rankings as a business destination are mid-tier.

Business processes in the **Philippines** are more complex than for other emerging markets, but in our analysis its wages are expected to remain the lowest of the economies studied.

Global Competitiveness Index

100=most competitive



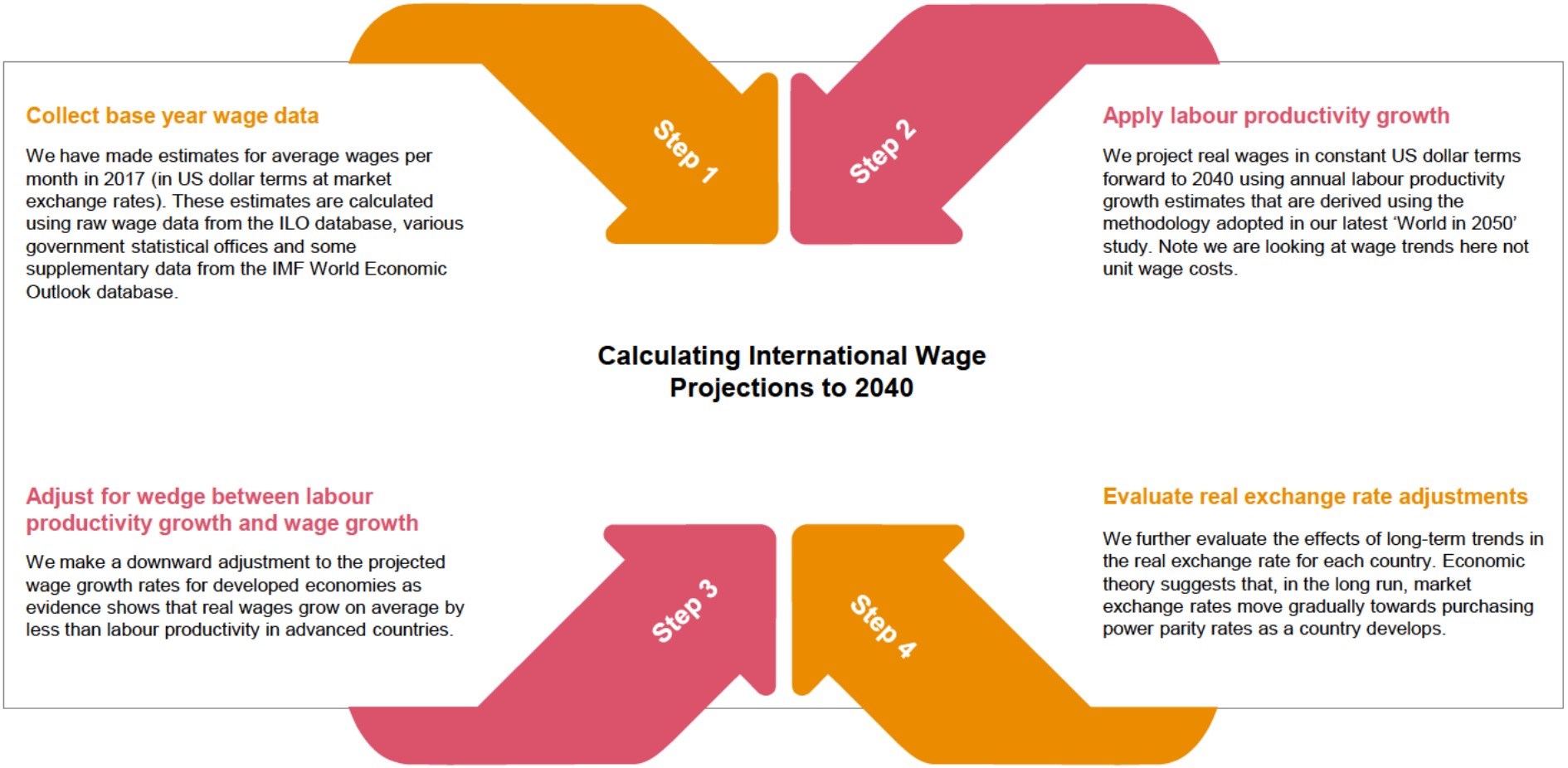
Source: World Economic Forum Global Competitiveness Index 4.0, 2018 report

4

Technical appendix

International Wage Projections to 2040 methodology: How does it work?

We use a 4-step method to project wage growth for 21 countries around the world up to 2040, taking into consideration (i) labour productivity growth, (ii) a wedge between labour productivity growth and wage growth and (iii) projected real exchange rate movements.



Wedge between labour productivity growth and real wage growth

Our approach to the labour productivity wedge is rooted in empirical evidence which says that, on average, labour productivity growth has exceeded real wage growth in advanced economies. According to ILO and OECD estimates, the average annual 'wedge' between the two has been around 0.4 percentage points over the past 20 years for developed countries. We assume that this effect linearly tapers away to zero by the end of our projection period in 2040.

In contrast to some of the larger estimates for the wage-productivity gap found in the literature, we applied the GDP deflator and not the more commonly used CPI deflator to adjust for inflation in the nominal wage figures. The GDP deflator better suits our purpose of estimating real labour costs rather than the standards of living of a given country. This is because the GDP deflator captures changes in all goods and services while the CPI deflator is more relevant for assessing the purchasing power of workers.

A divergence of the two deflators over time may also distort the true wage-productivity wedge if wages were deflated by the CPI and productivity levels by the GDP deflator.

For emerging economies there is no clear evidence of real wage growth decoupling from labour productivity growth and we therefore made no downward adjustment to our projected real wage growth rates for developing countries. Instead, we assume real wages in emerging economies grow broadly in line with labour productivity growth as projected in our latest World in 2050 study. All this analysis is in domestic currency terms – real exchange rate effects vs the US dollar are considered in the next two pages.

Note that we are using national average productivity growth here. For a particular project (e.g. a turnkey factory of a given design), productivity growth may not increase over time unless additional capital investment is made. This will be a matter for companies to decide based on their particular circumstances, so it is not something we can take into account in the present analysis, which is focused on wage trends not unit labour cost trends.

Real exchange rate (RER) adjustment (1/2)

Our methodology for projecting real exchange rates forward combines insights from a wide range of empirical literature and economic theory.

Our approach is primarily motivated by the 'Penn effect', which states that richer countries, in comparison with poorer ones, tend to have higher price levels. [1] The Penn effect has been demonstrated in various studies [2], although there are different explanations for its existence. The most influential explanations are from (i) Balassa and Samuelson (1964) who explain the Penn effect from the perspective of inter-country differences in the relative productivity of tradable and non-tradable sectors ('Balassa-Samuelson effect'); and (ii) Kravis and Lipsey (1982) and Bhagwati (1984) who explain the Penn effect from the perspective of capital-labour ratios.

Based on the Penn effect, we also look at how market exchange rates move gradually towards purchasing power parity rates as a country develops. Purchasing power parity (PPP) refers to the exchange rate at which a representative basket of goods and services would cost the same amount in different countries. For example, the current price of a haircut is higher in London than in Beijing, but as China continues to develop, the price in Beijing can be expected to move closer to the price in London.

The precise rate of real exchange rate appreciation is uncertain and often very volatile in the short run. This should be taken into account by interpreting our projections as indications of likely broad long-term trends, rather than precise forecasts. The projections presented are inevitably subject to significant margins of error.

We chose to end our analysis at 2040 as relatively few businesses will look beyond this time horizon in making location decisions.

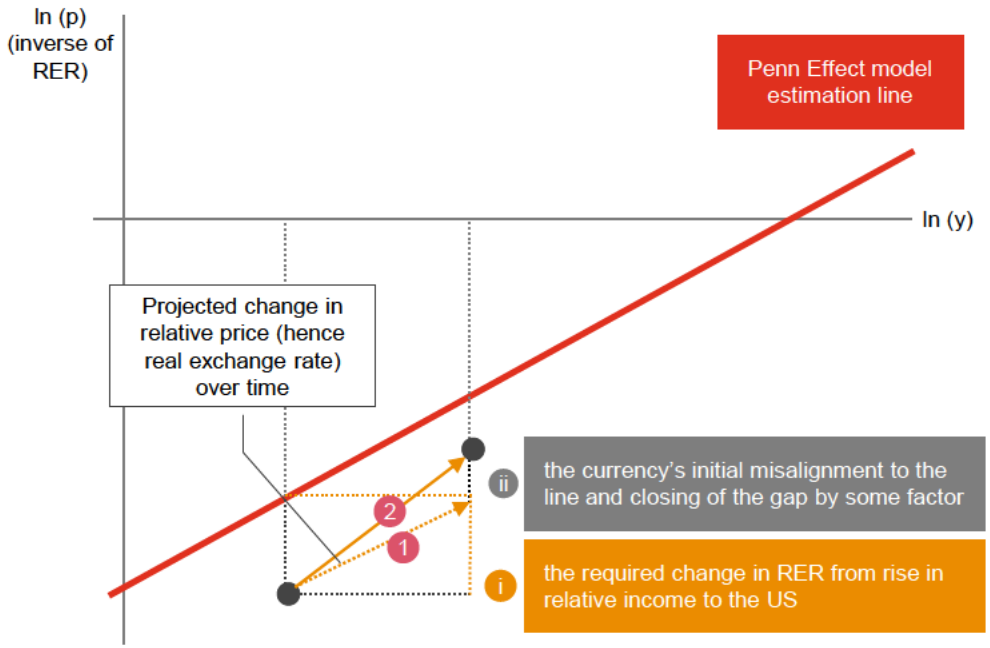
RER adjustment using the Penn effect

Following the approach in Frankel (2006), we have modelled the movement of the real exchange rate in the long-term towards the real exchange rate predicted by the Penn effect by recognising:

(i) the required change in the real exchange rate from rises in relative income ('the Penn effect'); and

(ii) the fact that any such gap would only close gradually over time.

Illustrative example of our approach



[1] Samuelson 1994; Zhang 2010.

[2] Balassa, 1964; Kravis and Lipsey, 1982; Summers and Heston, 1991; Rogoff, 1996; Frankel, 2005.

Real exchange rate (RER) adjustment (2/2)

Using (1) the basic Penn effects model,

$$\log(relative\ price) = \beta_1 + \beta_2\ \log(relative\ income) + \mu$$

(2) academically established relationship between relative prices and RER, and

$$\text{relative price level} = \frac{1}{\text{RER}}$$

(3) our approach,

$$\log(p_t) = \log(p_{t-1}) + \Delta\log(\widehat{p_t}) + \alpha(\log(\widehat{p_{t-1}}) - \log(p_{t-1}))$$

we have formulated the RER adjustment factor as:

$$g_{\text{RER}} = -\hat{\beta}_1 \log\left(\frac{y_t}{y_{t-1}}\right) - \alpha(\widehat{\beta_1} + \widehat{\beta_2}\log(y_{t-1}) + \log(r_{t-1})$$

where:

RER= $\frac{EP^*}{P}$ (i.e. how many baskets of goods you can afford in a country for one basket of goods in the US)

g = annual growth/movement rate of RER relative to that of the US

p = relative price = a country's price level relative to that of the US

r = a country's RER relative to that of the US

y = a country's income level relative to that of the US (in PPP terms)

$\widehat{\ }$ = expected value (as opposed to actual) using the Penn effects model

Estimation of parameters

We used a random effects regression for 174 countries from 1980-2018 of p_it, which denotes the inverse real exchange rate, and y_it, where the data are taken from the IMF World Economic Outlook database.[1]

Based on the regression analysis and theoretical framework, our estimation of β_1 is **-0.02** and β _2 is **0.18.**

Note we have used an overarching mean estimate for all countries covered due to unpredictable and volatile nature of the RER movement.

The error correction term α was calculated based on a regression analysis using residual values lagged 20 years (i.e. $P_(t-20)-(P_(t-20)\ )\widehat{\ }$), and calculated the annual decay rate required to reduce the misalignment by the fraction estimated by the regression over 20 years.

On this basis, our estimate of α is **0.04**

[1] Hausman test failed to reject the null hypothesis..

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