What Determines Purchasing-Power Parity Exchange Rates?

Alan Gelb and Anna Diofasi

Abstract

In an effort to provide a better understanding of the large variation in price levels between countries, we report on a cross-country analysis of national price levels, using Purchasing Power Parity (PPP) data on 168 economies from the most recent 2011 round of the International Comparison Program (ICP). PPPs are used for many purposes, including to set international poverty lines and allocate IMF quotas. The well-known Balassa-Samuelson income effect is not the only factor affecting PPPs, particularly for low- and middle income countries. Structural and policy factors make a difference. Small island states are relatively costly for their income level as are sparsely populated countries. Countries with large subsidy programs – as measured by fuel subsidies – tend to have lower price levels than predicted on the basis of income. More open labor policies – as measured by a higher share of migrants in the labor force – are associated with lower price levels in higher-income countries. The proposition that very poor governance is associated with both low income and high prices receives some modest support. Aid inflows and a negative current account balance are correlated with higher price levels (the latter less strongly), but FDI and remittances are not. We also observe a strong association between inequality and higher price levels, which provides some support for the proposition that the ICP may over-weight globally comparable goods. Our results confirm the tendency for African countries to be more expensive than countries with similar incomes in other parts of the world. We fail to fully explain this phenomenon but offer a number of explanations that together could account for it, including low agricultural productivity. Finally, we confirm the relationship between low PPP price levels and greater competitiveness in manufactures, especially for low and middle-income countries.

JEL Codes: E31, O47, R32

Keywords: purchasing power parity, price level, competitiveness, International Comparison Program, sub-Saharan Africa

Center for Global Development
www.cgdev.org

Working Paper 416
September 2015

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We are grateful to Grant James Cameron, Nada Hamadeh and staff from the ICP Team, three anonymous reviewers, and also to participants at the Research In Progress seminar on March 11, 2015 at CGD for helpful comments.

CGD is grateful for support of this work from its funders and board of directors.

Alan Gelb and Anna Diofasi. 2015. "What Determines Purchasing-Power Parity Exchange Rates?" CGD Working Paper 416. Washington, DC: Center for Global Development. http://www.cgdev.org/publication/what-determines-purchasing-power-parity-exchange-rates-working-paper-416

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I Introduction

Price levels vary enormously between countries. The 2011 round of the International Comparison Program (ICP) finds price levels (here defined as the ratio of Purchasing Power Parity (PPP) exchange rates to nominal exchange rates with respect to the US dollar) as low as 30% of the US price level in Egypt and as high as 160% in Switzerland. Differences in income, as indicated by the Balassa-Samuelson relationship, can account for some of this gap. However, price level differences remain considerable even after controlling for income levels. Some groups of countries, notably in Sub Saharan Africa (Africa), appear to have systematically higher prices than expected; Gelb, Ramachandran and Meyer (2013) found price levels about 30% higher than other low-income countries using the 2005 ICP data. Other groups of countries, such as the Gulf States, appear surprisingly cheap. This paper considers a range of factors that may be important in shaping the global pattern of PPP prices with a view to better understand why they look as they do.

Why should we care about PPPs? They are used for many purposes, including the formula that determines IMF shareholding (Silver 2010) and the construction of international poverty lines that underpin core indicators for international development including the Millennium Development Goals and the UN Human Development Index (World Bank 2015). Real exchange rates benchmarked on PPP have become a critical element in analyses of competitiveness. In particular, Rodrik (2008) shows that countries with undervalued real exchange rates relative to expected income-adjusted PPP-based levels are more competitive in the export of manufactures and that this translates into a direct boost to economic growth. This is a major issue for Africa, where even growing countries have largely failed to transform their economies (McMillan and Rodrik 2011, ACET 2014). Nevertheless, while many studies consider real exchange rate indices, there are few that systematically consider factors that influence the actual price level differences between economies that affect competitiveness.[1]

The Balassa-Samuelson hypothesis that richer countries are usually more expensive than poor ones provides a well-established foundation for subsequent PPP analysis (Balassa 1964; Samuelson 1964). Moving beyond this, empirical research on the determinants of the price level has often been limited by the small number of economies for which reliable data has been available. Kravis and Lipsey (1983) observe that openness, as defined by the ratio of trade to GDP, is also positively related to the price level; they argue that as labor abundant countries become more open, the price of labor increases, causing the price of services to

1 Studies that examine the factors responsible for variations in real exchange rates over time include Ricci et al. 2008, Amuedo-Dorantes and Pozo 2004, Lane and Milesi-Ferretti 2002. In a recent study, Prasad, Rajan and Subramanian (2007) examine the role of capital inflows and find that the ability to finance trade deficits – whether through aid, capital inflows, or remittances - is associated with higher real exchange rates and lower growth. Rodrik (2008) also observes that increased capital account openness is associated with real exchange appreciation.

rise and also the overall price level. Using a sample of 31 countries, Clague (1986) finds that the trade balance and the price level are negatively correlated, while the importance of minerals and tourism show a positive association with the price level. A later study by Ahec-Sonje and Nestic (2002) considers several potential determinants of PPPs, including the degree of economic liberalization and population size and density in addition to income, but again includes only a small sample of 39 high income and transition countries.

This paper extends these studies to a wider set of variables and economies. Because of methodology changes between ICP rounds, we restrict the analysis to the most recent and comprehensive PPP round of 2011. This included a total of 199 economies. Of these, 177 had full price data coverage, while 22 relied on partial or interpolated values. We present the analysis for the sample of those 168 of the177 economies where both full price data from the ICP and GDP per head data from the World Development Indicators (WDI) is available, and also comment on the nature of the excluded economies.

We start from the baseline Balassa-Samuelson model, develop a theoretical framework to suggest variables that might be expected to influence estimated PPP and test for these in sequence, starting off with those that are most plausibly exogenous. We find that a limited number of factors can "account for" a considerable proportion of the scatter of PPPs around the Balassa-Samuelson line, and that the effects are largely – but not entirely-- as predicted by theory. This supports the credibility of the broad pattern of PPP measurement. At the same time we find some evidence to support the proposition put forward by Ravallion (2014) that the basket of goods and services used to estimate PPP exchange rates over-weights globally comparable goods, especially those consumed in urban settings. We offer some explanations for the "Africa effect" but cannot account for it entirely. Lastly, we consider the relationship between the price level and the share of exports made up of manufactured goods, taking into account a number of structural and institutional features that plausibly affect both variables.

Section II considers a number of factors including geography, policies and institutions that might be expected to influence the PPP price level net of the Balassa-Samuelson effect. Section III reports on data. Section IV reports on tests of the associations between the factors and estimates of PPP prices. In addition to income, geography and density seem to matter. So do energy subsidies and, in richer economies, open labor market (immigration) policies. We also find some support for the "reverse governance" hypothesis – that very poor countries with very weak governance and management are more costly than expected because they are not able to take advantage of their low-wage labor to produce non-traded goods and services. Our results present a mixed picture on financial flows. Aid dependence and, to a lesser extent, current account deficits are associated with appreciated PPP price levels but FDI flows and remittances appear to have little relationship with PPPs.

We also find some support for the proposition that high measured PPPs are related to dualism as measured by inequality. This plausibly results from an over-sampling of globally comparable goods in urban centers. However, these factors cannot fully explain the relative

costliness of African countries. Large measurement errors in GDP, as suggested by the recent increases in some African countries due to rebasing, could account for much of the difference. The omission of second-hand prices from the ICP's collection process could be a factor in some situations. Another factor could be particularly weak agricultural productivity in Africa.

Section V examines the relationship between the price level and manufactured exports. Similarly to previous studies, we observe an association between competitive PPP price levels and the share of manufactured goods in exports. This relationship persists even after allowing for a range of controls that influence both variables, with the relationship stronger in poorer economies where the location of manufacturing is more driven by costs. Section VI concludes.

II What Factors Might Affect PPP Exchange Rates?

To motivate the analysis, Figures 1a and 1b show log-log scatter charts of the 2011 PPP estimates against country income (in nominal terms). Figure 1a includes all economies with ICP price level (full and partial) estimates[2] and GDP per head data, while 1b includes only the 168 economies with full price and GDP per head data (restricted sample). The Balassa-Samuelson effect is estimated as a smooth quadratic log-log relationship between GDP per head and the PPP level. It explains only 60% of the variance in PPP in the full sample and 70% in the restricted sample. Most of the power comes from the upper part of the income distribution; for economies in the lower income range there is surprisingly little relationship between income level and PPP. If we limit the analysis to low- and middle income economies, less than 20% (35% for the restricted sample) of the variation in price levels is explained by income. The patterns suggest several outlier clusters far off the fitted curve at lower, middle and higher levels of income and that the PPP price levels of many low-income African countries are high compared to those of non-African countries at comparable levels of GDP per head. As noted by other studies using earlier rounds of data, Africa is "costly" despite being poor. We now consider a number of structural and institutional factors that could plausibly shape the global pattern as well as the relationship between PPP exchange rates and manufactured exports.

2 For non-benchmark economies, the price level is estimated based on non-standard 2011 ICP methodology, either through the use of partial price data or approximation based on a number of economic and geo-political indicators. Pacific small island states, where only household consumption-linked price data is available, stand out among the non-benchmark group as having particularly high price levels for their per capita income. For a more detailed discussion, see the Annex (Figure A1). GDP/head data is from the World Development Indicators.

Figure 1a. Price Levels (2011 Round) and GDP per head (all economies)

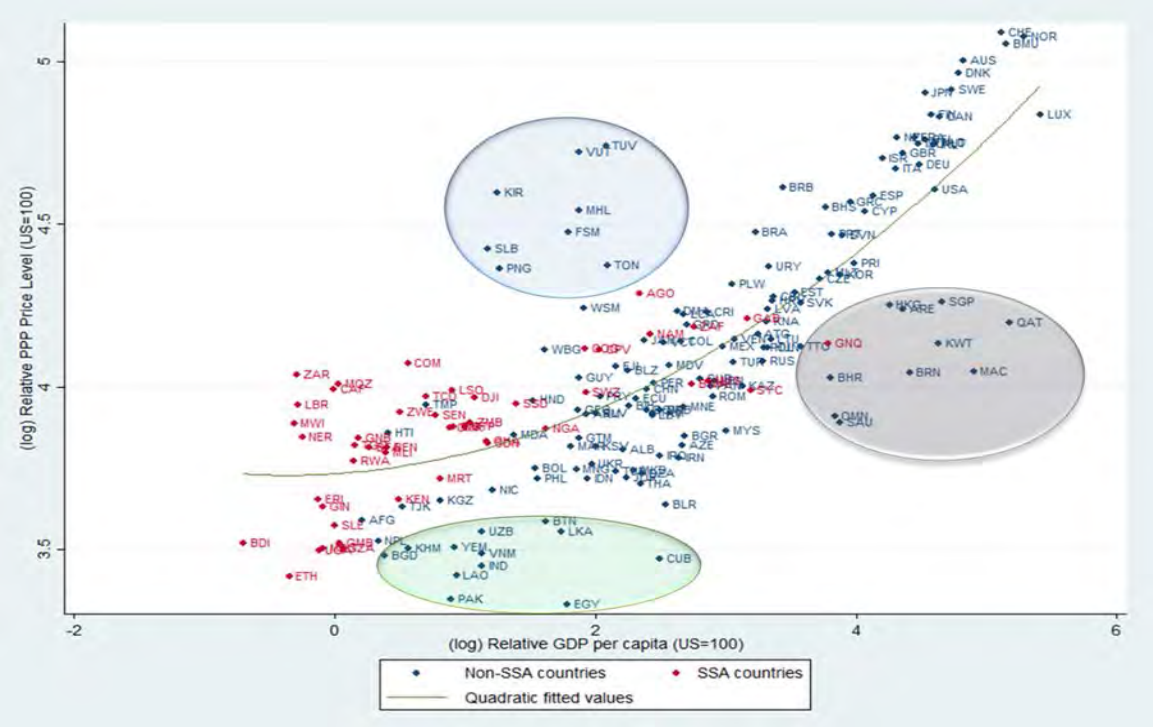
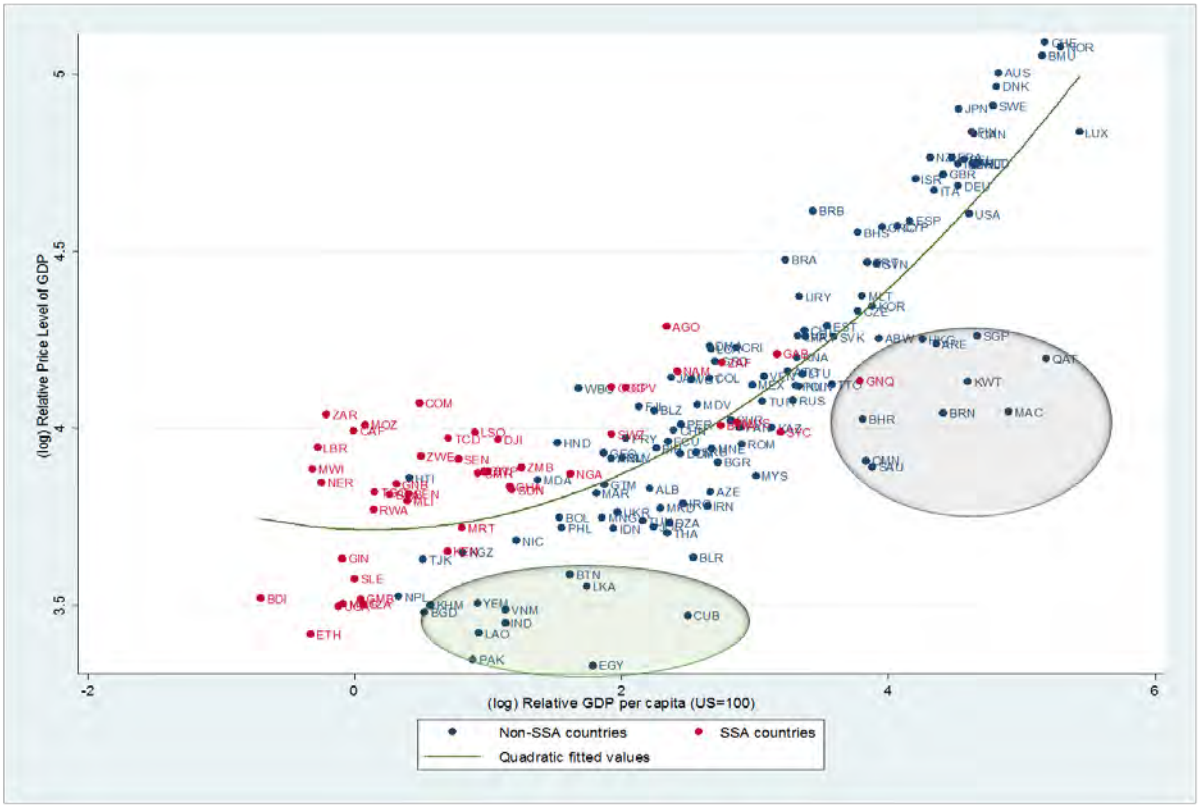


Figure 1b. Price Levels (2011 Round) and GDP/head (economies with full data)

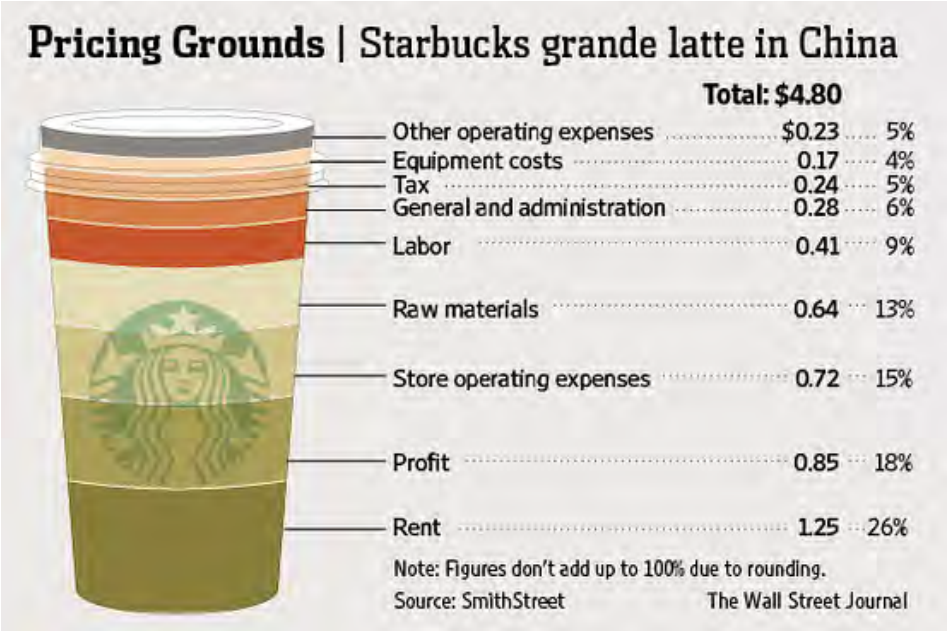


2.1 Income.

The Balassa-Samuelson effect postulates that rich countries are relatively more productive in the traded goods sectors than in the (traditionally) non-traded services sectors. This could be because the former rely more on markets for purchased inputs (Rodrik 2008) and that such transactions-intensive sectors function more effectively in higher-income, better-managed countries. The effect is a rise in wages in both the non-traded and traded sectors, and an increase in the relative prices of non-traded goods.

Theory provides few clues about the shape of such a relationship or why, as suggested by Figures 1a and 1b, it might be stronger at higher levels of income. One possibility could be the effect of income-related shifts in demand, first away from subsistence production towards traded industrial goods and only later back towards non-traded inputs and services (Echevarria 1997; Kravis, Heston, and Summers 1984). These services may come to constitute the major part of final price even for products based on "traded" commodities such as coffee causing market prices to be higher across the board in countries with high-cost non-traded services. Even in a middle-income country like China (Figure 2), raw materials represent only 13% of the price of a Starbucks coffee[3].

Figure 2. Price composition of a Starbucks latte sold in China



Source: http://consumeronomics.anoj.net/2013/09/caffeinonomics-1-pricing-cup-of.

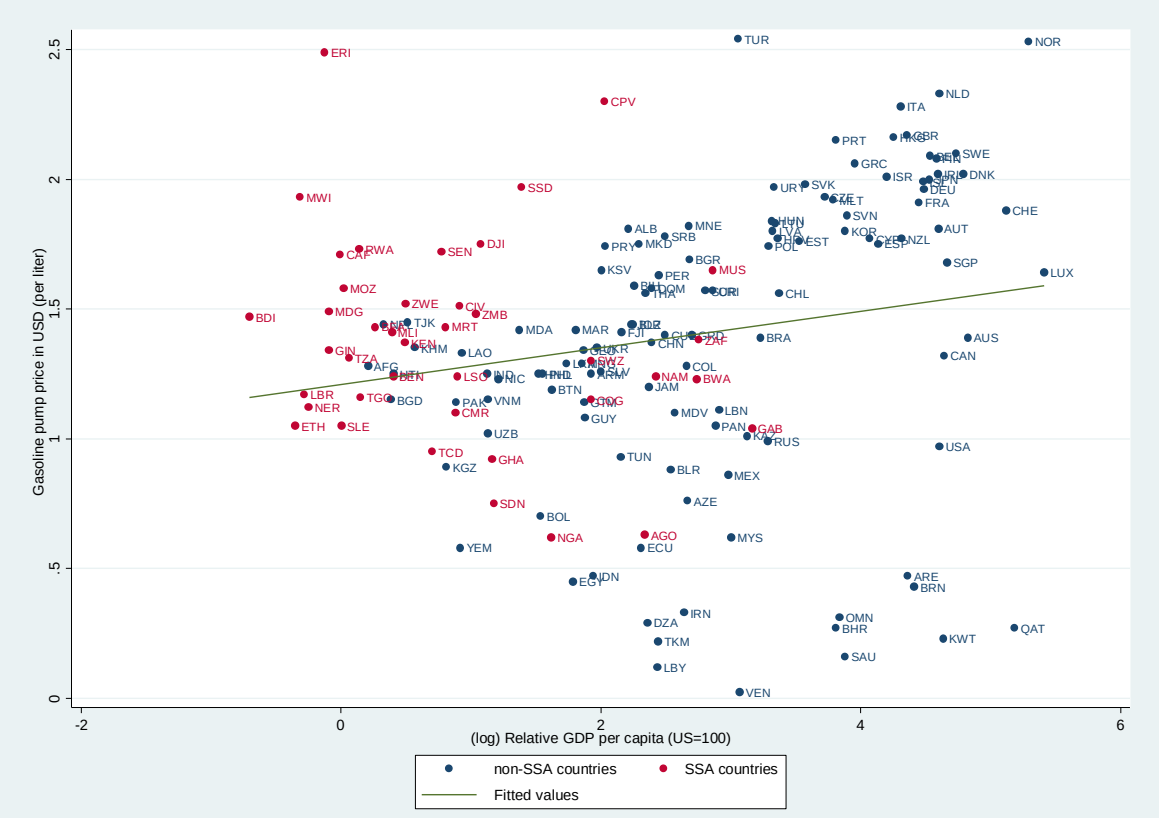
3 Kravis and Lipsey (1983) observe that wages will increase more than proportionately in labor abundant countries with open trade, resulting in a higher price level. It is not clear, however, that this will boost PPP allowing for the Balassa-Samuelson income effect. Based on the performance of countries like China, Indonesia, or Bangladesh, our data suggests that that these countries have relatively low PPP prices taking into account their income levels.

As discussed further below, estimates of GDP in many poor countries may be underreported, especially in Africa. Ghana (60%), Nigeria (89%), Kenya (25%), and Zambia (25%) have recently seen large upwards GDP revisions. Systematic underestimation of GDP levels in poor countries, especially in Africa, would have an effect on the shape of the PPP relationship by contributing to the "flat tail" at low income levels.

2.2 Subsidies and Taxes, especially on Energy.

In mid-2014 the price of a gallon of petrol ranged from to $0.04 in Venezuela to US$9.46 in Norway, a difference of over 80,000 percent. Gasoline prices can be high or low in countries at all points in the income spectrum (Figure 3). Energy subsidies are likely to have large economy-wide price and cost effects, so that countries that spend more on subsidies could have relatively low PPP price levels for their income levels. Such countries will often be hydrocarbon producers but, as the case of Norway indicates, not all oil exporters maintain low prices for domestic fuels[4].

Figure 3. Global Gasoline Prices



4 High fuel prices could also reflect a more general policy of low subsidies or high indirect taxes (VAT, sales or excise) that influence the price level.

2.3 Geography: Isolation, Sparseness and Size.

Isolation and remoteness have repeatedly been identified as obstacles to economic diversification and growth (Redding and Venables 2004, Sachs 2003, Gallup et al. 1998). The same factors will likely to influence the price level, through their effect on transportation costs for traded goods as well as 'scale' effects based on size and population density. Smaller and more isolated countries, such as island states, are likely to be relatively costly. They face higher costs for traded goods in part because of the far higher unit transport costs for small consignments and they are also less able to produce many "non-traded" goods efficiently because of limited scale. Similarly, sparsely populated countries might also see relatively high price levels[5]. Landlocked countries could also face particularly high price levels due to the higher prices associated with overland transportation (in contrast to water-based transport) and dependency on neighboring countries' physical and administrative infrastructure.

2.4 Institutional Quality.

Virtually all measures of institutional quality are strongly associated with income levels. This may reflect a causal relationship from institutions to income (Kaufmann and Kraay 2002, Acemoglu, Johnson and Robinson 2001) although there is still some debate in this area; in any event, a simple association between measures of institutional quality and the price level will be strongly positive.

The more complex question is whether one might expect a "reverse governance" relationship between institutional quality and the price level net of the Balassa-Samuelson effect. At the low end of the development spectrum Collier and Gunning (1999) and Collier (2007) note the possible role of very weak institutions in both reducing incomes and raising costs by reducing the supply of critical non-traded inputs. In an extreme case, as the rule of law and essential infrastructure deteriorate, an economy contracts into a dual economic structure, with very low-productivity subsistence production on the one hand and offshore oil wells on the other. Even products normally considered as non-traded have to be imported, as the country is unable to take advantage of its cheap labor to produce them. As institutions deteriorate further, the price level rises even as income falls.

2.5 Open Labor Markets.

Since the Balassa-Samuelson relationship hinges on increases in the price of non-traded goods and services due to higher labor costs, it raises the question of whether higher-income

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5 Sparseness can be understood in different ways. How a country's population is distributed - whether it is clustered in a few densely populated areas (as in "sparse" Australia) or distributed more or less evenly across all regions (as in "dense" Rwanda) – matters a great deal if we believe that the most critical factor enabling low prices is having sufficient economic mass to facilitate local production. Small islands are a conundrum; though isolated from wider economic mass many are quite densely populated over their small land area.

countries can mitigate this effect through immigration. Since services and construction typically attract a high share of migrant labor immigration would represent a positive supply shock to the non-traded sector and cause a fall in its prices. At the same time the labor inflow, if accurately captured, boosts the domestic population and so reduces the baseline PPP exchange rate as estimated from the Balassa-Samuelson effect. A negative residual – that more open labor markets are associated with a lower PPP net of the income dilution effect – would require the gains from the open labor market to exceed the losses due to the sharing of output among a larger population.[6] A second mechanism linking migration and PPPs could involve remittances: migrant workers send remittances abroad forcing the host country to run a trade surplus through a depreciated exchange rate.

2.6 Financial Inflows that Sustain a Current Account Deficit.

Large inflows of foreign exchange, in the form of aid, remittances, or other flows tend to boost spending and appreciate the real exchange rate, but might not at the same time increase per capita GDP (Prasad et al. 2007). Conversely, policies that limit absorption to run a sustained current account surplus would tend to be accompanied by an "undervalued" PPP exchange rate, as argued by Subramanian and others for China (Subramanian 2010). The impact could of course depend on the reasons for a current account imbalance and how it is financed. For example, perceptions that the economy is very competitive (undervalued) could trigger large investment inflows to finance a current deficit.

These arguments should be distinguished from those around the "overvalued" exchange rates for resource-rich countries. Resource-rich countries may run large current account deficits, as when the prospect of valuable resource rents pulls in large foreign investment in mining or when a government borrows heavily against projected revenues. They may also run prolonged surpluses, to save abroad in a sovereign wealth fund or to finance the remittance of profits by mining companies. Recent research has confirmed the strong link between a high commodity share of exports and higher real exchange rates (Arezki and Ismail 2010, Ricci et al 2008) but this "Dutch Disease" (Ross 2012) is more about the level of the real exchange rate relative to a rate that would be competitive for non-resource producing sectors than about the price level relative to that based on PPP theory. As we will see, some highly specialized resource exporters are heavily *undervalued* on that criterion because of subsidies but this does not necessarily mean that they are more broadly competitive.

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6 As a counterexample, suppose that the immigrants made no contribution to increasing output but only diluted GDP/head. With constant demand shares between traded and non-traded goods their relative price is unchanged as is the PPP price level. This is higher, however, relative to the "reference" PPP price level because the latter decreases with GDP/head.

2.7 Inequality.

The products baskets used for PPP calculation place a high emphasis on product comparability and thus over-weight goods which are available globally or at least across the region (Ravallion 2014). Especially in poor countries many of these globally comparable goods would be marketed largely in urban areas; high levels of inequality could result in "elitist" brand-name and other globally popular, but not locally typical goods being available at high prices to cater to the tastes of a small, but wealthy minority. Over-sampling such globally comparable goods could boost the PPP exchange rate even though the average person might be consuming a very different basket of goods and services.[7] The ICP has taken steps to improve the representativeness of goods priced in its 2011 round and weights goods and services based on their share of GDP. But in poor economies where a very large share of purchased items are second-hand, self-produced or even donated, the price surveys' focus on new items in shops or markets may not adequately reflect the prices faced by a typical citizen who might see a secondhand tee-shirt as a close substitute for a new one.

III Data

PPP estimates.

PPP price level estimates using a consistent methodology are only available in cross-section, one round at a time. While the most recent comprehensive PPP datasets for 2005 and 2011 could be considered as a very short panel there are changes in methodology between these survey rounds, including the way in which regional groups of PPPs are linked together to form the global estimates. In addition, some of the factors we wish to consider will change little over a short period or may only be estimated for one point in time. For these reasons we restrict the analysis to the most recent PPP round of 2011 (Table 1), recognizing that the use of a cross-section imposes some limitations on the analysis.[8]

A total of 199 economies participated in the 2011 ICP round, with 177 providing full, detailed price level results. We use the GDP price level as our dependent variable as it is the most widely used price level indicator and it provides us with a wide picture across the economy. However we have also tested using the price level based on actual individual consumption[9] as our dependent variable, and this yields very similar results to our GDP-

7 Some studies also suggest that the income elasticity for non-tradable goods and services is greater for higher income quintiles so that higher inequality appreciates the real exchange rate (Min 2002; Garcia 1999).

8 PPPs cannot be rigorously extrapolated from the data collection year based on changes in their GDP deflators relative to each other. Discrepancies are caused by a large number of factors (see McCarthy (2011) for a detailed discussion), including differences in the products being priced for the ICP and those being priced to estimate volumes in a country's national accounts. See also: Ravallion (2014) and Deaton and Heston (2010).

9 The sum of individual consumption expenditures of households, and services provided by nonprofit institutions and the government for household consumption

based price level regressions[10]. We include in our analysis all 168 entities for which the overall GDP price level had been published in the 2015 World Bank/ICP report of the 2011 results[11] and for which GDP/head data for 2011 was available from the World Development Indicators database. We exclude 22 for which the overall (GDP) price level had been estimated based on either partial price data (household consumption expenditure for the small Pacific island states) or non-price data comprising a number of economic and other geo-political indicators[12] and an additional nine economies for which no 2011 GDP/head estimates (or other data) were available in the WDI database. Our PPP price level is the price level for each country in internationally comparable terms with the US price level set equal to 100.

One general point on the estimates is that cross-country differences in price levels could be greater than they appear from the PPP data if measured PPP indices overemphasize globally available goods and services because of the pressure to obtain prices for internationally comparable products (Ravallion 2014). Urban areas also tend to be overrepresented in poorer countries, where rural markets can be hard to access (Chen and Ravallion 2008). We comment further on this below.

GDP estimates.

GDP per capita data for 2011 is from the World Bank's World Development Indicators (WDI) database. "Low- and middle income countries' include both lower- and upper-middle income and low income countries from the World Bank's income classifications. IDA-eligible countries are those with a GNI per capita below $1,215. We estimate the baseline Balassa-Samuelson effect as a quadratic function on log GDP per capita.[13] GDP per capita data was available from the WDI for 168 of the 177 economies with price level data. Table 1 shows a summary of data used in the analysis.

Geography and Scale.

While recognizing the complexity of the concept of economic density we use a set of simple established indicators. They include: the size of the economy, overall population density and whether or not the country is a Small Island Developing State (SIDS)[14]. SIDSs include a

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10 Section 4.8 of this paper on the Africa Price Puzzle provides some additional details about these results.

11 See Table 2.1, p. 24-29 (World Bank 2015).

12 For a list of non-benchmark economies and the methodology used to calculate overall price levels when no price data is available, see World Bank (2015), p. 212-213. We have also carried out the estimation using all countries with partial and full price data and GDP/head data availability, with broadly similar results.

13 Higher-order polynomials were also tested but were not an improvement.

14 SIDSs are defined as the 51 countries recognized as such by the United Nations, minus Singapore. We did not classify Singapore as a SIDS for our dataset given its status as a high-income country. Of those SIDS included in the World Bank/ICP price level tables, only 23 have full price level data, conforming to standard ICP calculations.

diverse set of countries, from Jamaica to Fiji, with varying degrees of remoteness, isolation, and access to international markets and so this classification can only be an approximate measure of these attributes. We tested a number of other commonly used geographical variables, including whether a country was landlocked and the length of a country's paved road network, but they had no statistically significant effect on the price level.

Institutional Quality.

As one indicator we use the Government Effectiveness index from the World Bank's Worldwide Governance Indicators (WGI) (Kaufmann et al. 2012). As a broader measure we take the World Bank's Country Policy Institutional Assessment (CPIA) scores for IDA-eligible countries.[15] This indicator rates countries from 1 (low) to 6 (high) against a set of 16 criteria including economic management, structural policies, policies for social inclusion and equity, and public sector management and institutions. We use the World Bank's Logistics Performance Index (LPI) to test specifically for trade-related institutions. The LPI assesses 160 countries in terms of the quality of trade logistics on a scale of 1 (low) to 5 (high), including infrastructure, customs performance, and the ease of arranging competitively priced shipments.

Open Labor Markets.

In the absence of a well-established measure of labor market openness, we use information on mid-year international migrant stocks and total population data for 2010 from the United Nations' Population Division. For the purposes of our analysis, males and females between the ages of 15 and 64 are considered to be part of the workforce.[16] This measure does not account for the time since the migration took place, neither does it distinguish between countries that tie migration specifically to job opportunities (as in the Gulf states) versus countries where the migrant stock is more likely to include non-working members of migrant families.

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15 Although the CPIA is estimated for all of the World Bank's client countries it is only released for those eligible to receive IDA. Nevertheless it is of particular interest as an indicator intended to capture the wide range of institutional and policy features that are considered relevant to economic performance and development.

16 We are grateful to Michael Clemens for suggesting this approach and directing us towards data sources.

Table 1. Data and Sources

Core category	Sub-categories	Proxies	Sources	Year/ Construction
PPP exchange rate (dependent variable)		(log) Relative ratio of PPP conversion factor to market exchange rate; US=100	World Bank (2015)	2011
Income		(log) Relative GDP per capita (current USD); US=100	World Bank (2014)	2011
Subsidies		Fuel subsidies (% of GDP)	IMF (2013)	2011
Geography and Scale	Remoteness/ Isolation	Country is a 'Small Island Developing State'	UN (2014)	2014
	Size of the economy	total (log) GDP	World Bank (2014)	2011
	Population density	(log) number of people per square km	World Bank (2014)	2011
Institutional quality	Effective governance	Worldwide Governance Indicators	Kaufmann et al. (2012)	2011
		Country Policy Institutional Assessments	World Bank (2014)	Average of the four cluster scores, 2009-2012
	Trade infrastructure and capacity	Logistics Performance Index	World Bank (2014)	2012
Open labor markets		Share of international migrants in workforce	UN (2013)	2010
Trade and capital inflows	Trade deficit	Current Account Balance (% of GDP)	World Bank (2014)	Average of 2009-2012 data
	Export composition	Share of manufactures in total exports	World Bank (2014)	2011
	Official Development Assistance	Net ODA received (% of GNI)	World Bank (2012)	Average of 2009-2012 data
Inequality		Gini index	World Bank (2014)	Latest available, 2000- present

Capital Inflows, Trade, and Competitiveness.

We use the current account balance as a share of GDP to measure the imbalance between production and total absorption of goods and services and the ratio of ODA to GNI to measure aid flows.

Inequality.

We take the latest Gini value available for the country from the year 2000 onwards, based on the World Bank's WDI database. One complication with these data is that Gini coefficients are measured on an income basis in some countries and on a consumption basis in others, resulting in substantially lower estimates.[17] Most estimated Ginis for Africa rely on the consumption method, resulting in relative underestimation.

IV Results

We now consider the empirical relationships between these variables and PPPs from the 2011 ICP round. The discussion below summarizes the results of the regressions set out in Annex Table 1. As noted, results are for the set of countries with full price data

4.1 The Balassa-Samuelson Effect and the Main Outliers.

Differences in the level of income explain about 70% of the variance in PPP price levels across countries, consistent with previous findings (Rodrik 2008, Rogoff 1996). We find strong evidence for a quadratic relationship. The Balassa-Samuelson effect is weaker for low- and middle income countries explaining only about 30% of the variance.

Figures 1a and 1b suggest four sets of economies that are off the predicted values for their income level. One cluster of rich but cheap states (gray circle) appears to be primarily oil-rich. Qatar, Kuwait, the United Arab Emirates and Equatorial Guinea have similar per capita incomes to the US and Europe, but prices that are at least 30% lower. The Gulf countries are also unusual in terms of the share of international migrants in their workforce. In the United Arab Emirates and Qatar international migrants make up around 90% of the working age population; Kuwait, Bahrain, Oman, and Jordan are also in the top 10, with international migrant shares greater than 40%. These numbers are clearly far out of the ordinary even compared to other high income countries where the median share of international migrants is around 15%. Similarly, Singapore, Macao, and Hong Kong – also part of our high-income, low-price cluster – also have very high ratios of international migrants.

17 For the OECD population, the average pre-tax income Gini is around 0.46 and the post-tax Gini is 0.31. One would not expect such a large difference for most developing countries because of their less progressive tax systems, but the difference between income and consumption Ginis would still be substantial.

A second set of countries that appears in Figure 1a but not in Figure 1 is a group of small island states with very high PPP price levels. These are estimated by the ICP based on incomplete data and are therefore excluded from the statistical analysis.

A third group of low- and middle-income countries has lower-than-predicted price levels (green circle). These are mostly economies with heavy subsidies on fuel and other goods. Egypt spends about $20 billion a year on energy and bread subsidies; Pakistan and India both provide generous government funding for agricultural inputs and energy. Three of the countries - Vietnam, Cuba, and Laos - are socialist, single-party states with economy-wide subsidies on health, education, and a number of inputs and basic goods.

Finally, African countries (marked in red) stand out as the priciest poor states and are largely responsible for the flattening of the Balassa-Samuelson line at low income levels. As in the 2005 PPP exercise, they are around 30% more costly than other countries at comparable levels of income.

4.2 Fuel Subsidies

All of the high-income oil-rich states with low PPP price levels relative to income maintain large subsidies on fuel consumption as do the low- and middle income states with below expected cost levels. Egypt, the country with the lowest price level in our sample, spends over 6%of its GDP on fuel subsidies alone, while other low-cost countries such as Sri Lanka or Pakistan spend around 1%. Overall, every additional percentage point share of GDP in petroleum subsidies is associated with a 5% lower PPP price level, holding income constant. [18] For low- and middle income countries, the effect is also highly significant though a little smaller, about 3.3%for each additional percentage point in subsidies.

Allowing for fuel subsidies increases the explanatory power of the model across all country groups. Income level and fuel subsidies combined explain over 78% of the variance for the whole sample, and over 43% for developing economies. Since fuel subsidies represent an exogenous policy choice, we incorporate them as a control variable, together with GDP per capita, into the rest of our analysis.

4.3 Small Islands, Sparseness and Economic Size.

After excluding small island economies with insufficient PPP and GDP data, we are left with 23 countries characterized as a small island developing states (SIDS) by the UN (see Annex, Table A1) in our dataset. Being a SIDS is associated with a 10% higher price level controlling for income and fuel subsidies. For low and middle income countries the small island effect is somewhat greater at 12%. Given their atypical characteristics – densely populated, but

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18 The measure includes foregone revenue from selling petroleum products below world prices for net exporters (economic cost). To the extent that fuel subsidies are part of a broader subsidy policy the estimated coefficients might somewhat overstate their impact.

mostly lacking benefits from economies of scale - SIDSs are included as a control variable in further regressions.

Sparse countries are also more costly. Controlling for SIDSs, subsidies, and income, a 10% increase in population density is associated with about 0.3% lower price level; for the IDA eligible countries this increases to over 0.6%. This suggests that higher population density contributes to 'markets of scale', enabling lower prices. We use sparseness as a control variable in our second set of controls in further regressions.

Economic size is not significant in our overall sample, and is sensitive to the inclusion of SIDSs in the subset of low- and middle income countries.

4.4 Institutional Quality.

Because measures of institutional quality are strongly correlated with income, a simple association between them and PPP is strongly positive. The question here is whether, allowing for income levels, fuel subsidies and geography, weak institutions are associated with higher PPP levels in poor countries through the "reverse governance" Collier-Gunning effect.

We first consider the WGI measure of government effectiveness. Taking all economies in the sample, having a more effective government has no significant relationship to PPP if we include our usual controls.[19] For low- and middle income countries, we observe a weak negative association between good governance and the price level (only significant at the 10% confidence level). Controlling for income, subsidies, and SIDSs; one additional point on the effectiveness index is associated with a 7% lower price level. However, once we also include population density in the model, the relationship loses significance. We see similar results for the smaller group of IDA eligible countries[20].

Using the more comprehensive CPIA indicator for IDA eligible countries yields a similar result. One additional point on the CPIA is associated with a 12.5% lower price level for

19 GDP per capita, GDP per capita squared, fuel subsidies and SIDSs. The sign on the coefficient is positive, but closer examination of the data suggests that any such 'price penalty' effect is driven by the high income countries, and specifically the difference between the 'grey-circle', resource-rich countries and the high-income, high-PPP OECD countries (in the top right corner of Figure 1) that generally have higher ratings for government effectiveness.

20This is one of our more puzzling findings, which hints at a substitutive relationship between good governance and scale. Perhaps it is easier for governments to deliver services to more densely populated areas; or a more concentrated populace can exert more influence on the government than a geographically more dispersed one. However, an interaction variable for population density and government effectiveness was not significant.

IDA eligible countries, applying our standard controls, but while the coefficient remains negative its level of significance is also sensitive to the inclusion of population density. [21]

These results offer a modest degree of support for the Collier-Gunning "reverse governance" proposition that at low levels of development very poor policies and institutions can contribute to both impoverishment and higher prices at the same time.

4.5 Open Labor Markets.

Considering all countries with data on the share of international migrants in the labor force, and controlling for incomes, fuel subsidies and SIDSs, countries with more migrants tend to have lower PPP exchange rates. A ten percentage points higher share of migrants in the labor force is associated with a 7% lower price level. As expected, this is mainly an upper-income phenomenon.[22] Consistent with previous findings by Lach (2007) and Cortes (2008) regarding immigrants' effect on prices, migrants appear to create a positive supply stimulus to the non-traded sector, lowering prices and making the economy more price-competitive, particularly in higher income countries.[23] The gains from open labor market policy appear more than sufficient to compensate for the effect on expected PPP of sharing output among the larger population. Open labor markets are still significant after excluding the Gulf countries as perhaps a special case.

4.6 Financial Flows and the External Account

We find that a more positive current account balance is associated with a lower price level in the full sample group: a ten percentage point greater current account balance is associated with a 7% lower price level. This underlines the link between competitiveness (as demonstrated by low prices) and export orientation. This effect however disappears among low- and middle income economies once we control for the presence of small island states.

At the same time, official development assistance (ODA) as a percentage of GNI, appears to be of considerable importance for developing countries. Applying the standard controls, a ten-percentage point greater ODA share in GNI is associated with an 8% higher price level

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21 Regarding the Logistics Performance Index (LPI), the coefficient is negative, but not significant for any of the country groups, using our standard set of controls.

22 For low- and middle income countries the coefficient is also negative, but it is only significant if we also control for location in Sub Saharan Africa. In this case a ten percentage points higher share of migrants in the labor force is associated with a 3% lower price level. For IDA eligible countries, the share of international migrants in the labor force is not significantly associated with the PPP price level.

23 An alternative explanation could suggest that migrants are more likely to choose countries with higher overall incomes, but low price levels as their destination. However, the restrictive nature of immigration policies, particularly the need for sponsors for low-skilled immigrants both in the Gulf and Western countries, suggests that immigrants have limited choice of destination countries and that immigration levels can reasonably be taken as an indicator of policy.

for the subset of low- and middle-income countries. The effect is similar for IDA eligible countries: a ten percentage point increase of ODA in GNI is associated with a 7% higher price level. We find no significant relationships between greater inflows of remittances or FDI and the price level.

While ODA enables poor countries to run current account deficits the relationship between ODA and the current account turns out to vary widely, even across lower-income countries. For example, Sri Lanka, Senegal, and Rwanda all recorded current account deficits around 8% of GNI in 2011 but their ODA/GNI ratios differed a great deal -– 1% in Sri Lanka, 7% in Senegal and almost 20% in Rwanda. A closer look indicates that some differences reflect statistical errors. The Gambia is the most conspicuous case of a country apparently receiving high levels of ODA and recording a current account surplus. However, the 2013 IMF Staff Report on Gambia notes that, contrary to the authorities' reporting, the country has most likely been running a large current account deficit (IMF 2013).

4.7 Inequality

Higher income inequality, as measured by a higher Gini index, is associated with a higher PPP price level. Overall, having a Gini 10 points greater is reflected in a 7.4% higher price level allowing for our controls. This effect is mostly felt in lower-income countries: for low- and middle income countries the same increase in the Gini is associated with a 9% higher PPP price level and for IDA eligible countries with close to a 14% increase[24]. For the group of high- and upper middle income countries alone, we see no association between inequality and PPP.

This pattern lends some support to the proposition that correlation between inequality and higher PPPs could be due to the ICP's over-sampling of internationally comparable goods, particularly those consumed by only a small elite in poor developing countries.

4.8 The Africa Price Puzzle

Why is Africa so costly? Is the "Africa effect" a symptom of some of the factors already considered in the analysis or does it reflect other factors that are peculiar to the region? None of the independent variables used in our main analysis can eliminate the significance of our sub-Saharan Africa dummy in conjunction with our standard sets of controls[25]. However, including the Gini as a measure of inequality shrinks the SSA dummy coefficient by about one third. The analysis points to several possible factors behind high African PPP price levels some of which are related to dualism and inequality.

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24 Due to missing values for the Gini the number of observations in our regressions is reduced to 129 countries for all countries, 97 for the low- and middle income group, and only 55 in the IDA eligible group.

25 Set 1: Income, income squared, fuel subsidies, SIDS dummy; Set 2: Set 1 + population density, economic size, government effectiveness

Applying our standard controls, the 'Africa effect' remains large for all three groups of countries. For the whole sample, location in Sub Saharan Africa is associated with a more than 15% higher PPP exchange rate; this jumps to 20.5% for low-and middle-income countries and to 32% for IDA eligible countries. Such a difference would place African states at a significant disadvantage compared with their closest competitors in international markets.

Sparseness and Scale. African countries tend to be relatively sparsely populated. Controlling for population density cannot explain their high PPP price levels although the size of the Africa effect decreases somewhat (to 12.6% for all countries and 18% for low-and middle income ones); neither can the small size of Africa's economies explain away their high price levels.

Institutional quality. Sub-Saharan Africa is often associated with weak institutions, corrupt governments, and instability and the previous analysis suggested at least weak support for the proposition that this raises costs. However, the Africa effect remains when we control for our institutional quality variables (and using our four standard controls).

Open labor markets. While our findings suggest that a higher share of international migrants is associated with lower price levels this is mainly an upper-income relationship. Nevertheless, it is possible to imagine that Sub Saharan African countries could be at a disadvantage if they lose out on migration-linked benefits that lower costs, such as improved trade connections between host and home countries or a more highly skilled labor force in local non-traded production of goods and services. However, open labor markets are not a significant determinant of the 'Africa effect'.

Financial Flows and the External Account. Even though aid dependence appears to be associated with a higher PPP price level, we find no relationship between the current account balance or the level of ODA and the Africa effect.

Inequality. Taking the countries for which data on the Gini is available, its inclusion reduces the Africa effect. For low and middle income countries the price premium falls by about one third or almost 5 percentage points. The impact is probably understated because the use of consumption-based Ginis underestimates inequality in Africa. At least part of Africa's unusually high PPP exchange rates could therefore be due to the oversampling of globally comparable urban goods, including those demanded by expatriates.

Underestimation of Income. Another possibility is that the Africa effect reflects widespread underestimation of income levels. The recent upwards revisions of GDP in several countries, including Ghana (60%), Nigeria (89%), Kenya (25%), and Zambia (25%) suggest that this could be the case for many countries on the continent. Taking a linear approximation to the relationship between the logs of income and PPP, an illustrative 30% increase in income per head would correspond to a 5.3% increase in the PPP price variable. This could account for as much as another third of the Africa effect.

As a further test, we include the World Bank's Statistical Capacity Indicator as an independent variable (Table 4). The PPP price level is negatively associated with this indicator and the coefficient is robust to our usual controls as well as the inclusion of the measure of government effectiveness variable. It is no longer statistically significant when the Sub-Saharan Africa dummy is included but at the same time, the size of the coefficient on the SSA dummy is somewhat reduced. This suggests that low statistical capacity (taken as a proxy for underestimated GDP) is one of the factors behind Africa's high price levels.

Omission of Second-hand Markets. The ICP's price surveys only collect prices for new products. However, in many Sub-Saharan African countries a large proportion of consumer goods, from clothing to heavy machinery, are bought and sold on second-hand markets. Recent estimates suggest that second-hand clothing represents 30% of the total value of clothing imports of Sub-Saharan African countries, twice as much as for South Asia and seven times the share in Latin America (Baden and Barber 2005). In 2013 Benin alone imported an estimated 314,000 used vehicles - many destined for the Nigerian market - - more than twice the number of new cars sold outside in SSA excluding South Africa (Ribstein and Boswell 2014)[26]. While there are good reasons for not covering second-hand prices in surveys, these could be a factor in reducing the effective cost of living for purchasers who buy mostly second-hand goods and see little quality premium in a new product. This could imply that African economies are more competitive than suggested by the ICP's price level data.

Weak Agricultural Capacity. We finally consider whether the source of high prices in Africa can be traced to low agricultural productivity. The price level for the ICP category of food and non-alcoholic beverages is considerably higher in Africa relative to the prices for most other ICP categories. Food and non-alcoholic beverages also account for 23% of nominal expenditures in Africa, the highest share of all regions[27]. Figure 4 illustrates how the relationship between food price levels and income appears to be flat for low- and middle income countries. Only at much higher income levels (around $12,500 GDP p/c), does a marked association between higher income and higher food price levels emerge.

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26 For comparison, GM sold 80,000 new cars in Sub-Saharan Africa in 2012, of which only 10,000 went to countries other than South Africa. Toyota sold 243,000 new cars in all of Africa (including North Africa), of which over 150,000 went to the South African market.

27 Expenditures on food and non-alcoholic beverages account for around 12% of nominal expenditures in Asia and the Pacific and in Latin America; while only 7% in Europe and OECD member states.

Figure 4. Price Level Index of Food and Non-alcoholic Beverages and nominal GDP per capita

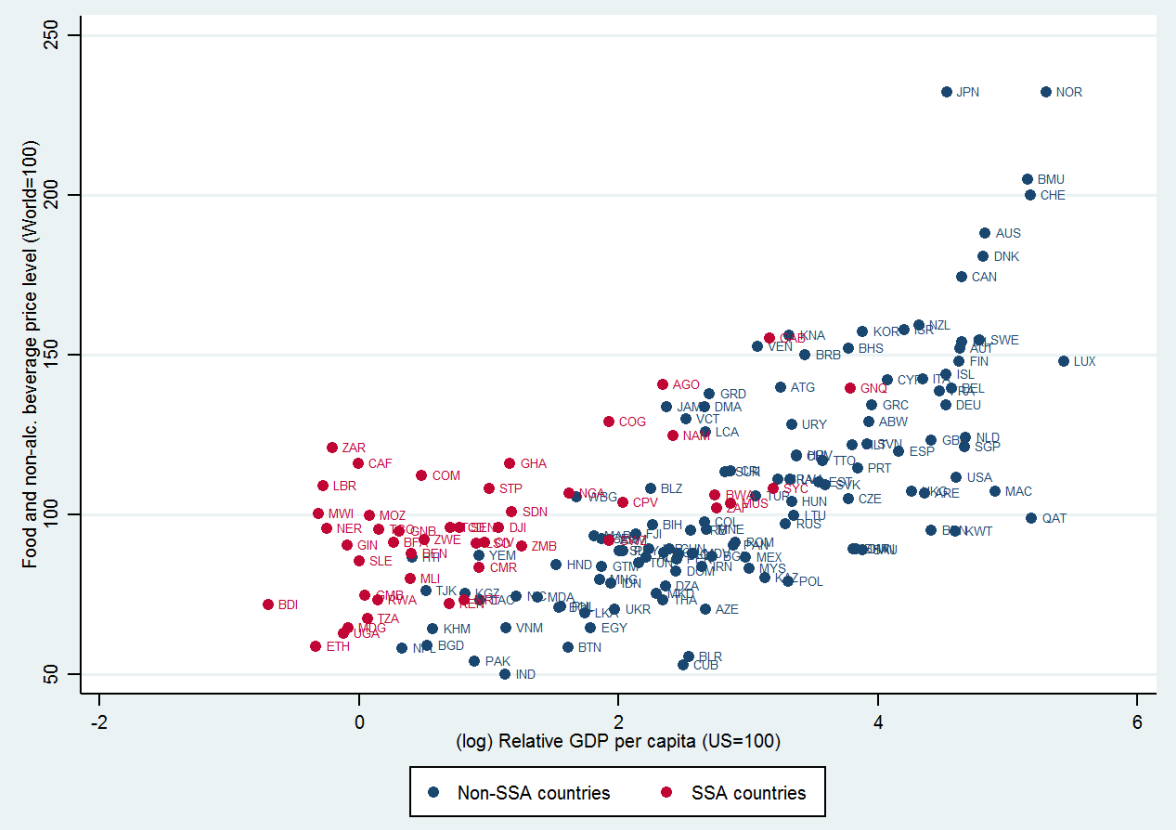


Figure 5 depicts the ratio of the price level for food and non-alcoholic beverages relative to the overall ICP price level. Food is relatively more expensive in poorer countries, and particularly so in many African countries. On average the food price level is about 50% higher in low- and middle income countries than the overall price level in the economy. The country with the lowest relative food price, the Netherlands, has highly competitive agriculture characterized by productive industrial farming and excellent distribution and logistics, conditions that are very different from those in most low-income countries. [28]

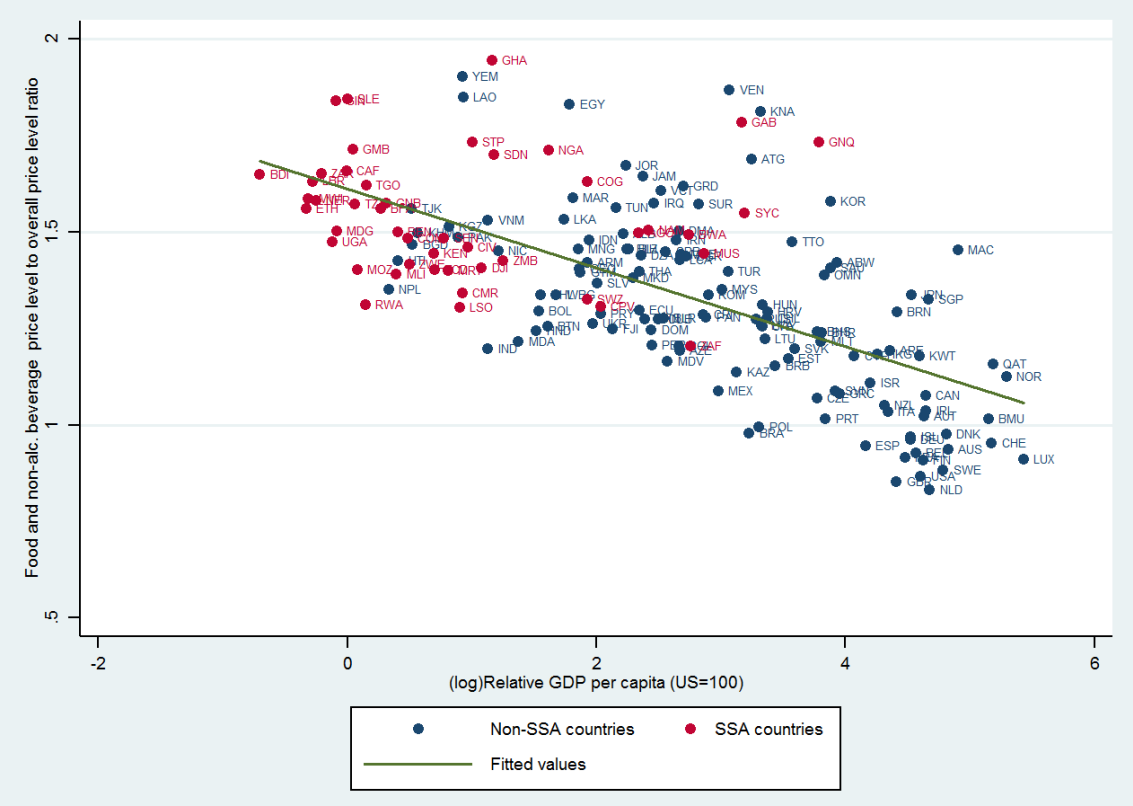
In the absence of the high relative price of food there would be less 'flattening of the curve' in the relationship between PPP price levels and income in poor countries.[29] Part of the high observed price levels may be that in many low income countries a large part of the food

28 Despite its small land area, the Netherlands is the world's second largest food exporter after the United States; for more details, see: http://www.the-netherlands.org/key-topics/food--nutrition

29 We cannot calculate the non-food price level index for all countries; however, given that food is about 50% more expensive in low-income countries and that it makes up about 20% of total expenditures, we estimate that the price level of the rest of the economy is likely to be 10% lower than the overall price level

consumed is self-produced: in Sub-Saharan Africa about 70% of the production is estimated to be subsistence farming (IAASTD 2009).

Figure 5. Ratio of the food and non-alcoholic beverages price level to the overall price level and nominal GDP per capita



As noted previously (p.10), we also tested the use of the PPP price for household consumption as our dependent variable. In line with the food price level results above, we found the coefficient on the Sub-Saharan African dummy to be greater than before (and always significant). Small island developing states also appeared consistently more expensive than other economies in terms of individual consumption-based prices.

V Price competitiveness and manufactured exports

With the exception of a few specialized natural resource exporters, most of the countries that have graduated to high or upper-middle-income status have done so through the expansion of manufacturing industry. The importance of manufactured exports for economic growth has been highlighted by a number of recent studies. Rodrik (2008) places particular emphasis on the importance of undervalued currencies – measured by low price levels – in spurring the growth of manufactures and manufactured exports. We test whether this appears to be the case using the most recent PPP data and the extent to which a relationship appears to reflect structural or other features that may influence both the price

level and the comparative advantage of the country. We use the overall (GDP) price level and variables as discussed above. Data on the share of manufactures in exports comes from the WDI database.

Results

As expected, countries with relatively high prices are less competitive in manufactures. For all three of our country groups the PPP exchange rate demonstrates a statistically significant negative relationship with the share of manufactured goods in total exports, after controlling for income, small islands, and fuel subsidies. The relationship is also robust to the inclusion of scale and institutional quality indicators. Controlling for fuel subsidies actually boosts the strength of the relationship because many oil exporters subsidize domestic energy.[30] However, the coefficient on the PPP exchange rate reduces as other "independent" variables like small island states and governance are included. In particular, governance appears to be particularly strongly associated with manufactured exports. Scoring one point higher on the WGI's government effectiveness scale is associated with a 13 percentage point higher share of manufactured exports, holding all else constant.

Taking all countries in the sample and adding also the Africa dummy, the coefficient on the price level is no longer significant, suggesting that its effect may largely reflect geographic and institutional factors that influence both production structure and costs. However, the comparative cost theory might be expected to apply more strongly in poor countries where labor costs are a more important determinant of industrial competitiveness. Indeed, the PPP price level coefficient is quantitatively far larger for these countries and it maintains its significance as structural and institutional variables are included, even when an Africa dummy is added.

VI Conclusion

This study examines the latest PPP data for 2011, to better understand the global pattern of the PPP estimates and also their implications for export competitiveness, a topic of particular significance for Africa. The approach is to use theory to suggest a range of variables that could reasonably be expected to affect PPP and to include the most plausibly exogenous ones as controls while investigating a further set of relationships. The cross-section nature of the exercise is a constraint on the analysis, but we see no easy way round this because the methodology for determining PPPs differs between rounds. While the results cannot assert causation, the nature of many of the variables suggests that they influence the PPPs rather than the reverse.

30 Energy costs do of course play a role in the location of industry. Arezki and Fetzer 2014 analyze the return of manufacturing to the US as a result of the lower energy prices made possible by the Shale Revolution.

Our results confirm that PPP price levels are higher in richer countries as suggested by the Balassa-Samuelson effect. However, this relationship is not as strong as might be expected. There are several groups of outliers and income explains only one third of the variation in PPPs for low and middle-income countries with full data. Geography accounts for part of the variation. Small island states, have consistently high PPP prices (plus 10%) for their income. Higher population density is correlated with lower PPP prices – density implies larger local markets for labor and goods and is likely to boost competition and efficiency and to hold down prices.

Cheap fuel policies are strongly associated with low PPP price levels. Each percentage point of GDP in economic fuel subsidies (taking the world price of fuel as a reference point) translates into a 5% lower PPP price level. Many of the cheap-fuel countries are oil exporters although not all oil exporters pursue cheap-fuel policies. More open labor markets also seem to be important, at least for higher income countries. Those with a larger share of migrants in their labor force seem to reap large gains from of expanding the supply of non-traded goods and services that more than offsets the PPP effect of having to divide (the higher) GDP among more people. The Gulf nations provide very cheap energy and permit a high migrant share in their workforces as well as imports. Their PPP price levels are therefore very low, only around half of the level in European countries with similar incomes. Some, notably Dubai, are actively using this low-cost strategy to diversify their economies (Gelb 2011).

Because governance indicators are strongly associated with income levels the simple association between governance and PPP is strongly positive. However, at least in the low-income countries there is some support for a "reverse-governance" relationship, though its strength depends on the indicator used. Poor countries are not necessarily cheap when their poverty is driven by very poor governance. With high levels of crime and violence and poor regulation they cannot take advantage of their cheap labor and resources to produce non-traded goods and services. This both constrains the supply of traded goods and requires products that are usually non-traded to be imported at high cost.

Aid inflows are strongly correlated with higher price levels as is (more weakly) the current account, but FDI and remittances are not. This lends some support to the theory that aid results in unproductive spending that drives up prices without strengthening the supply-side of the economy. Aid flows are less clearly exogenous than geography however, and it is not implausible to speculate that some of the reason for the effect could be the response of aid to factors that contribute to higher PPP. Our results also indicate that the relationship between the current account and the price level depends on the reason for imbalances and how they are financed.

So far, the statistical results support the "rationality" of PPP measurements in the sense that PPP price levels relate to geography, policies and institutions in ways that conform to theory. However, the strong correlation between inequality and higher price levels, even after controlling for income, geography, scale and subsidies as well as institutional quality raises

questions. Higher inequality could be associated with elite demand for 'brand' items, for which sellers can charge large premiums in smaller markets. Consistent with previous studies, an over-emphasis on pricing globally comparable products could lead to over-weighting of such traded products in the bundle of goods and services used to measure PPPs in poor countries.

PPP price levels matter for export diversification. A greater share of manufactured goods in exports is strongly associated with lower PPP rates, especially outside the high-income country group. The relationship between PPP and manufactured export share is even stronger once energy subsidies are factored in, as some of the countries with low PPPs are energy-rich countries that pursue cheap-fuel policies. Once we begin to introduce other factors, including geography (such as small-island status) and institutions that also plausibly influence both PPPs and the export share of manufactures, the story becomes more subtle. Taking the global set of countries, these erode the significance of PPP so that the latter becomes more a symptom of a number of factors that limit export diversification. For low and middle-income countries PPP retains its significance as a correlate of export structure, but with a lower coefficient.

The 2011 PPPs confirm the tendency for African countries to have higher price levels than countries with similar incomes in other parts of the world. This 'Africa effect' is robust to the inclusion (one-by-one and jointly) of our controls and other variables, including aid dependence and inequality, although their inclusion does reduce its magnitude. GDP measurement errors could be partly responsible for the residual effect -- based on the recent large GDP revisions for Kenya, Ghana and Nigeria, per capita incomes in Africa may be considerably higher than reflected in the data. Correcting for this would reduce the 'overvaluation' seen for many poor African countries though it is unlikely to eliminate it fully.

Finally, food prices appear to be a particularly strong driver of Sub-Saharan Africa's high PPP price level. This suggests that the source of low competitiveness, for example in manufactures, may largely lie outside that sector, in agriculture.

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Annex Tables

Table 1. OLS regression results[31]

Effect on price level						
Independent Variables	Income group	Control variables				
		Income	Income + income squared	Controls 1 (Fuel +SIDS)	Controls 1 + SSA	N[32]
Income (log relative GDP per capita)	All	0.206*** (0.0142)[33]	-0.007 (0.0361)	0.00769 (0.0364)	0.0686* (0.0408)	168-160
	Low- and Middle Income	0.118*** (0.0171)[33]	-0. 0159 (0.0596)	-0.00145 (0.0593)	0.105* (0.0563)	112-107
	IDA eligible	0.133*** (0.0279)[33]	-0.0492 (0.0810)	-0.0295 (0.0874)	0.0713 (0.0743)	64-59
Income squared	All	… …	0.0445*** (0.00798)	0.0434*** (0.00789)	0.0359*** (0.00809)	168-160
	Low- and Middle Income	… …	0.00466** (0.0187)	0.0433** (0.0187)	0.0227 (0.0176)	112-107
	IDA eligible	… …	0.0840*** (0.0298)	0.0712* (0.0362)	0.0685** (0.0272)	64-59
Population density (log number of people per sq. km)	All	-0.0206 (0.0135)	-0.0303** (0.0127)	-0.0329*** (0.0101)	-0.0263** (0.0103)	168-160
	Low- and Middle Income	-0.0230 (0.0141)	-0.0220 (0.0135)	-0.0375** (0.0143)	-0.0222 (0.0110)	112-107
	IDA eligible	-0.0246 (0.0215)	-0.0385* (0.0213)	-0.0606*** (0.0212)	-0.0356** (0.0172)	64-59
Economy size (log GDP)	All	-0.0101 (0.00897)	-0.0135 (0.00819)	0.00346 (0.00982)	0.00823 (0.00934)	168-160
	Low- and Middle Income	-0.0344*** (0.0100)	-0.0342*** (0.00947)	-0.0207 (0.0125)	-0.0131 (0.0116)	112-107
	IDA eligible	-0.0541*** (0.0137)	-0.0452*** (0.0163)	-0.0358 (0.0226)	-0.0342** (0.0168)	64-59
WGI Government Effectiveness	All	0.123*** (0.0316)	0.0664* (0.0360)	0.0287 (0.0380)	0.0511 (0.0387)	168-160
	Low- and Middle Income	-0.0333 (0.0392)	-0.0457 (0.0389)	-0.0744* (0.0420)	-0.0573 (0.0384)	112-107
	IDA eligible	-0.0790 (0.0511)	-0.126*** (0.0449)	-0.116** (0.0525)	-0.0576 (0.0446)	64-59

31 The displayed values represent the coefficient on the independent variable (far left column) in a regression with a given set of controls (displayed on top), and the price level as the dependent variable. The N column represents the number of observations. Each regression was run for three groups of countries, as categorized by their income level.

32 High value represents number of observations without controls, low value after the inclusion of the fuel subsidies control.

33 Results of the bivariate regression, with only income on the right-hand side

Table 1. (continued)

Effect on price level							
Independent Variables	Income group	Control Variables					
		Income	Income + income squared	Controls 1 (Fuel +SIDS)	Controls 1 + SSA	Controls 2 (C1 + Pop, Size, G E)	N[34]
CPIA	IDA eligible	-0.147** (0.0574)	-0.156*** (0.0460)	-0.134** (0.0642)	-0.0681 (0.0559)	-0.0832[35] (0.0632)	64-60
LPI	All	0.115* (0.0583)	-0.0150 (0.0674)	-0.0288 (0.0634)	-0.00317 (0.0579)	0.0204 (0.0684)[35]	141-136
	Low- and Middle Income	-0.109* (0.0637)	-0.122* (0.0641)	-0.110 (0.0665)	-0.0742 (0.0498)	-0.0713 (0.0728)[35]	95-90
	IDA eligible	-0.220** (0.0978)	-0.205** (0.0985)	-0.154 (0.118)	-0.0695 (0.0861)	-0.0913 (0.111)[35]	52-47
Current Account Balance (% of GDP)	All	-0.00782*** (0.00173)	-0.0101*** (0.00181)	-0.00712*** (0.00192)	-0.00683*** (0.00195)	-0.00681*** (0.00181)	159-152
	Low- and Middle Income	-0.00515*** (0.00160)	-0.00471*** (0.00157)	-0.00258 (0.00174)	-0.00208 (0.00174)	-0.00222 (0.00208)	105-101
	IDA eligible	-0.00549** (0.00242)	-0.00337 (0.00230)	-0.00231 (0.00251)	-0.00237 (0.00226)	-2.43e-06 (0.00275)	59-55
ODA (% of GNI)	Low- and Middle Income	0.0110*** (0.00317)	0.00958*** (0.00307)	0.00827*** (0.002249)	0.00733*** (0.00204)	0.00795*** (0.00285)	108-104
	IDA eligible	0.00992*** (0.00296)	0.00793*** (0.00265)	0.00712*** (0.00226)	0.00530*** (0.00146)	0.00552*** (0.00205)	63-59
Int'l Migrant Share (% of total workforce)	All	-0.00414*** (0.00120)	-0.00775*** (0.00134)	-0.00656*** (0.00128)	-0.00672*** (0.00128)	-0.00631*** (0.00133)	164-157
	Low- and Middle Income	-0.00141 (0.00293)	-0.000512 (0.00265)	-0.00179 (0.00202)	-0.00297* (0.00169)	-0.00381* (0.00194)	110-105
	IDA eligible	0.00734* (0.00428)	0.00487 (0.00465)	0.00146 (0.00532)	0.000666 (0.00364)	0.00166 (0.00508)	63-58
Inequality (Gini coefficient)	All	0.00393* (0.00222)	0.00844*** (0.00178)	0.00741*** (0.00192)	0.00479** (0.00207)	0.00714*** (0.00209)	135-131
	Low- and Middle Income	0.0101*** (0.00170)	0.00981*** (0.00169)	0.00880*** (0.00189)	0.00582*** (0.00213)	0.00859*** (0.00204)	104-100
	IDA eligible	0.0124*** (0.00238)	0.0133*** (0.00225)	0.0138*** (0.00287)	0.00749** (0.00313)	0.0125*** (0.00291)	59-55

34 High value represents number of observations without controls, low value after the inclusion of the fuel subsidies control.

35 Government effectiveness control not included; only population density and economic size are controlled for

Table 2. The SSA dummy coefficient[36]

Africa effect (SSA dummy) on Price Level			
Independent Variables	Income group	Controls 1 (Income, Fuel +SIDS)	N
Income + Income squared	All	0.145*** (0.0448)	160
	Low- and Middle Income	0.187*** (0.0380)	107
	IDA eligible	0.278*** (0.0358)	59
Population density	All	0.119*** (0.0451)	160
	Low- and Middle Income	0.165*** (0.0396)	107
	IDA eligible	0.244*** (0.0382)	59
Economy size	All	0.151*** (0.0445)	160
	Low- and Middle Income	0.179*** (0.0377)	107
	IDA eligible	0.276*** (0.0315)	59
WGI Government Effectiveness	All	0.161*** (0.0443)	160
	Low- and Middle Income	0.179*** (0.0375)	107
	IDA eligible	0.263*** (0.0390)	59

Africa effect (SSA dummy) on Price Level				
Independent Variables	Income group	Controls 1 (Income, Fuel +SIDS)	Controls 2 (C1 + Pop, Size, GE)	N
CPIA	IDA eligible	0.264*** (0.0401)	0.248*** (0.0392)	59
LPI	All	0.202*** (0.0433)	0.175*** (0.0447)	136
	Low- and Middle Income	0.210*** (0.0389)	0.192*** (0.0414)	90
	IDA eligible	0.277*** (0.0428)	0.274*** (0.0445)	47
Current Account Balance	All	0.148*** (0.0503)	0.139*** (0.0512)	152
	Low- and Middle Income	0.172*** (0.0422)	0.161*** (0.0425)	101
	IDA eligible	0.268*** (0.0381)	0.251*** (0.0394)	55
ODA	Low- and Middle Income	0.174*** (0.0378)	0.153*** (0.0386)	104
	IDA eligible	0.265*** (0.0369)	0.236*** (0.0418)	59
Int'l Migrant Share	All	0.161*** (0.0485)	0.148*** (0.0452)	157
	Low- and Middle Income	0.200*** (0.0377)	0.171*** (0.0382)	105
	IDA eligible	0.279*** (0.0361)	0.249*** (0.0393)	58
Inequality	All	0.137*** (0.0412)	0.110*** (0.0398)	131
	Low- and Middle Income	0.144*** (0.0397)	0.113*** (0.0365)	100
	IDA eligible	0.224*** (0.0391)	0.191*** (0.0426)	55

36 Values in table show the coefficient on the SSA dummy, with the (log) relative price level as the dependent variable. The independent variables in each regression are show in the left-hand column, while the controls included are on the top. Each regression with its main independent variable was run for three groups of countries, as categorized by their income level.

Table 3. The price level and the share of manufactured goods in exports

	All countries					
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp
log GDP per capita	9.972**	13.93***	16.59***	8.901	13.69***	8.579
	(4.634)	(4.607)	(4.686)	(6.262)	(4.418)	(6.314)
log GDP per capita sq	-0.302	0.563	-0.197	0.323	-2.102	-1.700
	(1.260)	(1.453)	(1.489)	(1.396)	(1.357)	(1.359)
log Price Level	-5.429	-40.23**	-35.65**	-26.12	-23.33*	-17.68
	(14.51)	(17.27)	(17.28)	(17.84)	(13.75)	(14.35)
WGI_GovEff					12.93**	12.93**
					(5.693)	(5.682)
logPop_density					5.412***	5.110***
					(1.759)	(1.774)
log GDP					2.933**	2.762**
					(1.300)	(1.277)
Fuel subidies (% of GDP)		-8.872***	-9.178***	-9.126***	-7.023***	-7.031***
		(1.429)	(1.426)	(1.375)	(1.570)	(1.528)
SIDS dummy			-15.43*	-14.61*	-11.22	-10.96
			(8.079)	(8.405)	(7.973)	(8.142)
SSA dummy				-17.13*		-11.63
				(8.897)		(8.724)
Constant	43.30	173.7***	156.7**	136.4**	70.34	62.50
	(54.27)	(64.62)	(64.62)	(62.81)	(56.51)	(55.85)
Observations	137	133	133	133	133	133
R-squared	0.138	0.291	0.313	0.338	0.459	0.470

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

	Low and middle income countries only					
	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp
log GDP per capita	7.348	14.84**	17.52***	13.45*	14.35**	11.21
	(6.828)	(6.366)	(6.202)	(7.071)	(5.963)	(7.139)
log GDP per capita sq	2.824	1.700	0.918	1.283	-0.377	-0.123
	(2.619)	(2.449)	(2.395)	(2.357)	(2.237)	(2.219)
log Price Level	-60.25***	-82.01***	-74.31***	-66.78***	-55.93***	-51.02***
	(13.95)	(13.16)	(13.43)	(15.66)	(14.34)	(15.40)
WGI_GovEff					12.50*	13.08**
					(6.502)	(6.486)
logPop_density					4.294	3.925
					(2.587)	(2.644)
log GDP					1.745	1.752
					(1.932)	(1.918)
Fuel subidies (% of GDP)		-8.267***	-8.839***	-8.863***	-7.251***	-7.262***
		(1.427)	(1.480)	(1.489)	(1.504)	(1.505)
SIDS dummy			-19.34**	-19.16**	-19.65*	-19.17*
			(8.211)	(8.637)	(9.928)	(10.18)
SSA dummy				-7.461		-5.597
				(8.635)		(8.264)
Constant	246.0***	327.2***	298.9***	277.8***	205.7***	194.6***
	(52.80)	(49.86)	(50.74)	(54.78)	(61.98)	(63.68)
Observations	87	85	85	85	85	85
R-squared	0.207	0.348	0.388	0.395	0.478	0.482

	IDA eligible countries only					
	(13)	(14)	(15)	(16)	(17)	(18)
VARIABLES	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp	Man_exp
log GDP per capita	15.25*	24.09***	22.22**	13.36*	24.39**	13.29
	(8.029)	(8.462)	(8.472)	(7.070)	(10.72)	(9.485)
log GDP per capita sq	-2.482	-5.442	-3.339	-5.409	-5.271	-6.097
	(3.999)	(4.255)	(4.242)	(4.384)	(4.881)	(4.857)
log Price Level	-75.87***	-84.95***	-81.38***	-48.68***	-65.65***	-36.61
	(17.24)	(16.33)	(16.72)	(17.24)	(23.12)	(22.39)
WGI_GovEff					0.326	-0.933
					(9.322)	(9.413)
logPop_density					5.050	3.197
					(4.108)	(3.728)
log GDP					-0.407	1.186
					(3.609)	(3.071)
Fuel subidies (% of GDP)		-7.773**	-8.122**	-9.000**	-6.955*	-8.407**
		(3.583)	(3.593)	(3.636)	(3.844)	(3.919)
SIDS dummy			-15.89*	-10.49	-25.22	-12.24
			(8.762)	(10.64)	(16.72)	(18.12)
SSA dummy				-24.26**		-23.31**
				(10.62)		(11.30)
Constant	303.4***	338.1***	324.9***	226.7***	248.9**	156.0
	(64.91)	(61.45)	(63.13)	(59.25)	(107.6)	(98.48)
Observations	46	44	44	44	44	44
R-squared	0.307	0.382	0.400	0.479	0.436	0.502

Table 4. Statistical capacity and the price level

	Low and middle Income countries only						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
VARIABLES	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level
log GDP per capita	0.129***	-0.00861	0.0236	0.0528	0.119**	0.0464	0.112*
	(0.0214)	(0.0587)	(0.0571)	(0.0595)	(0.0542)	(0.0598)	(0.0574)
log GDP per capita^2		0.0493***	0.0453**	0.0372**	0.0238	0.0368**	0.0249
		(0.0185)	(0.0176)	(0.0187)	(0.0175)	(0.0183)	(0.0173)
WGI GovEff	-0.0333	-0.0457	-0.0623	-0.0373	-0.0413	-0.0224	-0.0333
	(0.0392)	(0.0389)	(0.0446)	(0.0390)	(0.0378)	(0.0416)	(0.0401)
log Pop_density						-0.0236	-0.0137
						(0.0149)	(0.0148)
log GDP						-0.00502	-0.00628
						(0.0128)	(0.0127)
Fuel subsidies (% of GDP)			-0.0397***	-0.0381***	-0.0306***	-0.0349***	-0.0286**
			(0.0116)	(0.0110)	(0.0115)	(0.0119)	(0.0123)
SIDS dummy				0.0537	0.0709	0.0676	0.0689
				(0.0425)	(0.0458)	(0.0609)	(0.0581)
Statistical capacity				-0.00461**	-0.00228	-0.00383**	-0.00184
				(0.00147)	(0.00164)	(0.00162)	(0.00175)
SSA dummy					0.154***		0.143***
					(0.0417)		(0.0427)
Constant	3.642***	3.675***	3.649***	3.957***	3.668***	4.065***	3.771***
	(0.0507)	(0.0531)	(0.0545)	(0.108)	(0.135)	(0.134)	(0.151)
Observations	112	112	107	107	107	107	107
R-squared	0.311	0.357	0.452	0.526	0.578	0.542	0.585

	IDA eligible countries only						
	(15)	(16)	(17)	(18)	(19)	(20)	(21)
VARIABLES	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level	log Price Level
log GDP per capita	0.162***	-0.0488	-0.0287	0.0337	0.0818	0.0189	0.0909
	(0.0315)	(0.0805)	(0.0859)	(0.0915)	(0.0790)	(0.0928)	(0.0851)
log GDP per capita^2		0.105***	0.0973***	0.0583	0.0686**	0.0622*	0.0658**
		(0.0320)	(0.0336)	(0.0368)	(0.0305)	(0.0362)	(0.0307)
WGI GovEff	-0.0790	-0.126***	-0.103**	-0.0584	-0.0487	-0.0370	-0.0444
	(0.0511)	(0.0449)	(0.0505)	(0.0517)	(0.0417)	(0.0567)	(0.0418)
log Pop_density						-0.0411*	-0.0187
						(0.0233)	(0.0215)
log GDP						-0.0169	-0.0268
						(0.0203)	(0.0194)
Fuel subsidies (% of GDP)			-0.0447**	-0.0432	-0.0187	-0.0359	-0.0112
			(0.0199)	(0.0265)	(0.0205)	(0.0243)	(0.0171)
SIDS dummy				0.0596	0.0553	0.0662	0.00502
				(0.0632)	(0.0446)	(0.104)	(0.0934)
Statistical capacity				-0.00449*	-0.000794	-0.00349	-0.000246
				(0.00249)	(0.00246)	(0.00249)	(0.00221)
SSA dummy					0.257***		0.245***
					(0.0439)		(0.0433)
Constant	3.601***	3.597***	3.612***	3.930***	3.476***	4.210***	3.775***
	(0.0613)	(0.0596)	(0.0607)	(0.174)	(0.182)	(0.259)	(0.217)
Observations	64	64	59	59	59	59	59
R-squared	0.276	0.399	0.444	0.490	0.648	0.552	0.685

Table A1.

List of the 51 Small Island Developing States (as defined by the United Nations)[37]

American Samoa
Anguilla
Antigua and Barbuda
Aruba
Bahamas
Barbados
Belize
British Virgin Islands
Cape Verde
Commonwealth of the Northern Marianas
Comoros
Cook Islands
Cuba
Dominica
Dominican Republic
Federated States of Micronesia
Fiji
French Polynesia
Grenada
Guam
Guinea Bissau
Guyana
Haiti
Jamaica
Kiribati
Maldives
Marshall Islands
Mauritius
Micronesia
Montserrat
Nauru
New Caledonia
Niue
Palau
Papua New Guinea
Puerto Rico
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
São Tomé and Principe
Seychelles
Singapore[38]
Solomon Islands
Suriname
Timor-Leste
Tonga
Trinidad and Tobago
Tuvalu
Vanuatu
US Virgin Islands

37 Economies included in our analysis as SIDS are underlined
38 Not classified as a SIDS in our dataset due to its high-income status