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# Can Balassa and Samuelson effect explain the international price disparity between low and high income countries?

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## Abstract

This article assesses the Balassa and Samuelson effect which offers an explanation of the differences in international prices based on productivity disparity between tradables and nontradables. It argues that although the Balassa and Samuelson effect provides a reasonable explanation for the deviations in price levels between countries that export similar types of commodities, it is less compelling in terms of explaining the price differences between low and high income countries, as these countries typically export dissimilar types of commodities.

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## 1. Introduction

This article contributes to an old debate over the Balassa and Samuelson effect (BSE) that provides an explanation of higher prices in high income countries (HICs) based on productivity disparity between tradables and nontradables.[1] The BSE suggests that the average price levels are systematically higher in HICs due to faster productivity growth rates in their tradables sector. This article argues that although the BSE provides a reasonable approach to the explanation of the deviations in price levels between countries that export similar types of commodities, it is less compelling in terms of explaining the price differences between low and high income countries, as it implicitly assumes that low income countries (LICs) and HICs are competing in international markets over similar products. This is a very strong assumption that is neither acknowledged nor discussed in the literature. As will be shown, if LICs and HICs export dissimilar kinds of commodities, a faster productivity increase in HIC exports would in fact lead to lower average prices in HICs compared to LICs. This article offers three alternative explanations that may better account for the increasingly higher average prices in HICs. The importance of this paper lies in that the BSE is a well recognised and widely utilized theoretical argument and a very large literature relies on the precision of the theory. If the BSE has some flaws, however, so may this large literature.

## 2. 'Balassa-Samuelson effect'

It is a common observation that average prices are higher in HICs compared to LICs when they are expressed in a common currency such as the US Dollar. Indeed, one dollar would buy more goods and services in a LIC such as Kenya than a HIC such as the USA. This is a rather surprising phenomenon as prices and productivity levels are inversely related and HICs are more productive by definition. Therefore one would expect lower prices in HICs and higher prices in LICs. The BSE offers a theoretical explanation for this puzzle.

The conventional BSE is based on the Ricardian value theory where the prices are determined by the cost of production. The BSE is based on 3 reasonable assumptions: 1. Productivity gains are concentrated in the tradable sector which increases the domestic relative price of nontradables.[2] 2. The relative prices of tradables converge. 3. The tradable sector in HICs is more productive compared to that of LICs, which increases the relative price of nontradables, thus average price level. In other words, a faster productivity increase would reduce the relative price of tradables to non-tradables but because the prices of tradables are internationally determined (therefore cannot decline), an increase in the price of non-tradables is required which increases the average prices.[3]

[1] In this article 'high' and 'low' income countries refer to the ranking of countries in terms of their per capita GDP (PPP - current international $). This is different from the World Bank's classification of countries into low, middle and high income which involve categorising countries into these separate groups.

[2] Bergin, Glick and Taylor (2004) suggest that productivity gains in the production of particular goods can also lead to those goods becoming traded.

[3] It will be shown below that the increase in the price of non-tradables is achieved by a real exchange rate appreciation.

In order to explore BSE and its potential limitations, the following simple equation will be useful. The average price level in local currency (P) can be calculated as:

$$P = a.P_X + b.P_M + c.P_N \quad (1)$$

where,

| | |
|---|---|
| P | : Average domestic price level in local currency. This is the average price of the bundle of goods that make up GDP. |
| $P_X$ | : Average domestic price of exportables in local currency |
| $P_M$ | : Average domestic price of importables in local currency |
| $P_N$ | : Average domestic price of nontradables in local currency |
| a, b, c | : Share of the sectors ( a + b + c = 1) |

The above equation consists of three parts. The first part is the average price of exportables, the second part is the average price of importables and the third part is the average price of nontradables. The average price level in international currency ($P_\$$) is:

$$P_\$ = ER.P = ER.a.P_X + ER.b.P_M + ER.c.P_N \quad (2)$$

where ER is the nominal exchange rate.[4] Under free trade conditions, the first and the second parts are determined by the international prices of the tradables:

$$ER.P_X = P_{XI} \quad (3) \qquad ER.P_M = P_{MI} \quad (4) \qquad ER.P_N = P_{N\$} \quad (5)$$

where,

| | |
|---|---|
| $P_{XI}$ | : International price of exportables in international currency (US $) |
| $P_{MI}$ | : International price of importables in international currency (US $) |
| $P_{N\$}$ | : Domestic price of nontradables in international currency (US $) |

Equations (3) and (4) imply that, as long as the international prices of tradables stay constant, their average domestic price level in international currency is independent of the domestic price changes. The domestic prices of importables are determined by their international prices and by ER. Any change in the domestic prices of exportables will be matched by a change in ER. The competitive ER is given by:

$$ER = P_{XI} / P_X \quad (5)$$

Equation (5) implies that any change in the price of exportables (both $P_{XI}$ and $P_X$) requires an adjustment of ER. For example an increase (decrease) in $P_X$ would require a depreciation (appreciation) of ER, whereas an increase (decrease) in $P_{XI}$ would require an

[4] Note that a fall in the nominal exchange rate (ER) implies a depreciation of the currency.

appreciation (depreciation) of ER.[5] Therefore the real exchange rate (RER) can be defined as:

$$RER = (ER * P_X) / P_{XI} \qquad (6)$$

Given the above equations the logic of BSE can be revealed. When international price of exportables ($P_{XI}$) remains constant, a decline in domestic price of exportables ($P_X$) due to a productivity increase would cause an appreciation of the ER (in equation 3a below) which would reduce the domestic price of importables ($P_M$ in equation 4a) and increase the average price of non-tradables in international currency ($P_{N\$}$ in equation 5a).[6] The average price in domestic currency (P in equation 1a) would decline (country would experience deflation) due to a decline in the prices of exportables ($P_X$) and importables ($P_M$) in domestic currency but the average prices in international currency ($P_\$$ in equation 2a) would increase due to an increase in the average price of non-tradables in international currency ($P_{N\$}$). Note that in equation 2a, the average prices of both tradables in international currency ($P_{XI}$ and $P_{MI}$) remain the same as they are determined by international markets. Although the average price of non-tradables in domestic currency ($P_N$) remains the same, the average price of non-tradables in international currency ($P_{N\$}$) increases due to the appreciation of the ER.

$$P = P_X + P_M + P_N \qquad (1a)$$
$$\downarrow \quad \downarrow \quad \downarrow$$

$$P_\$ = ER.P = ER.P_X + ER.P_M + ER.P_N \qquad (2a)$$
$$\uparrow \qquad \uparrow \ \downarrow \quad \uparrow \ \downarrow \quad \uparrow$$

$$ER.P_X = P_{XI} \qquad (3a)$$
$$\uparrow \ \downarrow$$

$$ER.P_M = P_{MI} \qquad (4a)$$
$$\uparrow \ \downarrow$$

$$ER.P_N = P_{N\$} \qquad (5a)$$
$$\uparrow \quad \uparrow$$

Therefore when a country's productivity for exportables increases ($P_X$ declines) faster than nontradables, given everything else is held constant, its average price in international currency ($P_\$$) would increase. Kravis and Lipsey (1983), and Heston, Nuxoll and Summers (1994) estimated a correlation between $P_X/P_N$ ratio and per capita GDP and found a negative correlation between them which implies faster productivity increase for exportables compared to nontradables in HICs which supports the predictions of the BSE.

## 3. What is wrong with the BSE?

*Firstly*, table 1 shows that while there is a strong positive correlation between relative price level and per capita GDP between countries in 1980, 1990 and 2000 which indicates that HICs have higher prices, such a correlation was very low in 1960 and 1970, and virtually did not exist in 1950. Bergin, Glick and Taylor (2004) suggest that before the First World War the relationship between price level and per capita GDP was in fact negative. It can safely be assumed that HICs have been experiencing faster productivity increases in their tradable sector for a long time, yet their average prices were not

[5] This model assumes that ER responds only to changes in $P_{XI}$ and $P_X$. This is obviously unrealistic as a number of other factors such as change in interest rates and international capital flows would also influence changes in ER and therefore price levels. This issue will briefly be discussed towards the end of the paper.

[6] The average price of non-tradables in domestic currency ($P_N$) would remain the same.

significantly higher than LICs until the 1970s which questions the universality of the BSE.

*Secondly*, although the BSE can explain why some countries have higher prices than others, it cannot explain why HICs have higher prices than LICs. When $P_X$ for a country declines due to a productivity increase, its $P_\$$ will increase only if $P_{XI}$ remains the same. If productivity increase is not specific to the country but is more widespread and $P_{XI}$ declines (in equation 3b below), the ER does not need to change and its $P_\$$ (in equation 2b) will decline. If tradable prices decline at an equal rate in all countries, their $P_X/P_N$ ratio as well as P and $P_\$$ would decline. The relative prices between countries (in international currency), however, would not change. Obviously, the decline in $P_\$$ would be lesser in countries that experience faster productivity increases in their exportables than the average.

$$P = P_X + P_M + P_N \quad (1b) \qquad P_\$ = ER.P = ER.P_X + ER.P_M + ER.P_N \quad (2b)$$
$$\downarrow \quad \downarrow \qquad\qquad\qquad \downarrow \qquad\qquad \downarrow$$

$$ER.P_X = P_{XI} \quad (3b) \qquad ER.P_M = P_{MI} \quad (4b) \qquad ER.P_N = P_{N\$} \quad (5b)$$
$$\downarrow \quad \downarrow$$

The idea that faster relative productivity increase in exportables causes higher $P_\$$ in HICs can only hold if HICs and LICs were exporting similar commodities[7] and competing against each other. If HICs and LICs export fundamentally different types of commodities and in general HICs compete against each other, faster productivity increase in exportables would mean lower $P_{XI}$ and $P_\$$ for HICs. This issue has not been addressed in the literature.

Consider the following two hypothetical scenarios. If there is no trade between HICs and LICs, and HICs trade only among themselves, a productivity increase for exportables would reduce their $P_{XI}$ and $P_{MI}$ at the same rate. This is because exportables for HICs as a group are also their importables. The terms of trade ($P_X/P_M$) would remain the same, $P_X/P_N$ and $P_M/P_N$ as well as P and $P_\$$ would decline. Obviously, specific HICs that increase their export productivity faster than the average would experience a decline in $P_\$$ less than other countries. However, faster overall productivity increase in exportables would reduce (not increase as predicted by BSE) P and $P_\$$ in HICs compared to LICs. Alternatively, if HICs and LICs only trade with each other and do not trade among themselves, then, export prices for HICs (LICs) would be import prices for LICs (HICs). If productivity increases faster for HIC exports, this would reduce their $P_X$ and $P_{XI}$ faster than their $P_M$ and $P_{MI}$. The terms of trade would decline (increase) for HICs (LICs). The P and $P_\$$ would decline in HICs due to lower exportable prices and in LICs due to lower importable prices.

[7] This is clearly unrealistic as comparative advantage (particularly in the Heckscher-Ohlin model) and development levels of countries determine the difference in trade bundles between high and low-income countries.

According to IMF's Direction of Trade Statistics, in year 2000, about 72 percent of HIC exports and about 58 percent of LIC exports went to HICs and about 66 percent HIC imports and about 55 percent LIC imports were from HICs. Therefore in reality, $P_{MI}$ in HICs and LICs is largely determined by $P_{XI}$ in HICs and less by $P_{XI}$ in LICs. Consequently, productivity change in HIC exports will have a stronger impact on $P_{MI}$ in both HICs and LICs. Although faster productivity increase in HIC exports would result in lower P and $P_{\$}$ in HICs as well as LICs, P and $P_{\$}$ would fall faster in HICs as they import more from other HICs. Therefore faster productivity increase in HICs would lead to lower average prices in HICs which goes against the predictions of the BSE .

## 4. Alternative explanations

There are three possible alternative explanations of the higher $P_{\$}$ in HICs. *Firstly*, LICs are increasingly exporting manufactured commodities which implies that they may be increasingly competing with HICs. According to Heintz (2006), the share of manufacturing exports in total exports for developing countries was 17.7 percent in 1980 and increased to 70.4 percent in 2000. The same figures were 70.2 percent and 83 percent for industrialized countries. Moreover, some LICs have managed to move into technology-intensive manufactured exports such as electronics (UNCTAD, 2002). Therefore, LICs and HICs are seemingly becoming alike in terms of their export characteristics. Heintz (2006) confirms that manufacturers in LICs are increasingly competing with the well established manufacturers in HICs. If LICs were increasingly competing with HICs over similar products, the BSE would become ever more relevant and the figures in table 1 which show progressively a stronger positive correlation between relative price level and per capita GDP through time would make more sense. If LICs and HICs increasingly compete over similar products and HICs are more productive in such exportable commodities, $P_X$ in HICs would decrease faster than $P_{XI}$ which would increase their $P_{\$}$.[8]

However, there are a number of problems with this explanation. *Firstly*, despite their overall move into manufacturing production, a natural process of economic development, many LICs still rely on the exportation of primary commodities. Secondly, increasing exports in manufactured commodities for LICs does not necessarily imply that LICs and HICs are now competing against each other over similar manufactured commodities. According to UNCTAD (2002), the type of manufactured commodities that LICs and HICs are exporting are substantially different and with the exception of a few East Asian newly industrializing countries, most LICs are still exporting relatively unsophisticated manufactured commodities based on natural resources and unskilled labour. Even when LICs appear to have paved their ways into relatively technology-intensive exports, such expansion often involve low-skill and labour intensive assembly stages of international production chains organized by multinational companies (UNCTAD 2002). Therefore it should be considered as the lower-end of participation in the same production process rather than competition against HICs over similar products. If LICs and HICs export dissimilar manufacturing commodities, a relative increase in $P_{\$}$ for HICs cannot be due to superior productivity levels in their exportables.

[8] Note that such and argument has never been made in the literature in defense of the BSE.

*Secondly*, the commercial policies of HICs which limits LICs access to their markets particularly in agricultural products may have played an important role. Due to protectionist and promotionist agricultural policies, HICs have increased their share in agricultural exports. According to Food and Agriculture Organization figures, particularly EU (15) countries increased their share of world agricultural exports from 21.5 percent in 1961 to 44.5 percent in 2003 and became net agricultural exporters in 2000. Although the US's share of world agricultural exports declined from 16.1 percent in 1961 to 10.6 percent in 2003, it remains a major net agricultural exporter. Industrialized countries increased their share of world agricultural exports from 51.2 percent in 1961 to 65.7 percent in 2004 and became net agricultural exporters in 1996 and 1997. The share of LICs in world agricultural exports declined radically in most cases. sub-Saharan Africa's share, for example, declined from 7.8 percent in 1961 to 2.1 percent in 2004, and sub-Saharan Africa became a net agricultural importer in 2001. Therefore, structural changes in the composition of exports in LICs and HICs may not only come from rapid industrialization in LICs but also from protectionist and promotionist agricultural policies of HICs. The competition from heavily subsidized and protected HIC agricultural exports may have forced many LICs to devalue their currencies to remain competitive which may have reduced their $P_{\$}$.

The *third* alternative explanation of increasing average prices and the faster declining relative price of tradables to nontradables ratio ($P_T/P_N$) in HICs is that the average price of nontradables may actually be increasing. This could take two different forms. First, a price increase for nontradables relative to tradables is possible without any productivity and price changes for the actual goods and services if demand and production shifts from less expensive to more expensive nontradables. As argued earlier, HICs and LICs are becoming similar in terms of the share of agriculture, services and manufactures in their exports but the same cannot be said for their shares in total GDP. Although HIC exports are concentrated in manufactures, their GDPs are concentrated in services. According to the aggregate data obtained from the World Development Indicators (World Bank, 2002), while declining, the share of agriculture in total GDP remains relatively high in low (24.7 percent) and middle (9.5 percent) income countries compared to HICs (1.8 percent) in year 2000, and while increasing, the share of services in total GDP is relatively low in low (43.5 percent) and middle (55 percent) income countries compared to HICs (69.5 percent).[9] Rudi Dornbusch (1998) argued that an income increase can change the relative demand from agricultural to manufactured commodities and manufactured commodities to services as services tend to be 'superior goods'. This is also known as 'Petty's Law'.[10] Therefore, even without any productivity changes, a shift in domestic demand and

[9] See World Bank (2002) for the definition of these income groups.

[10] 'Petty's Law', however, is very controversial particularly for the relative demand shift from manufactured commodities to services. Kravis, Heston and Summers (1983) argue that the rising share of services in GDP and the share of workers employed in services are a result of relatively slower productivity increases (therefore relatively higher prices) in services than a demand shift from manufactured commodities to services associated with rising income. Kravis, Heston and Summers (1983: 193) argue that, 'in real terms, the low-income countries tend to consume services in at least the same proportion as the high-income countries'. Nevertheless, 'Petty's Law' is less controversial for the relative demand shift from cheaper agricultural commodities to more expensive manufactured commodities and services.

production from cheaper agricultural products to more expensive services is bound to increase domestic average prices. Second, the prices of more widely consumed nontradables may actually be increasing in HICs. Although there is no easy way to prove this argument due to data limitations, such increase may come from quality improvements such as lower student/teacher ratio in education or patient/doctor ratio in health.

A number of other alternative explanations of the higher prices in HICs can also be considered but it is important to separate long-term permanent forces that influence $P_{\$}$, such as productivity changes for exportables (both domestic and international), importables and nontradables, from transitory factors such as temporary capital inflows and outflows, or the effects of export price booms or busts. Macdonald and Ricci (2001), and Burstein, Neves, and Rebelo (2003) argued that a relative increase in the productivity of the wholesaling, retail and distribution sector which comprises a large share of today's economy would have similar effect to a relative productivity increase in tradables and would increase $P_{\$}$.[11] Equally important is the distance factor and the fall in transport cost (Aten, 1997). If transport cost falls for HICs more than LICs, this would have similar impact to an increase in their $P_{XI}$ and would cause an appreciation of their currency. Capital movements and interest rate policies may also play an important role. The increasing mobility of international capital may cause depreciation and appreciation of currency and cause increase/decrease in $P_{\$}$. Such capital movements, however, would not result in higher $P_{\$}$ in HICs as HICs tend to be net capital exporters. Trade policies might have influence on RER and $P_{\$}$. Harberger (2003) suggests that import restrictions would reduce demand for imports, cause an appreciation of the ER by reducing demand for foreign currency and push up $P_{\$}$, whereas taxes on exports would reduce the supply of foreign currency, cause a depreciation of the ER and reduce $P_{\$}$. Lipsey and Swedenborg (1996) also confirm that there might be a positive correlation between protectionist policies and $P_{\$}$.

## 5. Conclusion

It should be made clear that this article does not challenge the overall validity of the BSE. It is indeed true that (given everything else is held constant) a country's price level in international currency will increase if the country experiences a rapid productivity growth in its exportables sector. However because the BSE implicitly assumes that LICs and HICs are competing in international markets over similar products, it has very limited ability to explain the price disparity between LICs and HICs. Therefore a large literature that uses BSE should be read with greater care.

**Table 1: Degree of correlation between relative price level and per capita GDP (R-bar-squares)**

[11] According to Kravis, Heston and Summers (1983), scale economies and concentration of production in a limited number of geographical locations increased the need for distributive services.

| | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 |
|---|---|---|---|---|---|---|
| R-bar-squares | 0.018 | 0.081 | 0.127 | 0.485 | 0.491 | 0.594 |

Notes: R-bar-squares are used to indicate the degree of correlation between the variables. The calculations involved 52 countries.
Source: Penn World Table.

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