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The Standard Model of Trade and the Marshall – Lerner Condition

Abstract. There are similarities between standard trade model and Marshall-Lerner condition. However, in order to see whether the condition can work both ways (with decrease and increase of the currency exchange rate), and the properties of this model could be thoroughly utilized, the revaluation case is being considered. The J-curve effect is also being examined. Looking at further research ideas, the Marshall–Lerner condition could be a complimentary tool in explaining the standard model.

Key words: standard trade model, Marshall-Lerner condition, revaluation, elasticities, balance of trade

JEL Classification: B27, F12

Introduction

When discussing contemporary trade theories, one should pay special attention to the standard model of trade (Paul Krugman – Maurice Obstfeld Model) presented in the famous book (Krugman, Obstfeld, 2015). The model that is more general than Ricardian, specific factors, and Heckscher-Ohlin proposals (Naotendur, 2017) implies the existence of the relative global supply curve resulting from the production possibilities and the relative global demand curve resulting from the different preferences for a certain good. The exchange rate - the relation between the export prices and the import prices is determined by the intersection between the two curves - the relative global supply curve and the relative global demand curve (cis01, 2017). If the other elements remain constant, the exchange rate improvement for a country implies a rise in the welfare of that country (buying more imports). Generally, knowing the supply and demand curves in the model, we can have an idea about the volume of import and export.

If one analyses the standard model of trade a certain analogy comes out, i.e. to the Marshall–Lerner condition (Lerner, 1944). The condition deals with long-term export and import demand elasticities, but it starts with a study on the impact of devaluation or depreciation of a given currency (shift in exchange rate) on the trade balance. However, the effects of revaluation of a given currency were not examined. That's why the aim of this little paper is to attend to it, draw further analogies to the standard model of trade, and to look for the prospects of further research. Comparative and intuitive methods were employed.

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The Standard Trade Model

Standard trade model is a general model that includes Ricardian, specific factors, and Heckscher-Ohlin models as special cases. It starts with the well-known concept of the production–possibility frontier (PPF) (Samuelson, 1967). The PPF curve shows the maximum possible production level of one commodity for any given production level of the other, given the existing state of technology. So, for example, production of guns would need to be sacrificed to produce more butter (Lipsey, 1995). If production is efficient, the economy can choose between combinations (points) on the PPF: B if guns are of interest, C if more butter is needed, D if an equal mix of butter and guns is required (Fig. 1). a point beneath the curve (such as A) indicates inefficiency, and a point beyond the curve (such as X) indicates impossibility.

A country's PPF determines its relative supply function. National relative supply functions specifies world relative supply function, which along with world relative demand determines the equilibrium under international trade. This equilibrium is again a relative price, ie. a ratio of export versus import prices, in other words – the "terms of trade" (Fig. 2).The latter decide upon the distribution of gains from trade.

A higher relative price for exports means that the country can afford to buy more imports. An increase in the terms of trade increases a country's welfare.

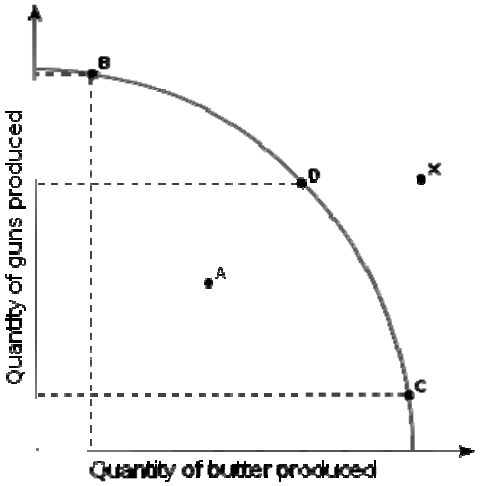

Fig. 1. Production–possibility frontier (PPF)

Source: Lipsey, 1995.

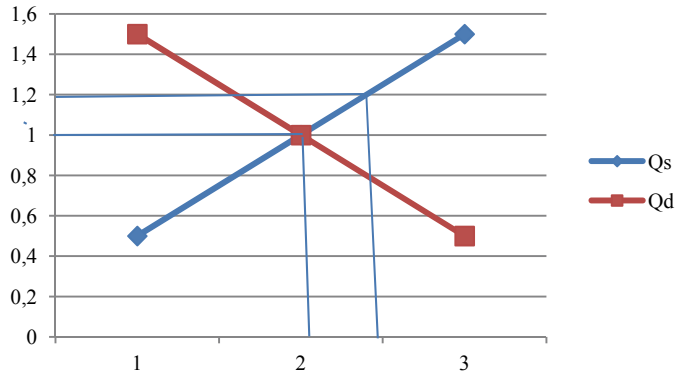

Fig. 2. The ratio of export versus import prices, the supply and demand curves

Source: based on Krugman, Obstfeld, 2015.

The vertical axis represents the price ratio, Qs is the relative global supply curve, and Qd is the relative global demand curve. For simplicity reasons, the supply and demand functions in Fig. 1 are linear, while in reality the relationship is curvilinear.

The Marshall – Lerner condition

The Marshall–Lerner condition refers to the situation that a currency devaluation or depreciation will only "cause a balance of trade improvement if the absolute sum of the long-term export and import demand elasticities is greater than unity" (Davidson, 2009).
In other words ExportsPED + ImportsPED > 1
where PED stands for the price elasticity of demand

After devaluation, imports become more costly and exports are cheaper because of a change in relative prices.

In a number of studies, it has been found that trade in goods tends to be inelastic in the short term, as it takes time to change consuming patterns and trade contracts (Bahmani, Ratha, 2007). Thus, the Marshall–Lerner condition is not met, and a devaluation is likely to worsen the trade balance initially. In the long term, consumers will adjust to the new prices, and trade balance will improve (the so called J-curve effect) (Feenstra, Taylor, 2014). However, Rose (1997) argues that there is little evidence that the exchange rate significantly affects the trade balance, while Pandey (2013) also referring to other empirical studies states that devaluation of the exchange rate causes an improvement in the trade balance. Some other studies (Ahmed, 1991) indicate that there are countries where there is no J-curve effect.

In economics, the 'J curve' refers to the trend of a country's trade balance following a devaluation or depreciation. A devalued currency means that imports become more costly (Feenstra, 2014). We also assume, that just after devaluation the volume of imports and exports change very little or does not change at all (as in the example in the table below). That is why the balance of trade (current account) is worsening. However, after some time,

the volume of exports may start to rise because it becomes more competitive, while imports is still more costly and falls. So the trade balance tends to improve (Fig. 3 – the PED in the graph is really the sum of export and import elasticities)[2].

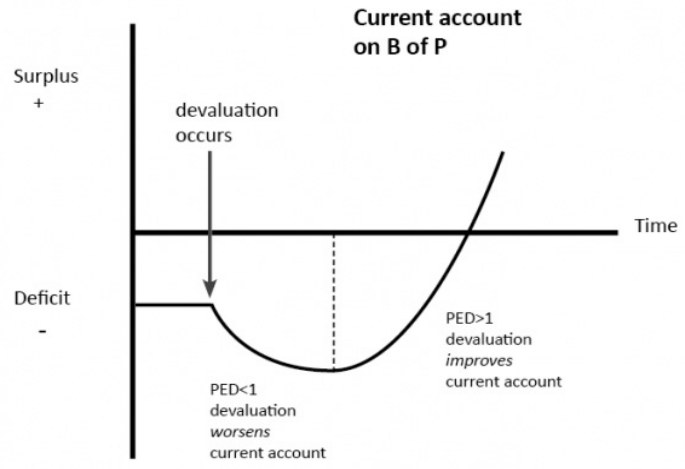

Fig. 3. The "J curve" and the devaluation process

Source: curve, 2017.

Let us illustrate this, by creating a simple "balance of trade" table, where:
a – elasticity coefficient (exports) price elasticity of the foreign demand for export (Exports PED);
b – elasticity coefficient (imports) price elasticity of the domestic demand for imports (Imports PED);
q – quantity of exports and imports;
p – domestic price;
pf – export and import price (in foreign currency).

Table 1. The Marshall-Lerner condition – devaluation

Export					Import					
A	q	p	pf	Value p x q	b	q	p	pf	Value p x q	balance
	100	10	10	1000		100	10	10	1000	0
	100	10	9	1000		100	11	10	1100	-100
0.2	102	10	9	1020	0.2	98	11	10	1078	-58
0.3	103	10	9	1030	0.3	97	11	10	1067	-37
0.5	105	10	9	1050	0.5	95	11	10	1045	5

Source: Sołdaczuk, 1987.

[2] For more in-depth explanation see: Feenstra, M., Taylor, A. 2014. International Macroeconomics. New York: Worth Publishers, 261–264.

At the initial stage the exchange rate is 1/1. The first row shows that the balance is 0. The government carried out a 10 percent devaluation. It means that when the domestic price is 10, the foreign price in exports is 9. If the foreign price of imported goods is 10, the domestic price is 11. So despite devaluation, the balance is negative, which is not, what we were hoping for (Krugman, Obstfeld, 2015). Once we introduce elasticities, starting from 0.2 up to 0.5, both the volume of exports and imports change (e.g. 2 percent rise in export corresponds to 10 percent fall in foreign prices). The negative balance diminishes. Finally with both a and b elasticities at 0.5 the balance is positive, which confirms the Marshall-Lerner condition.

The revaluation example

Let's return to our table, making some adjustments.

At the initial stage the exchange rate is 1/1. The first row shows that the balance is 0. Whatever the reason, the government may decide to rise the value of its currency. It carries out a 10 percent revaluation. It means that when the domestic price is 10, the foreign price in exports is 11. If the foreign price of imported goods is 10, the domestic price is 9. One may expect a negative balance of trade, but it's still positive. We again introduce elasticities, starting from 0.2 up, to 0.5. Of course both the volume of exports and imports change (e.g. 2 percent fall in export corresponds to 10 percent rise in foreign prices). The positive balance lowers. However, with both a and b elasticities at 0.5 the surplus of exports over imports is small, but it still exists. Only, with higher elasticities (if the sum exceeds unity, e.g. 1.2) the balance is decisively negative. Generally it proves the Marshall-Lerner condition also works in the reevaluation process.

Table 2. The Marshall-Lerner condition – revaluation

Eksport					Import					
A	q	p	Pf	value p x q	b	q	p	pf	value p x q	balance
	100	10	10	1000		100	10	10	1000	0
	100	10	11	1000		100	9	10	900	+100
0.2	98	10	11	980	0.2	102	9	10	918	72
0.3	97	10	11	970	0.3	103	9	10	927	43
0.5	95	10	11	950	0.5	105	9	10	945	5
0.6	94	10	11	940	0.6	106	9	10	954	- 14

Source: based on table 1.

Conclusions

There are certain analogies between the standard model of trade and the Marshall – Lerner condition, though they deal with different exchange rate. It would be interesting to try to combine two models. Marshall – Lerner theorem is called a condition but really it's also a simple model of trade. Marshall-Lerner condition usually describes what may happen

after devaluation. However the revaluation case is also worth examining. It also indicates that the sum of elasticities should be bigger than one for worsening of the balance, while for devaluation the condition to equal unity might be enough for balance improvement, as indicated in some older textbooks (Sołdaczuk, 1987). The core of the Marshall - Lerner condition is the concept of export and import elasticities. The magnitude and shifts in those parameters are crucial for the changes in the trade balance of a country i.e. for its welfare. That is why the concept of elasticities and its impact on the improvement of exports could add further aspects to the standard model.

Direction for further research

In the standard model of trade, the discussed ratio is really the terms of trade, which offers new research possibilities, i.e. creating some scenarios employing different term of trade categories. The other way of specifying the model could be an attempt to incorporate to it long term export and import elasticities.

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