

AN ALTERNATIVE APPROACH TO THE TRADE DYNAMICS IN CROATIA

Daniel Tomic

Juraj Dobrila University of Pula

Faculty of Economics and Tourism «Dr. Mijo Mirković»

P. Preradovića 1, 52100 Pula, Croatia

dtomic@unipu.hr

ABSTRACT

The point of understanding the international finance and trade perspective is closely related to comprehension of the terms of trade (exchange rate) – trade balance nexus. How well can a country balance its international trade engagement over international price changes and/or applied exchange rate regime is of great importance, especially for a small, opened, indebted and import dependent country such as Croatia. By focusing on the relationship between the terms of trade, exchange rate, volume of trade, current account and output we are trying to provide some new insights into trade dynamics over a business cycle in Croatia. Furthermore, the analysis is done on aggregate level and evaluates only the market of goods, for it constitutes the larger part of the trade balance. Empirical assessment relies on the lead and lag cross-correlation functions between the variables comprising the period 2000 – 2014. Results suggest the existence of the S-curve pattern leading us to some indicative conclusions regarding the trade dynamics in Croatia.

Keywords: *business cycle, Croatia, S-curve, trade dynamics*

1. INTRODUCTION

Empirical research on the exchange rate, as one of the most important variable in the Croatian economy, is rather extensive. Since real effective exchange rate had been steadily appreciating after 2000 and we witnessed mild depreciation after 2009, it was necessary to find out whether Croatian kuna was misaligned or not. Controversy over this topic split academics and professionals, causing many mixed and opposed conclusions, nevertheless dictating different patterns of analysis within different scientific approaches. An important stylized fact regarding the evolution of exchange rates in transition economies like Croatia is

the initial undervaluation of the real exchange rate, misalignments and appreciation of the real exchange rate due to transition-related structural changes, and other factors (Bahmani-Oskooee and Kutun, 2009, p. 2523). On the other hand, theoretical and empirical studies on the importance of the terms of trade for Croatia have been rare. Theoretically, terms of trade are relevant explanatory variable of the movements in exchange rates and output for improvements in relative terms of trade are expected to lead to the appreciation of the exchange rate, hence the change in output produced and traded. Both, exports and imports solidly depend on exchange rates and/or terms of trade, as well as their development. Average share of export to GDP in last fifteen years was around 45%, which indicates that Croatian economy is not closed, but rather open. However, this export was insufficient in respect to demand and preferences towards import products (average share of import to GDP was around 55%), thereby generating constant trade deficit (average share of trade deficit to GDP was around 10%). Surplus on the service account of the balance of payments compensates to a large extent for the exceptionally high Croatian trade deficit. In such situation, policy makers can apply two measures to influence its international competitiveness: (a) internal approach that relies on supply side-policy implications and/or (b) external approach that is directed towards devaluation/depreciation of a national currency. First approach calls for serious structural changes with emphatic rather than sensible economic and social costs. The second approach seems an easier path to competitiveness, yet applied in wrong economic environment could cause disastrous consequences for whole economic system. Though trying to achieve the aftermaths of the first approach, Croatian policy makers have been constantly 'flirting' with possible currency depreciation, never actually applying it due to threatening effect that could rise from high international indebtedness. A country that is experiencing a decline in its net exports may adhere to currency devaluation or allow its currency to depreciate, but due to adjustment lags such as recognition, production, delivery and etc. (Bahmani-Oskooee and Xi, 2015, p. 79) the trade balance may continue to deteriorate, with improvement coming later (so-called J-curve); if it even comes! Whether depreciation actually helps in improving trade deficits remain a key question that has drawn much scholarly attention. This relation is concentrated around the J-curve phenomenon and Marshall-Lerner condition, and recently a new concept based on asymmetric cross-correlations functions which may resemble an S-curve pattern. The concept of an S-curve, introduced by Backus, Kehoe and Kydland in 1994, suggests that the cross-correlation function between current terms of trade (exchange rate) and future values of the trade balance is positive, but between current terms of trade (exchange rate) and past values of the trade balance it is negative. Therefore, an S curve is a slight extension of the J-curve in the sense that the impact of exchange rate depreciation wears out after a while and there is no further improvement when all impacts are realized. The aim of this paper is to look into the relationship between the terms of trade, real effective exchange rate and current account developments (with few mediating variables) in order to analyze the trade dynamics over a business cycle as well as to link possible fluctuations of some variables with the fear of misalignments of the Croatian kuna. Additionally, the analysis is done on aggregate level and evaluates merchandise market by including income terms of trade and current account measures of only goods traded. Empirical part evaluates the lead and lag cross-correlation functions between the variables comprising the period 2000:Q1 – 2014:Q4. Results suggest the existence of the S-curve pattern leading us to some indicative conclusions regarding the trade dynamics in Croatia. The rest of the paper is organized as follows. Section 2 surveys theoretical and empirical literature.

Section 3 gives a full perspective to the analytical part by describing used methodology and data, and explaining the results. Section 6 provides some concluding remarks.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

The role of trade is crucial for economic growth as well as economic development of a country. Trade surplus tends to bring inflows into economy giving a way for economic expansion. The relationship between the terms of trade and trade balance has been discussed thoroughly in the literature of international finance, and it is extended to include the exchange rate in the analysis (Rhee, 2014, p. 5). Magee in 1973 became a pioneer in explaining such a relationship by depicting the so-called J-curve. In their seminal paper, Backus et al. (1994) showed that terms of trade (or alternatively exchange rate) is positively correlated to future movements of the trade balance but is negative correlated with past movements thus resulting in an S-shaped curve. However, Backus et al. (1994) doubted that such S-pattern existed in developing and less-developed countries because of different economic structures, mainly due to the fact that the degree of openness of the foreign sector is different in these countries (Rhee, 2014, p. 5). The S-curve is closely related to J-curve which was used to show the relationship between the trade balance and a real devaluation. Namely, the theory behind the J-curve states that a country's trade deficit will worsen initially after the depreciation of its currency because higher prices on foreign imports will be greater than the reduced volume of imports. The effects of such change in the price of exports compared to imports will eventually induce an expansion of exports and a cut in imports, which, in turn, should improve the balance of payments¹. Though there is a vast body of empirical literature dealing with the topic, still the findings are quite negative i.e. there is little statistical evidence of a J-curve pattern in general. Most of the studies that tried to test the J-curve existence have relied upon a reduced form trade balance model and regression analysis with not much support. Yet in some countries and in specific periods, J-curve phenomenon has been recognised (for an extensive review of the literature see Akbostanci (2004), Šimáková (2014) or Bahmani-Oskooee and Kutun (2009)). As we already mentioned, the S-curve is an extension of the J-curve since the impact of exchange rate depreciation wears out after a while and there is no further improvement when all impacts are realized, meaning that at the top of the curve, the slope is zero or negative. Though conceptually related, these two concepts are methodologically different. Note that the S-curve, which is a description of unconditional cross-correlations between the two variables, is not the same thing as the J curve, which describes the conditional dynamic response of one variable following a shock to the other. Thus it is possible to depict an S-curve in the data, even absent a detectable J-curve (Baxter, 1995, p. 1854). Ghosh (2012, p. 326) points that existing studies on S-curve can be classified under three categories: (1) aggregate level, (2) disaggregate level and (3) industry level analyses. The fundamental paper by Backus et al. (1994) in which they developed international real business cycle model and found that the trade balance is countercyclical and the cross-correlation function of the trade balance and the terms of trade display an S-shape, focused on aggregate data for 11 developed OECD countries. Next important paper was written by Senhadji (1998) who also used real business cycle model to show that, for the

¹ Exchange rate depreciations should reduce imports and increase exports thereby contracting a country's trade deficit provided the well-known Marshall-Lerner condition (the sum of the export and import demand elasticities are at least equal to unity) holds. Therefore, the effects of exchange rate depreciations on exports, imports, and hence on trade balance are neither guaranteed nor instant.

most of the 30 less developed nations, productivity shocks are key factor in generating an S-curve. Parikh and Shibata (2004) analyzed the relationship using annual data from 1970-1999 for 59 less developed nations, all with mixed results. Nadenichek (2012) developed basic general equilibrium model and found that both trade balance and terms of trade are driven by productivity shocks and that the subsequent behaviour generates an S-curve pattern, reminiscent of the J-curve. He concluded that the fact that productivity shocks would generate a pattern similar to the J-curve underscores the importance of properly identifying the shocks generating movements in the trade balance in the broader J-curve literature. Rather heterogeneous results suggested that there could potentially exist the problem of 'aggregation bias', meaning that aggregate data will not show if a country's trade balance is improving against some trading partner(s) while deteriorating against others. Hence a country's trade balance and/or terms of trade could be deteriorating with one trading partner while at the same time improving with another. The aggregation could smooth out the fluctuations observed in the bilateral trade (Bahmani-Oskooee and Ratha, 2007b, p. 431). This led to a number of papers dealing with disaggregate data re-examining in that way the relationship between the terms and balance of trade on the bilateral basis (see Bahmani-Oskooee and Ratha (2007a, 2007b), Rhee (2014), Ono and Baak (2014), Akkay (2015)). Most of the studies found a support for the S-curve relationship, however for most of the countries analyzed this nexus was shown to be relatively weak. This again led to a further disaggregation, papers now focusing mainly on the industry level relations (see Bahmani-Oskooee and Ratha (2008, 2009 and 2010), Bahmani-Oskooee and Xi (2015) etc.). Since the focus of our paper is an aggregate level type of the analysis we shall not evaluate literature on other two approaches through roughly (for deeper literature review on this topic see Akkay (2015)). A comprehensive review of empirical investigations into the existence of both the J-curve and the S-curve can be also found in Bahmani-Oskooee and Hegerty (2010). When concentrating on (the number of) studies that included Croatia, we have to express our concern. There is very limited number of papers dealing with the J-curve phenomenon and not one paper which would evaluate the possibility of an S-shaped curve. First that found evidence of the J-shaped curve for Croatia was Stučka (2004) for the period 1994-2002. He employed a reduced form model to estimate the impact of a permanent shock on the merchandise trade balance. It was found that one-percent depreciation in the exchange rate improves the equilibrium trade balance between the range of 0.94%-1.3% and it took 2.5 years for equilibrium to be established. Bahmani-Oskooee and Kutun (2009) did an extensive study on the emerging European countries (Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Poland, Romania, Russia, Slovakia, Turkey and Ukraine; period 1990-2005) and found empirical support for the J-curve pattern in three countries: Bulgaria, Croatia and Russia. On the other hand, Cota et al. (2006) examined whether bilateral real exchange rate changes in Croatia have any significant impact on trade balance changes between Croatia and six main trading partners (Slovenia, Austria, Germany, Italy, UK and France for the period 1995-2005) and found no empirical support for the J-curve. Hsing (2009) likewise examined the J-curve possibility for the bilateral trade between Croatia, Czech Republic, Hungary, Poland, Slovakia or Slovenia and the USA. He found that the J-curve cannot be empirically confirmed for any of these six countries. As we can see, J-curve literature for Croatia also offered some mixed results. Interestingly, all studies were made for pre-crisis period and could be considered as obsolete. We could say that there is a need for newer and conceptually wider studies which would approach the delicate topics of real exchange rate misalignments, depreciation, trade dynamics, changes in international prices, terms of trade volatility and

etc. This is especially true if we know that Croatian economy ‘traditionally’ suffers from the lack of international competitiveness and internal structural problems.

3. TRADE DYNAMICS OVER A BUSINESS CYCLE

The S-shaped relationship between lags and leads of the trade balance and the terms of trade/exchange rate is a well established feature of international data so it is desirable for researchers to observe and explain this empirical ‘regularity’. Therefore, the aim of this analysis is to investigate the trade dynamics based on the S-curve concept for Croatia.

3.1. Methodology and data

In order to investigate the dynamic relationship between terms of trade and trade balance based on the S-curve phenomenon at aggregate level we applied (adapted) methodology used by Backus et al. (1994) and analytical approach presented by Nadenichek (2012). Accordingly, S-curve depicts negative cross-correlations between past values of the trade balance (TB) and the terms of trade (TOT) or current real exchange rates (REX), but positive cross-correlations between future values of the trade balance and the terms of trade or current real exchange rate. If the contemporaneous correlation is negative, then there is also evidence of a Harberger-Larsen-Metzler (HLM) effect². In order to test the validity of possible S-curve pattern for Croatian economy we will calculate cross-correlations for both, terms of trade as well as real exchange rate. Cross-correlation coefficients (ρ_{k-TOT} , ρ_{k-REX}) are defined as:

$$\rho_{k-TOT} = \frac{\sum (TOT_t - \overline{TOT})(TB_{t+k} - \overline{TB})}{\sqrt{\sum (TOT_t - \overline{TOT})^2 \sum (TB_{t+k} - \overline{TB})^2}} \quad (1)$$

$$\rho_{k-REX} = \frac{\sum (REX_t - \overline{REX})(TB_{t+k} - \overline{TB})}{\sqrt{\sum (REX_t - \overline{REX})^2 \sum (TB_{t+k} - \overline{TB})^2}} \quad (2)$$

where marked values of the variables present the mean of all observations over a study period. By placing cross-correlation coefficients on the vertical axis and the different lags and leads (k) on the horizontal axis, we can graphically interpret and confirm the existence of the S-curve pattern. We will display the cross-correlation function for the terms of trade/real exchange rate and the trade balance ($t+k$) for k ranging from -8 to 8 quarters, i.e. leads and lags up to two years. Quarterly data for the terms of trade, real exchange rate and trade balance (as well as other mediating variables) are collected from the Croatian National Bank and Croatian Bureau of Statistics for the period 2000:Q1 – 2014:Q4. By applying methodology similar to Backus et al. (1994) we did not find evidence of the S-curve pattern for Croatia. However this is not strange if we remember relatively mixed results for J-curve testing. This

² When deterioration in the terms of trade causes a drop in income, consumption drops. However, if the marginal propensity to consume is less than one, the drop in consumption will be less than proportionate, causing both savings and net exports to decline. Since the terms of trade is defined such that an increase amounts to a deterioration of the same, a negative contemporaneous correlation between terms of trade and trade balance would be indicative of the HLM effect (see Bahmani-Oskooee and Ratha, 2009).

led us to consider an alternative approach to S-curve testing, having in mind the characteristics of the Croatian economy. First, all variables were seasonally adjusted using Census X12 seasonal adjustment procedure and then transformed in their logarithmic form. Second, since the J-curve phenomenon (as well as terms of trade) is mainly focused on the dynamics of merchandise trade we opted to evaluate the S-curve relationship only for goods. Though service sector plays an important role in Croatian economy, we did not find support for the relation when services are included in the analysis. Similar logic was used for trade balance variable, however here we also opted for alternative approach using a broader measure of current account balance (depicts visible exports and imports plus invisible exports/imports) instead of trade balance (depicts only visible and really traded exports and imports). Third, instead of barter terms of trade we used income terms of trade measure for Škare et al. (2012, p. 913) and Tomić (2014, p. 289) found that this variable is more relevant in macroeconomic modelling³. Therefore, our analysis is based on these variables: **ITOTg** – income terms of trade for goods (based on national accounts data on nominal and real exports and imports of goods in HRK) is calculated by multiplying the basic terms of trade measure (export prices/import prices) with the exports of good volume; **REER** – real effective exchange rate deflated with the consumer price index; **CAG** – current account measure only for goods in HRK. Other mediating variables are: **Y** – real gross domestic product (HRK), **QEXg** – real quantities of exported goods and **QIMg** – real quantities of imported goods. To calculate adequate cross-correlation coefficients we detrended the data (using Hodrick-Prescott filter with common smoothing parameter λ of 1600 for quarterly data) and tested the presence of a unit root. For this purpose we used Augmented Dickey Fuller test, Phillips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin test (available upon request). Generally, all tests confirmed the absence of unit root for all the variables (graphical displays of the variables also suggest that they are stationary in levels). In conclusion, variables reveal a stationary behaviour after the trend has been removed. There are two shortcomings of this kind of approach. First, aggregate level analysis can sometimes lead to ‘aggregation bias’ problem and second, conclusions based on adapted data should not be embraced as finite reasoning on this topic. Further research pattern should therefore include analyses on disaggregate level, especially industry level that could suggest which industries could reap the benefits of possible currency devaluation. Altogether, there is a vast empirical emptiness on this topic in Croatia suggesting a need for broader trade dynamics, J-curve and S-curve literature.

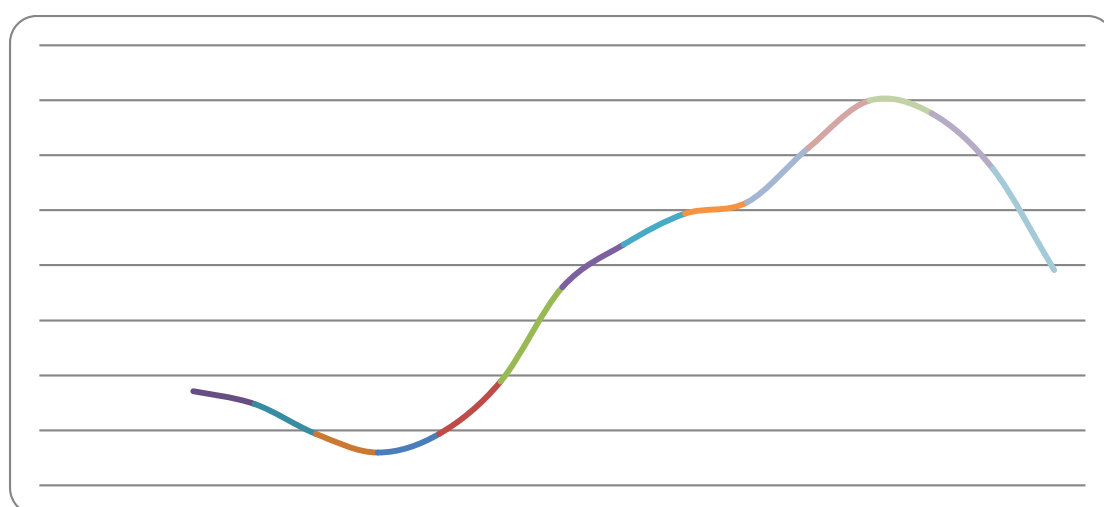
3.2. The existence of the S-curve

The main focus of this paper is to test the validity of an S-curve phenomenon in Croatia. Therefore, two S-curves will be presented according to two different approaches of the analysis. First S-curve relation reflects the terms of trade (presented as *ITOTg*) and trade balance (presented through *CAG*) nexus (see *Figure 1*), whereas the second S-shaped curve displays the real exchange rate (as *REER*) to trade balance (as *CAG*) relationship (see *Figure 2*), all at aggregate level respectively. Both relations demonstrated that while the cross-correlation between the current values of *ITOTg* or *REER* and the future values of *CAG* is

³ Whereas, the ‘basic’ barter terms of trade just measures variations in prices, the income terms of trade includes the effect of the changes in volume of quantities exported. This means that ‘basic’ terms of trade could decline even though income terms of trade improve since the quantities of export could grow at the larger scale. Income terms of trade measure reveals whether the country would end up with net gain or net loss as a result of changes in terms of trade and export volume, which *de facto* depends on the elasticity of demand for its export or in broader terms on Marshall-Lerner condition (see Škare et al., 2012, p. 913).

positive, the same cross-correlation between the current values of the *ITOTg* or *REER* and past values of the *CAG* is negative. When we plot cross-correlations functions against the lags and leads, relations resemble the letter S, meaning that we have found the evidence of an asymmetric S-curve phenomenon in both cases. Furthermore, the HLM effect is not revealed in any case since contemporaneous correlations in both cases are not negative. To scrutinize the subject we could also analyze the strength and the significance of cross-correlation coefficients. Namely, the highest statistically significant correlation coefficient of 0,35 in the first case (coefficients under the *Figure 1*) reveals in bottom line a positive correlation between the *ITOTg* and *CAG* (pro-cyclical behaviour of *CAG*); meaning in general that an improvement (appreciation) in *ITOTg* should lead to an improvement in *CAG*. Similarly, highest statistically significant correlation coefficient of – 0,59 in the second case (coefficients under the *Figure 2*) reveals a negative correlation between the *REER* and *CAG* (counter-cyclical behaviour of *CAG*). However, in our case a decrease in *REER* reflects a real depreciation of the kuna, which implies that the contemporaneous correlation coefficient between the two variables is expected to be positive, meaning that an appreciation (depreciation) of kuna in general should lead to an improvement (deterioration) in *CAG*. This probably reflects the behaviour of *REER*. Furthermore, historical data suggest that expansion of Croatian economy was always followed by the exchange rate appreciation, and *vice versa* during recessions. Thus, the past depreciation of exchange rate of kuna was *de facto* aftermath and not a monetary instrument, as some would conclude. Reason for that could be found in the fact that capital inflow produced appreciation pressure on exchange rate of kuna, which also resulted in private consumption biased growth of the Croatian economy (Benazić and Tomić, 2014, p. 90). Though few of the conclusions here cast some doubt on the existence of S-curve pattern, we think that they are very important facts that illustrate the complexity of the Croatian economic situation.

Figure 1: Cross-correlation *ITOTg* to *CAG* with lags and leads up to 8 periods



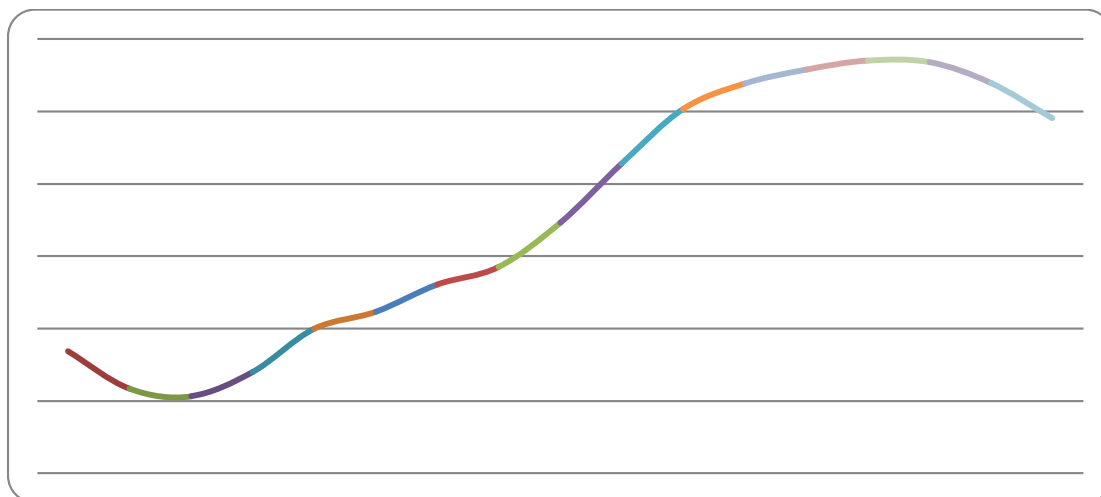
t-8	t-7	t-6	t-5	t-4	t-3	t-2	t-1	t-0	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8
-0.26	-0.19	-0.23	-0.33	-0.35	-0.34	-0.23	-0.07	0.18	0.00	0.10	0.24	0.30	0.36	0.17	-0.01	-0.19

*3quarter moving average was employed to smooth graphical presentation

**bold number denotes 1%, 5% or 10% significance levels respectively

Source: Author's calculation.

Table 2: Cross-correlation REER to CAg with lags and leads up to 8 periods



<i>t-8</i>	<i>t-7</i>	<i>t-6</i>	<i>t-5</i>	<i>t-4</i>	<i>t-3</i>	<i>t-2</i>	<i>t-1</i>	<i>t-0</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>	<i>t+5</i>	<i>t+6</i>	<i>t+7</i>	<i>t+8</i>
-0,46	-0,57	-0,59	-0,52	-0,40	-0,35	-0,28	-0,23	-0,11	0,06	0,21	0,28	0,32	0,34	0,34	0,28	0,18

*bold number denotes 1%, 5% or 10% significance levels respectively

Source: Author's calculation.

Concentrating on the S-curve phenomenon, results are consistent with the existing literature. Croatia is a small and opened economy that belongs to developing nations meaning that it can also exhibit an S-curve pattern largely due to limited access to international financial markets for capital formation and for smoothing effects of international terms of trade and other exogenous shocks. Hence, these results require interpretations with extra cautions. S-curve pattern does not necessarily suggest the existence of J-curve in the data, thus it is possible to depict an S-curve in the analysis without finding any evidence of the J-curve. In such manner we cannot recommend any real exchange changes to be used as a policy tool to manipulate trade flows based on the proof of the S-curve existence.

An S-curve describes only unconditional cross-correlations, whereas J-curve describes spots the conditional dynamic response of trade balance following a shock in the exchange rate. The inability of the S-curve to depict the strength and/or the speed of the adjustment process before and after the exchange rate/terms of trade depreciation explains its limitation within policy recommendations. Non-the-less, complemented with other types of research (correlations between other trade variables, exchange rate dynamics - Marshall-Lerner conditions - J-curve pattern, terms of trade developments and its causal relation to trade balance or output, analysis on disaggregated level and etc.), the S-curve confirmation could be of great help in achieving long-run policy goals suggesting that there indeed exists a nexus of some kind between the terms of trade/exchange rate and the trade balance. Will this allow exchange rate manipulation? Maybe! Considering the main objective of Croatian National Bank (exchange rate in Croatia has been given a role of economic stabilizer rather than a position of an active instrument within a monetary policy), we may conclude that reliance on exchange rate as a factor inducing positive movements in business cycles is a highly unrealistic assumption mainly due to a great external indebtedness (Benazić and Tomić, 2014, p. 89).

3.3. Other results

Additional goal of this paper was to examine cross-correlation functions between various trade variables at different lags and leads in order to clarify some questions revolving trade dynamics in Croatia (see Appendix). These too reveal some puzzling results. The cross-correlations between the CAG and Y are generally negative, reaching its minimum at contemporaneous values of both output and trade. It means that over a business cycle, an increase in output is related to a worsening of the current account. Nothing strange considering that Croatia is highly import dependent country. On the other side, cross-correlations between the $ITOTg$ and Y are positive, indicating that an increase in output is associated with an appreciation of income terms of trade (consistent with conclusion made by Škare et al. (2012), Kovačević and Tomić (2012) and Tomić (2014)). This is also consistent with some of our previous conclusions but opposite to an S-curve logic. Next, cross-correlations between $QEXg$ and Y , $QIMg$ and Y , $QEXg$ and $ITOTg$, and $QIMg$ and $ITOTg$ are positive in general, hump shaped, reaching in that manner a maximum at contemporaneous values. It suggests that a rise in output and income terms of trade can be associated with both an increased outflow and inflow of goods. In deduction, though Croatia is considerably opened economy, it still lacks the results on the export side. However, when we observe graphical display of the relationship between $QEXg$ and $ITOTg$, there is an allusion of the S-curve pattern in the data which is in conformity with our previous conclusion⁴. Croatia should therefore consider its strategic position and place it towards an improvement in export performance in order to perform well within established macroeconomic conditions. *Ditto* it calls for structural adjustments and an increase in competitiveness while maintaining fiscal discipline, all with questionable reach of a monetary policy.

4. CONCLUSION

The impact of currency depreciation on trade balance is still an empirically open question in international and financial economics. Our paper was pointed towards (at least partial) clarification of that question by analyzing trade dynamics in Croatia through the concept of S-curve. We employed two variables to test the S-curve hypothesis in order to answer the robustness requirements and came to conclusion that there indeed exists S-curve pattern in the Croatian data. Both relations demonstrated that while the cross-correlation between the current values of income terms of trade or real effective exchange rate and the future values of current account is positive, the same cross-correlation between the current values of the income terms of trade or real effective exchange rate and past values of the current account is negative. When we plotted cross-correlations against the lags and leads, relations

⁴ Interestingly, Škare et al. (2012, p. 914) found that depreciation of the kuna would lead to an improvement of the income terms of trade by 1.83%. Though it should be in reverse within the terms of trade scope (appreciation – increase in terms of trade; depreciation – decrease in terms of trade), since income terms of trade also include the volume of export it is logical that depreciation makes domestic products on world markets more cheaper, increasing in that way the volume of export, hence the income terms of trade. This conclusion is however doubtful considering possible exogeneity of Croatian income terms of trade, a low competitiveness of export products and the controversy over the J-curve effect Croatia.

resembled the letter S, meaning that we have found the evidence of the S-curve phenomenon in both cases. On the other hand, similar analysis between various trade variables reveals opposite conclusion, casting some doubt on the existence of the S-curve relation. This is even more so true when we evaluate in dept the sources of economic problems in Croatia, as well as empirical studies that suggest that exchange rate changes would not ultimately improve trade balance and international competitiveness but would lead to a debt chaos and economic havoc. However, the finding of an S-curve pattern does not necessarily mean we confirmed the J-curve pattern, meaning that conclusion should be affiliated in that manner. Hence, the inability of an S-curve to depict the strength and/or the speed of the adjustment process before and after the exchange rate/terms of trade depreciation explains its limitation within policy recommendations.

Due to several reasons, the results of this paper should be interpreted with due cautions. First, aggregate level analysis based on some adapted variables enables an alternative approach to the topic yet leaves room for analytical questions. Second, the revealed S-curve pattern should not be used as a pillar for economic policy actions due to its limited reasoning. And third, this ubiquitous S-curve often describes a natural design of flow systems in a business cycle manner, therefore it could only reveal natural behaviour of the terms of trade/exchange rate and trade balance. Non-the-less, complemented with other types of research (Markov switching model that would reveal two regimes, J-curve estimation etc.), the S-curve confirmation could be of great help in achieving long-run policy goals suggesting that there indeed exists a nexus of some kind between the observed variables giving as some new insight into Croatian trade dynamics and its international financial position.

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Appendix

Cross-correlation functions:

