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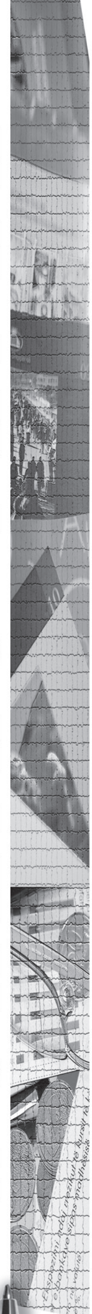

THE ROLE OF EXCHANGE RATES IN INTERNATIONAL TRADE MODELS: DOES THE MARSHALL-LERNER CONDITION HOLD IN ALBANIA?

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CONTENTS

ABSTRACT[1]

Income and price elasticities account for the size of the transmission among trading partners in real activity. The recent economic slowdown in advanced economies has become a concern for the growth rate in developing countries. Of a particular interest is the role of exports as a source of growth engine. Estimation of income and price elasticities of real trade volumes allows for an evaluation of the extent of such interrelationship and the Marshall-Lerner condition. Results show that while income is the main driver of trade flows in Albania, exchange rate plays a significant role in fostering export growth and substituting imports. Section 1 and 2 cover a theoretical and empirical review of literature, section 3 addresses issues with the data and methodology, while section 4 reports results. A policy perspective of Marshall-Lerner condition for countries with low export-import coverage ratio is attempted in the final section.

Keywords: Trade elasticity, Marshall–Lerner condition, Exchange Rate.

JEL Classification: F11, F14, F31

1 The author thanks Statistics Department for providing disaggregated historical data.

INTRODUCTION

In economies with significant degree of openness, the international transmission of changes in economic activity and prices plays a major role in domestic policies. One tool of a particular interest are trade elasticities, allowing to interpret the behaviour of trade flows and further translate the trade analysis into useful recommendations for policymaking in international economics. A very common illustration is the Marshall-Lerner condition accounting for the impact of exchange rate changes on the adjustment of the external account.

The inquiry is relevant to the analysis of sustainability of current account. Ultimately it holds that either a current account imbalance will widen indefinitely, be it either a surplus or deficit, or the relative prices will have to adjust over time to keep it from widening, given an asymmetry of the elasticities. In an ideally two-country world with similar inflation and growth rates, such an asymmetry would give rise to external imbalances[2]. Hence, adjustment is required.

Even in cases of symmetric elasticities, the persistently higher growth rates in some countries (mainly developing ones) relative to its trading partners with lower growth rates give rise to deteriorating trade balance. The relatively higher growth rate of the importing country translates into higher imports relative to exports, a widening trade deficit and eventually pressures on relative prices to adjust. In the most conventional sense, a relative price adjustment for the sake of trade imbalance corrections has come to be identified with exchange rate trends.

Finally, even after accounting for the above two, and assuming similar growth rates and symmetric elasticities, partial financing of trade balance through remittances at a significant margin in some developing countries calls for alternative sources in those countries as those remittances fail to grow indefinitely by the same rate as the economies do (Graph I.4. Appendix I).

[2] Johnson (1958) raised the point initially though it is quite an obvious arithmetic result.

The last argument brings up the role of exports in developing economies as an ultimate source of growth in the long process of catching up with more advanced ones. While other factors like remittances and FDI play a role, exports are not only a source of foreign income but also a signal of increasing productivity that invites more FDI into an economy. Lewis (1980) excellently argues that the slower economic growth in advanced economies will reduce the pace of development even in developing economies unless another source of growth is promoted. He proposed that trade among developing economies themselves can take up that role. The argument above is challenged by the role of price competition due to a downward sloping demand curve for exports, pointing to devaluations (Riedel, 1984). Yet, that would only hold from the point of view of one single country while Lewis' argument holds in a multi-country world (Faini, Fernando, & Senhadji, 1992). The whole controversy points to the role of evaluating price and income elasticities. Both are critical to the assessment of alternative economic policies that strike a balance between adjusting trade deficit and driving economic growth.

Reliable and stable estimates of those elasticities are most useful in evaluating the potential unfolding of a widening trade imbalance as well as the size of the adjustment required in respective variables to attain equilibrium. Unlike other means of financing, export growth is seen as a steady and reliable source of growth engine over the long term in developing countries in the catch-up process, rather more stable than FDI.

1. ECONOMIC FOUNDATIONS: THE IMPERFECT SUBSTITUTION MODEL

Identification of variables affecting export and import flows is based on classical demand theory, while considering the supply side mainly by assumption. Typical theoretical approach assumes that the elasticity of supply of exports and imports is infinite. Accordingly, trade flows are a negative function of price and a positive function of income, with the latter usually exogenous to the process.

There are two theoretical frameworks to approach trade elasticities. The Perfect Substitutions Model (PSM) fits when considering trade for close substitutes (if not perfect), while Imperfect Substitutes Model (ISM) for trade of differentiated goods (Goldstein & Khan, 1982).[3] This empirical analysis is based on the theoretical foundation of ISM (Goldstein & Kahn (1985); Marquez (1988); Senhadji (1998)). A critical assumption of this model is that neither exports nor imports are perfect substitutes for domestic production. The underlying assumption is that if the opposite were true, a country would be either an exporter or an importer. The empirical literature supporting this argument comes from large amount of empirical evidence showing that price differentials can be critically large for the same products in different countries (Frenkel (1981), Lipsey (1978)). In practice, both domestic and foreign goods can be found co-existing in the markets. Such evidence can be supported by the trend of consumers for product variation as a means of utility-enhancing.

The ISM built on demand and supply equations allows one to recognize simultaneous relationships among prices and quantities. Most empirical works on import and export estimations have considered prices as exogenous variables by making assumptions about the supply side. Hence, initially only export and import demand equations have been estimated through standard methodologies without any concern for endogeneity of prices due to supply-side impact. Introduction of cointegration has allowed addressing simultaneity at a later stage.

[3] When estimating elasticities of disaggregated variables or of a single good, both models can serve a purpose.

1.1 THE EMPIRICAL MODEL

The pragmatist approach to modelling export or import functions is that when considering elasticities for aggregate variables, the ISM is better suited. Through the literature, most researchers follow the ISM approach, as the data on imports and exports are aggregated, at least to a certain degree (Goldstein & Kahn (1985); Marquez (1988); Senhadji (1998)). The ISM of a country's exports to and imports from the rest of the world is formalized as follows:

$$M_d=\gamma(Y,PM,P) \qquad \gamma_1>0,\gamma_3>0,\gamma_2<0 \qquad (1)$$

$$X_d=\pi(Y^f * e,PX,P^f * e) \qquad \pi_1>0,\pi_3>0,\pi_2<0 \qquad (2)$$

$$M_s=\phi(PM^f(1+S^f),P^f) \qquad \phi_1>0,\phi_2<0 \qquad (3)$$

$$X_s=\xi(PX(1+S),P) \qquad \xi_1>0,\xi_2<0 \qquad (4)$$

$$PM=(PX)^f(1+T) * e \qquad (5)$$

$$PM^f=PX(1+T^f)/e \qquad (6)$$

$$M_d=M_s\, e \qquad (7)$$

$$X_d=X_s\, e \qquad (8)$$

Where,

M_d: quantity of imports demanded by the home country;

X_d: quantity of exports demanded by the world from the home country;

M_s: quantity of imports supplied by the rest of the world to the home country;

X_s: quantity of the home country exports supplied to the rest of the world;

PM and PM^f: prices in domestic currency paid by home and foreign importers respectively;

PX and PX^f: prices in domestic currency paid to home and foreign exporters respectively;

Y and Y^f: the level of nominal income at home and abroad (trading partner);

P and P^f: prices of domestic goods produced within the respective countries (PPIs);
T and T^f: the proportional tariffs;
S and S^f: subsidies to imports and exports;
e: the exchange rate defined as home currency per unit of foreign currency.[4]

Some elaboration is needed to get the final trade equations.[5] The real volume of exports and imports as a function of demand and supply factors is written:

$$M=\gamma'\left(\frac{Y}{P}, \frac{PM}{P}, \frac{PM^f*e}{P^f}\right) \qquad \gamma'_1>0, \gamma'_2<0, \gamma'_3>0 \qquad (1'')$$

$$X=\pi'\left(\frac{Y^f*e}{P^f*e}, \frac{PX}{P^f*e}, \frac{PX}{P}\right) \qquad \pi'_1>0, \pi'_2<0, \pi'_3>0 \qquad (2'')$$

Where,

$\left[\frac{Y}{P}\right]$ and $\left[\frac{Y^f*e}{P^f*e}\right]$ is real income at home and in the foreign country;

$\left[\frac{PX}{P^f*e}\right]$ is the relative price of exports vis-à-vis price of goods produced in the foreign market;

$\left[\frac{PM}{P}\right]$ is the relative price index of imports vis-à-vis price of goods produced at home.

As the price elasticity of exports and imports supplied is considered infinite in a competitive market, $\left[\frac{PX}{P}\right]$ and $\left[\frac{PM^{f*}e}{P^f}\right]$ are considered obsolete. Any cost effects on rising marginal cost of exports due to pressure to produce more exportable goods at home can be captured by a variable of production capacity at home, while infinite supply elasticity of imports is assumed as conventionally.[6] The other issue of simultaneity is subject to methodology.

[4] Marquez and McNeilly (1988) use dollar value for developing countries' exchange rate. Algieri (2004) uses real rate.

[5] Homogeneity of degree 0 of demand to domestic prices and equilibrium $X_d=X_s=X$ is assumed. No subsidies.

[6] In real life, it is hard to see perfectly competitive markets, and hence infinite supply elasticities. Such assumptions are necessary in empirical literature. Note also that since $M_d=M_s e$, then $PM=PM^f e$.

From a small open economy perspective (SOE), infinite supply elasticity holds only for the import supply function. The supply capacity of the rest of the world is much larger than the maximum demand by a SOE at any increment of the price of those imports (exports for the rest of the world), while the opposite may not hold for exports. Following the review by most authors above, infinite supply elasticity of imports is assumed throughout the paper.

Contrary to the above argument, home country's capacity to supply exports to the rest of the world for any price is limited. A supply function of exports (eq. 4) simply as a positive function of price may only hold for marginal price changes. Over the medium-term, supply of exports depends on the production capacity of the exporting country. For a SOE, such a boundary is very relevant. Goldstein and Kahn (1978) proposed introducing production capacity variable in the export supply function to account for finite supply elasticity. The argument is intuitive as marginal cost of increasing exports would be a function of the rising marginal cost of capital. They suggest either capital stock or real GDP per capita.

The downside of using real GDP itself is the ambiguity in terms of its expected sign. When GDP grows due to demand shocks, a negative sign can be expected, since resources shifted to fill domestic demand (Kalecki, 1971). When growth comes due to productivity shocks, then (+) sign is expected as exports could rise due to a greater availability of commodities. Optimally, a variable that stands clear of demand-driven fluctuations would serve the purpose of capturing supply-side effects in the export equation.

The above reduced from equations are derivable in a two-country dynamic optimization model with agents maximizing their utility subject to budget constraint (Senhadji & Montenegro, 1999). The model assumes households decide on the level and structure of consumption that maximizes their utility and then make an allocation between domestic and imported goods.[7]

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[7] Refer to Reinhart (1995) for a derivation in dynamic optimization problem in continuous time.

2. LITERATURE REVIEW

In the empirical literature, estimation of trade elasticities received an increasing attention when Houthakker and Magee (1969) raised the issue of asymmetry of elasticities as a source of external imbalance. While the role of price sensitivity had been recognized in the previous literature, they questioned the extent to which such asymmetry was an additional source of trade balance deterioration. A country with unfavourable income elasticities to trade would either suffer from relatively lower growth or see its trade balance deteriorate and its exchange rate depreciate.

The estimation of elasticities gained momentum in the 80s, focusing on non-oil trade (Riedel, 1984; Cline, 1984; Dornbusch, 1985). While such estimates were import elasticities for the latter, they were export elasticities for the developing countries. The results varied as low as 0.9-1.3 income elasticity by Riedel to as high as 2.4-4.7 in the case of Dornbusch. In some cases, LDCs' exports to industrialized economies turned insensitive to prices (Chart 1).

Marquez and McNeilly (1988) raise at least three issues when comparing elasticity results from different studies: omission of variables (dealt with using different proxy variables for income and price deflators), aggregation across countries or commodities and simultaneity. They relaxed restrictions on aggregation across commodities, and relied on 2SLS (addressing simultaneity) to estimate elasticities of non-oil imports of five industrial countries, from developing countries on individual and on aggregate level (Chart 1). Interestingly, a negative elasticity of -1.2 for Japanese imports can be reconciled with the theory when domestic goods are perfect substitutes for importable goods. Magee (1975) offers a rationale for critically low income sensitivity to importable goods. An increase in income may induce production of importable goods and hence pushing the income elasticity further lower to a negative range. Marquez & McNeilly (1988) find a narrower range of income elasticity for the same countries. The results are comparable, connecting exports of (non-OPEC) developing countries towards advanced ones, using the same methodology.

Within the EU, Bank of Spain (2003) reports income elasticities of exports below 1 for most euro area economies, except for Spain at around 1.4 and for Austria, Netherlands and Finland at around 1. Income elasticity for the new members from Eastern and Central Europe turns above 1.5 for both imports and exports, while the price elasticities vary in widely (Chart 1).

In Albania, two studies are recorded (Shtylla and Sojli, 2006; Vika, 2009) focusing on elasticities of nominal trade flows. The presence of price variable on the left leads to biases in the standard errors, critical for the significance of the results.

Chart 1 provides estimates from different studies across time. The wide range of estimates points to non-constant estimates over time. One would question whether asymmetric elasticities respond to relative growth rates to ensure trade balance or vice versa. Krugman (1989) pointed to a "45 degree rule" relating differences in income elasticities and relative growth rates. The relationship, when it holds, calls for a smaller adjustment in relative prices (exchange rates) than otherwise. To illustrate, though Japan had much higher growth rates relative to UK and US, it did not face downward pressures on its exchange rates, or even appreciated. It implied that the elasticities were not independent of relative growth rates.

Chart 1. Income and price elasticities in World Trade: selected papers

	Import elasticity		Export elasticity		Exporting Country	Importing Country	
	Y	P	Y	P			
Houthakker & Magee (1969)	1.37	-0.89	1.65	-1.24	Group[8]		
Cline (1984)			3.1	0	Non-oil world	Industrial	1961-81
Riedel (1984)			0.9-1.3	0	Non-oil LDC	Industrial	1960-78
Dornbusch (1985)			2.4-4.7	-1.2	Non-oil LDC	World	1960-83
Marquez & McNeilly (1986)			1.3-1.6		Non-oil LDC	Ca,Ge,Jp,UK	1974-81
Senhadji (1988)♠	1.45	-1.08			65 countries	World	1960-93
Senhadji & Montenegro (1999)♣			1.47	-1.02	World	53 countries	1960-93
Clarida (1992)	2.2	-0.95				US	1967-90
Marquez (1988)			1.4-1.9*	(0.02)-(3.13)	Non-OPEC LDC		1974-84
- Canada			1.87	-1.58	Non-oil LDC	Canada	1974-84
- Germany			1.9	-0.78	Non-oil LDC	Germany	1974-84
- Japan			-0.17	-3.13	Non-oil LDC	Japan	1974-84
- UK			0.81	-0.02	Non-oil LDC	UK	1974-84
- US			2.15	-0.71	Non-oil LDC	US	1974-84
Reinhart (1995)*	**1.22**	**-0.53**	**2.05**	**-0.32**	LDC	Industrial	1970-91
- Latin America	0.96	-0.36	2.07	-0.19			
- Asia	1.39	-0.40	2.49	-0.40			
- Africa	1.14	-1.36	1.25	-0.27			
Hooper *et al.* (2000)							1990-94
- Canada	1.4	-0.9	1.1	-0.9			1990-94
- France	1.6	-0.4	1.5	-0.2			1990-94
- Germany	1.5	-0.06	1.4	-0.3			1990-94
- Italy	1.4	-0.4	1.6	-0.9			1990-94
- Japan	0.9	-0.3	1.1	-1.0			1990-94
- UK	2.2	-0.6	1.1	-1.6			1990-94
- US	1.8	-0.3	0.8	-1.5			1990-94
New EU member countries					Trade Partner	Country	
Tomšik (2000)	1.1	"ns"	5.29	"ns"	World	Czech Rep.	
Benáček *et al.* (2005)	3.08	0.23	1.55	0.14	World	Czech Rep.	
Vagač *et al.* (2001)	1.99	-1.39	-	-	World	Slovakia	
Wdowinski, Milo (2002)	1.87	-1.05	2.10	-0.85	World	Poland	
Bobić (2009)	2.22	-0.88	1.98	-0.58[9]	World	Croatia	

* Pooled estimates. "ns": Not Significant. ♠ Fully-Modified long-run estimates: mean values for 65 countries. ♣ FM long-run estimates: mean values for 53 countries.

[8] Houthakker and Magee (1969) estimate elasticities of around 15 countries separately, by today members of OECD and hence industrialized economies by that time (Table 1, Page 4). In this paper, I only refer to a single estimate (for each elasticity) made for all the countries (Table 2, Page 5 of that working paper).

[9] Additional exchange rate variable is inserted. ER elasticity of imports is -0.926, while for exports is not significant.

At the other corner, the low price elasticities had triggered criticism and alternative explanations. Riedel (1984) had suggested that neglecting supply factors could be the reason. Accordingly, exports should be a function of a supply factor as well. Riedel argued that a small country can raise its exports through price competition, as long as there is capacity to produce, which is a supply factor. The driving force of exports may be a function of exporting country's capacity to produce at competitive prices.

Albanian non-oil exports of goods towards EU reached 12% of GDP as of 2011, making up for 0.025% of the EU imports. There is no clear cut answer as to what the maximum level is, though the simple average of exports/GDP of the ten new EU members in 2004 had reached 39% at the time of entry.[10] Also, Albania's (goods) imports/GDP ratio of 42% points to the absence of barriers to trade. Extra demand for Albania's exports can be triggered by substituting exports of other countries towards the same (Euro) area, for no change in the GDP of the importing country. That leads us to Riedel's price competition, theoretically connected to productivity and relative marginal costs of capital and labour.

Analysis of trade imbalance adjustments during the 90s attempted to connect exchange rate with current account, implying a J-curve. It is rooted in the "elasticities approach" to external adjustment triggered by relative price changes, with the M-L rule as a pre-condition.[11,12] As structural changes in relative prices are a longer and harder process requiring internal painful adjustments, there is a special interest in exchange rate from the policymaking perspective. Empirical evidence on J-curve is mixed, or even controversial. Initial results by Rose (1990) (1991) and Ostry and Rose (1992) found no significance of real exchange rate devaluations while Marquez and McNeilly (1988) and Reinhart (1995) were positive based on their findings.

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[10] Author's own calculation based on Eurostat data.

[11] Other theories may suggest alternative channels of transmission of exchange rate effect on current account.

[12] Assuming devaluation leads to real devaluation. The degree of substitutability between home and foreign goods plays a role also.

The large trade collapse following the global recession of 2007-08 has revived the interest in elasticities due to the failure of the existing estimates. Bussiere *et al*. (2011) introduces an import intensity-adjusted measure (IAD) of aggregate demand to account for it. Results from a panel of OECD countries show a slightly smaller income elasticity based on IAD (1.2 vs. 1.33 with GDP), in exchange for a higher price elasticity size (-0.18 vs -0.15). For the group of G7 countries, the discrepancies were even larger.

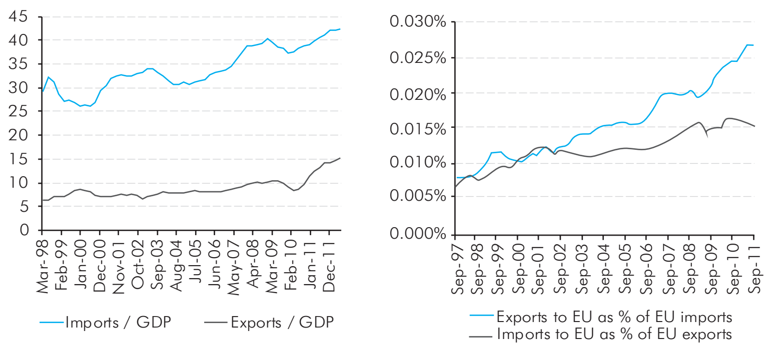
Empirical literature on trade elasticities has been narrowly defined by the standard specification as defined in the theoretical framework. Differences across the findings come up in terms of asymmetric income elasticities for developing countries as well as in the role of price effects. Krugman (1989) has been credited for analyzing the correlation of relative growth rates and income elasticity differences. The latest theoretical and empirical work addressing the external imbalances in a general equilibrium framework is covered by Obstfeld and Rogoff (1996). Such framework addresses in a comprehensive manner the above methodological issues as well.

3. CHOICE OF VARIABLES AND METHODOLOGY

3.1 DATA

Some of the variables for this study are available, though few are worked out as proxies. For Albania, only values of imports and exports as well as their sectoral decomposition are available. Country decomposition on an annual basis shows that imports from euro area have dominated the trend. During 1996-2003, their share is around 77% of total average, and has further declined to 58% of total imports in the remaining period. The imports from the whole EU facing the same market prices (as a share of total imports) are around 8% higher than those from the euro area. The decline in the share of imports from EU countries has been taken over by Turkey and China with around 6-7% of total for each country during 2004-11. The share of exports to euro area and EU is even higher, at around 80% and 90%, respectively.

Graph 1. Trade as a share of GDP (left), and as a share of EU total trade



Source: Bank of Albania, Institute of Statistics (INSTAT) and Eurostat.

The above information is used to calculate trade flow deflators based on unit value indices of the reverse trade flows of euro area available by ECB. Three (nested) groups of trade are defined: the manufacturing trade (SITC 5-9), fuel and other related products (SITC 3), and the remaining items consisting of food and raw materials (SITC 0-2, 4). Based on the above, the following trade deflators are defined.

PM^e_t: Import price index in foreign currency.
Unit value indices of the exports of euro area have been used to deflate each subgroup as defined above. Such indices are available for total exports, as well as for two subgroups petrol (SITC 3) and manufactured goods (SITC 5-9). To deflate the group food and raw materials (SITC 0-2, 4), total UVX is used (Source: ECB). Import price index in foreign currency is defined as follows:

$$PM_t^{e}=\sum_{i=1}^{3} (UVX_t^{X\_i\_eu})*w_t^{M\_i\_al}) \qquad \forall i=f,p,m \qquad (4.1)$$

where, $UVX_t^{X\_i\_eu}$ is the unit value index of euro area exports for the group "i"[13],

PX^e_t: Export price index in foreign currency.
The same approach is followed to obtain the real volume of exports and an export deflator (in foreign currency) using unit value indices of euro area imports.

$$PX_t^{e}=\sum_{i=1}^{3} (UVX_t^{M\_i\_eu})*w_t^{X\_i\_al}) \qquad \forall i=f,p,m \qquad (4.2)$$

where, $UVX_t^{M\_i\_eu}$ is the unit value index of euro area imports for the group "i".

The main purpose is to check for the elasticities of non-oil imports. Given the nature of manufactured exports of Albania, elasticities of manufactured trade might be of interest as well (Marquez & McNeilly, 1988).

Euro area is a large market for the other EU countries and potential candidates, becoming a price setter of traded goods across the region. Manufactured goods make up for 60-70% of total imports. While such a proxy does not take into account the individual share of each imported goods, but instead based on weights of each

[13] Superscription "f" stands for foods and raw materials (SITC 0-2, 4), "p" for oil and energy (SITC 3), and "m" for manufactured goods (SITC 5-9).

subgroup, it is based on assumption that prices of goods in each subgroup are highly correlated and hence discrepancies due to differing weights (from those in EU exports basket) are minor or insignificant.

PX^h_t Export price index measured domestically.

An alternative index of export prices (in domestic currency) is measured by Institute of Statistics of Albania (INSTAT). In addition, the index is not sufficiently long for the time under consideration. To make up for the missing observations in the export price index of INSTAT (PX^h), growth rates of domestic PPI have been used.

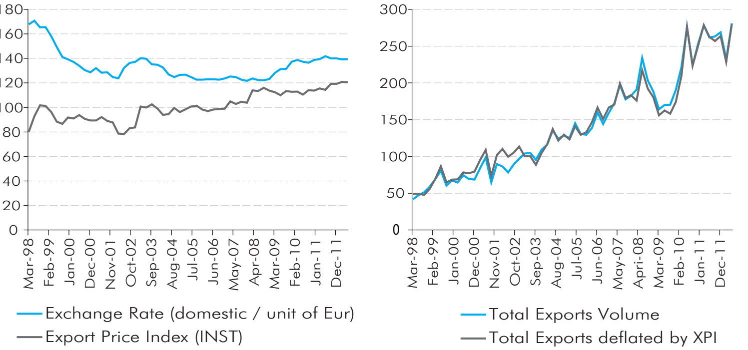
Since our export and import equations are built on premises of classical demand theory and hence are built as demand equations, caution is essential to watch both indices as the one from INSTAT might contain information on costs of products hence capturing supply-side effects, rather than demand-side pressures that exporters face in the market. In addition, the export price index might include the impact of changing exchange rate, depending on whether data represent domestic unit labour costs or foreign import prices. The presence of exchange rate effects in the price index might be a source of bias. At this stage of discussion, such an assumption is rather hypothetical. The issue is addressed by considering both alternatives.

Since PX^e is constructed using import price index of imports towards the euro area, it is at the same time the export price index of those countries exporting towards Euro area. In essence, it is the price that the European consumer of foreign goods faces. In such a competitive market for substituting other exporters' goods for Albanian exports, the latter is only a price taker and accepts those export prices prevailing in the export market as given.[14]

There is an essential conceptual difference between the two though. PX^e does have the advantage of being completely exogenous to the

[14] It is challenging and harmful for an economy to maintain an appreciated real exchange rate for a long time (due to productivity improvements), and hence a nominal appreciation follows.

Graph 2. Price and (real) volume of exports deflated by PX^e and PX^h



Source: Bank of Albania, INSTAT and own calculations.

behaviour of the exchange rate. Hence, it opens the opportunity to capture a more robust estimate of price elasticity split into exchange rate effect and that due to relative price index prevailing in the export market.

The series corresponding to the variables in the export and import equations follow the standard definitions and are obtained respectively. Chart 2 provides a list of definitions of variables.

Chart 2. Definition of variables used

PM^e_t	Import price index in foreign currency
PX^e_t	Export price index in foreign currency
PX_t^h	Export price index measured domestically
X_all_t	Real volume of total exports
X_fm_t	Real volume of non-oil exports
X_m_t	Real volume of manufactured exports
M_all_t	Real volume of total imports
M_fm_t	Real volume of non-oil imports
M_m_t	Real volume of manufactured imports
Y_t	Domestic aggregate demand (Absorption_al)
Y_t^f	Foreign aggregate demand (Y_eu)
P_t	Domestic producer prices (PPI_al)
P_t^f	Foreign producer prices (PPI_EU)
K_t	GDP/capita at constant prices: Production capacity variable as a supply factor in export equation

RPX_t	$PX_t^h / (e_t * P_t^f)$	Relative price index of exports measured domestically
RPX_t^*		PX_t^h / P_t^f
RPM^e_t	$PM_t^e * e_t / P_t$	Relative price index of imports
RPM_t		PM_t^e / P_t
RPX^e_t	$PX_t^e * e_t / P_t^f$	Relative price index of exports
$RPX_t^♣$		PX_t^e / P_t^f

3.2 METHODOLOGY

3.2.1 DATA PROPERTIES

The variables in this work are volume of exports and imports, domestic and foreign income levels (i.e. GDP) and price level of imports and exports, as well as domestic and foreign producer price indices. All variables are typically stochastically trend variables based on their macroeconomic properties. Augmented Dickey Fuller Test is used to test statistically for their properties. Such test consists in running a regression on the first difference of the series to be tested as follows:

$$\Delta y_t = a\Delta y_{t-1} + x'd + \beta_1 \Delta y_{t-1} + \ldots + \beta_q \Delta y_{t-q} e_t$$

where, x represents a "constant" or "constant and trend", the term $\alpha = \rho - 1$ contains the unit root term, while null and alternative hypotheses are:

$$H0: \alpha = 0$$
$$Ha: \alpha < 0$$

The lagged values of the Δy_t are added to control for serial correlation of the residuals to ensure the latter are white noise. Running the test without those lagged values is only valid for an AR(1) process. The critical values to test for unit roots are not the usual Student's t-distribution critical values but have been worked out by Dickey & Fuller (1979) and later augmented by McKinnon (1991) (1996).

In all cases, ADF test results for stationarity confirm that they are stationary at first level, with only a constant (Appendix I. Table

I.1).[15] One exception is the exports themselves (and exports without oil and energy), which are also stationary in level when a trend is included. Given the small number of observations, such trend stationarity is possible for inherently non-stationary variables.

The problem with the unit root test results is that it only considers 56 observations of the whole series, which can also be approximated by a linear trend. Recognizing such a linear trend as virtue of the series, it implies that exports themselves are independent of any macroeconomic process. The longer series contradicts such a premature conclusion, implying that the trend itself is indeed part of a longer stochastic process. What one is interested in is how the stochastic trend, observed in the longer series, evolves and to what extent the main driving factors influence it. Juselius (2006) makes a detailed discussion as to why non-stationarity should be seen more as a virtue of the economic series rather than a statistical process. The case is much stronger when the number of observations is relatively small (less than 70) and covers a short time span (14 years only).

When a longer period is considered, unit root test results for exports confirm the presence of a stochastic trend in the series. Indeed, the presence of a stochastic trend is what economic theory assumes, given that exports are mainly driven by income level of the foreign trading partner, the latter being non-stationary on its own. For the purposes of this study, exports series is considered in cointegration testing though much thought is given when analyzing the cointegrating relationship. Trend stationarity is dealt by following strict theoretical rules when deciding about the number of cointegration vectors and number of deterministic terms included as is further elaborated in the following sections on methodology.

[15] One exception is the exports themselves (and exports without oil and energy), which are also stationary in level when a trend is included. Similar issues arise when testing for volume of exports and imports of manufactured goods, though they are reported only for comparative purposes. Observation reveals the series have a clear upward trend. The small number of observations and large fluctuations around that trend affects root results. The results for this series also show minor problems with other diagnostics.

3.2.2 METHOD

Long-Run elasticities

A classical approach to estimating elasticities is the Johansen Approach (1988) (1991). The stochastic trend present in the data calls for a cointegration analysis in estimating elasticities. The approach proposes a Vector Error Correction Mechanism (hereby VECM) to determine a cointegrating relationship and to estimate long-run equilibrium coefficients by ML method. The method has desirable properties in terms of generating a long-run equilibrium, in addition to addressing its short run dynamics, and resolves the problem of simultaneity among the variables. The Johansen VECM representation builds on testing for the following:

$$\Delta Z_{i,t} = \sum_{j=1}^{k} \Gamma_{t-j} * \Delta Z_{i,t-1} + \Pi * Z_{i,t-1} + \Phi d_{i,t} + \varepsilon_{i,t}$$

where,

$Z_{i,t}$ is the vector of all “N” endogenous variables in the system,

$\Gamma_{i,t-j}$ is a matrix of short-term coefficients (N variables x N equations) driving the process,

$$\Pi = \alpha\beta' = \begin{pmatrix} \alpha_{11} \dots \alpha_{1N} \\ \dots \; \dots \; \dots \\ \alpha_{N1} \dots \alpha_{NN} \end{pmatrix} \begin{pmatrix} \beta_{11} \dots \beta_{N1} \\ \dots \; \dots \; \dots \\ \beta_{1N} \dots \beta_{NN} \end{pmatrix}$$

is the matrix of coefficients of the N variables in levels that are cointegrated, which is product of speeds of adjustments (α’s) and long-run coefficients (β’s),

Φ is a vector of short run coefficients for deterministic terms in the VAR model that may be equal to or different from zero,

$\varepsilon_{i,t}$ is the vector of i.i.d error terms with mean zero and finite variance.

Testing for cointegration amongst variables in $Z_{i,t}$ is done using LR trace test. It tests the null hypothesis that there are at most “r” distinct CVs using the trace statistic:

$$LR_{TR}(r|k) = -T\sum_{i=r+1}^{k} \ln(1-\lambda_i)$$

where λ_i is the largest eigenvalue of the Π matrix. Asymptotic critical values are provided by MacKinnon-Haug-Michelis (1999).[16] The appropriate rank condition for identification of each cointegrating vector is considered for potentially exogenous and weakly exogenous variables. Johansen (1995) developed conditions under which such restrictions are generically identifying.

Parameter constancy

Testing for parameter constancy necessitates comparing the behaviour of estimation residuals in different subsamples. For stable parameters, the properties of the residuals in the subsamples should not change. I applied such tests on the long-run cointegration equations.[17] Tests are implemented for the sample 1998-2010 Q2. As a general rule, the break-point is set at the 85th percentile of the number of observations. Most evidence from periodic reports suggests that the slowdown in economic activity due to the global shock has taken place after 2009 (Annual Report, 2010).

3.3 TESTING

Certain issues come up when testing for cointegration among macroeconomic variables with a small number of observations (typically in the range of 50-70 observations). The small number of observations raises questions not only on the robustness of the estimates but even on testing for cointegration. Juselius (2006) suggests the one that considers economic theory and unit root test results as a basis for the number of cointegrating vectors and deterministic terms (Appendix I. Table I.1). Yet, as documented in the previous section, the small number of observations raises similar questions even on unit root results. Hence, it is rather crucial to have a sound theoretical support for the type of

[16] Critical values of MHM used by Eviews package differ from those reported in Johansen and Juselius (1990).

[17] It is tempting to make such applications on system basis, though most other variables are weakly exogenous to the process. Test results are provided in Appendix I.

equations regressed and interpret those results virtuously on the basis of economic theory.

Typically when testing for cointegration among trade volume, income and price, it is expected to have only 1 cointegration relationship whereby the former responds to income and price. Testing in short samples may suggest more or less than 1 cointegration vector as test statistics for cointegration are critically influenced by the number of observations and informativeness of such short samples. One way to deal with it has been to develop new critical values (see Reihnsel and Ahn (1992), Johansen (2002)).

I rely more on the economic theory that suggests that there is only one cointegration relationship among these variables. Standard export and import demand model cointegration test results confirm the uniqueness of such cointegrating vector (CV). In order to choose the number of deterministic terms in the cointegration vector, I assumed only constants in the CV and the VAR system, based on unit root test results. Hence, a Cointegrated-VAR only with a constant in the CV and the VAR was considered (see Appendix I. Table I.2, Table I.3, Table I.4). In addition, when testing with more than three variables, tests may have suggested 2 CVs as the degree of freedom declines significantly. Such inconsistencies are very common when extra variables are added to the VARs with small number of observations. Following Juselius (2006) on cointegration with a small number of observations, I only restricted the number of CVs to 1, unless it is strictly justified by economic theory.[18]

There are at least three shortcomings to testing elasticities for trade volumes in Albania.

- First, few of the variables are not available and are built or partially completed for the purpose of this study (i.e. price indices). That may lead to biases due to estimation by the author.
- Second, the number of observations is in short end of the acceptable interval for such tests, and is a source of biases as well.

[18] For further test diagnostics, see Appendix I. Tables and Graphs. Some test results are only available upon request.

- Finally, trade volumes are not homogenous across their subgroups. Some goods have a significantly different share in total volume of trade in euro area versus their share in Albanian trade flows, while their prices may diverge significantly from the aggregate price index of the whole group.

While not all of them can be dealt with, some are partially considered in the next section.

4. MODEL SPECIFICATIONS AND RESULTS

4.1 SPECIFICATION OF THE EQUATIONS

In order to partially deal with some of the issues above, I have tested for several alternative specifications of export and import equations.

(i) Export Equation

The main equation reads as in the theoretical specification described in Section 2.1 with only an income and price variable. Alternative specifications account for subgroups of trade of non-oil exports ("X_fm") and manufacturing exports ("X_m").[19]

Following Marquez and McNeilly (1988), elasticities for subgroups of trade volumes are considered based on the above SITC classification. The classification for non-oil trade is of a special interest due to large share of trade volumes of oil as a single good. A higher elasticity (if considered a luxury good) or lower one (if considered an indispensable one for the economy) might bias the average (income and price) elasticity of trade volumes. Many prominent authors have dedicated an interest to non-oil trade (Dornbusch 1985; Cline, 1984; Riedel, 1984). The export equation, including subgroups, is defined as follows:

$$X\_i_t = \Pi\left(\frac{Y_t^f}{p_t^f}, \frac{px_t^h}{e_t * p_t^f}\right) \qquad \forall i = \text{all, fm, m} \qquad (5.10\text{-}5.12)$$

The relative price of exports (RPX_t) is given as a ratio of export prices (in domestic currency) and the product of foreign producer prices and exchange rate.

An alternative specification aims at identifying the role of exchange rate in the significance of the price elasticity of exports. Hence, the equation reads as follows (including the cases for the subgroups):

$$X\_i_t = \Delta_i\left(\frac{Y_t^f}{p_t^f}, \frac{px_t^h}{p_t^f}, e_t\right) \qquad \forall i = \text{all, fm, m} \qquad (5.20 - 5.22)$$

[19] Exports of manufacturing include items 5-9 of the SITC (Standard International Trade Classification).

It could be tempting to split the price variable into three different terms, but given the small number of observations such an experiment would require much caution in building up a strong case.

(ii) Alternative Specification of Export Equation

An alternative specification is set up using instead the Export deflator PX^e leading to a relative price of exports in foreign currency RPX^e (Chart 2). Such variable captures the change in relative prices that are neither due to exchange rate changes nor to unit labour costs at home. Exchange rate captures fluctuations in the relative price index due to its own fluctuations.[20] This specification is as good as the assumption that export volume deflated by PX^h measured domestically is similar to the volume of exports deflated by PX^e (Graph 2).

In terms of the base specification (eq. 5.20) defined previously, the new model is written as follows:

$$X\_i_t = \Delta_i\left(Y_t^f, \frac{PX_t^e}{P_t^f}, e_t\right) \qquad \forall i = all, fm, m \qquad (5.30 - 5.32)$$

where, (PX_t^e) is the new export price index based on unit value indices of euro area imports, and all other variables as in equation (5.20).

(iii) Supply Elasticity in the Export Equation

The potential theoretical drawback of the standard approach is that it may fail to capture the supply elasticity of exports leading to biased estimates. An indirect way to address it is to consider such a decline in unit labour costs equivalent to productivity growth. Productivity growth due to relatively lower labour costs that helps exports should have helped the overall economy grow faster as well. It takes one back to what Riedel (1984) argued about the

[20] An alternative reconciliation with the theoretical framework could be to use the real exchange. For pragmatic reasons, relative price of exports can be considered as a deflator to obtain the real exchange rate. Alternative estimates using RER in the same specification produced very similar results. Results available upon request.

presence of supply-side factors, though changes in relative prices may be due to factors other than simply due to reduction in unit labour costs.

Most authors suggest including domestic GDP to account for the supply-side factors, hence labour productivity leading to increased capacity of production for a given price, reconciling it with the proposal of Goldstein and Khan (1978). But in a case with small number of observations, regular GDP quarterly series has the disadvantage of being strongly under the influence of demand factors. Those fluctuations may dominate the general trend within a short period. The idea of expanding production capacity or increasing productivity assumes a smoothed gradual expansionary trend that might influence the growth of exports beyond what demand and export prices imply.

To address the above shortcoming, the annual data of GDP per capita at constant prices is interpolated in quarterly data linearly. It has the advantage of neutrality to growth due to population increase and hence is a better measure of productivity and capital stock over the medium to long run. The linear transformation into quarterly data also has the property of smoothness that sterilizes it from any correlation with foreign GDP due to business cycles and interconnectedness of the Albanian economy with that of the euro area. Yet, such correlation on an annual basis could still bias the income elasticity estimate. In addition, the variable may capture effects of further accumulation of capital or improvement in technology and know-how.

Following the specification of equation (5.30) and the theoretical specification in eq. (2’) in the theoretical framework in section 1.1, the new export equation model is defined as:

$$X\_i_t = \Delta_i\left(\frac{Y_t^f}{P_t^f}, \frac{PX_t^e}{P_t^*}, e_t, k_t\right) \qquad \forall i = all, fm, m \qquad (5.40\ \text{-}5.42)$$

where, (k_t) is the domestic GDP per capita at constant prices, with the rest as in equation (5.30).

(iv) Import Equation

The basis for the import equation is the above analysis. Demand for imports will depend on the domestic aggregate demand and the relative price of imports. As a proxy for the former, it is common through literature to use either GDP (with or without exports), domestic aggregate demand or industrial production.[21] The price variable is the ratio of import prices in domestic currency to a domestic producer price index. The main theoretical equations are specified for the volume of imports as well as for the two nested subgroups, non-oil imports and manufactured (SITC 5-9) products.[22] The three main equations read as follows:

$$M\_i_t = f\left(\frac{Y_t}{p_t}, \frac{PM_t^e * e_t}{p_t}\right) \qquad \forall i = all, fm, m \qquad (5.50\text{-}5.52)$$

where, (PM_t^e) is the price of imports in euro, (e_t) is the nominal exchange rate, P_t is the domestic producer price index, while $\frac{Y_t}{P_t}$ is the real domestic GDP variable. The GDP deflator is not the same as the producer price index, to avoid potential distortions.[23]

To check for the potential exogeneity of either exchange rate or relative price of imports, a specification with a separate exchange rate variable is as follows:

$$M\_i_t = \Omega_i\left(\frac{Y_t}{P_t}, \frac{PM_t^e}{P_t}, e_t\right) \qquad \forall i = all, fm, m \qquad (5.60\text{-}5.62)$$

The price of imports PM_t^e, is weakly exogenous to the process by virtue of it conception, while exchange rate is potentially endogenous and may as a result be a main determinant of relative price of trade. A second argument is the special interest in it as a correcting factor of trade balance.[24]

[21] Brussiere *et al.* (2011) considered import intensity-adjusted proxy made of GDP components with different weights.

[22] The series of non-oil non-manufactured imports (SITC 0-2.4), that is food and raw materials is very volatile relative to its mean. For pragmatic reason, I chose to test its significance attached to the manufactured imports.

[23] For that purpose, I have deflated the aggregate demand proxy by consumer price inflation.

[24] An alternative to respective price deflators for each subgroup of trade (non-oil & manufactured) was considered. The main result does not change, while the purpose is to maintain comparable results across specifications.

Main test diagnostics and test results on the number of cointegrating vectors in all the above specifications are provided in Appendix I.

4.2 RESULTS

4.2.1 EXPORT ELASTICITIES

Test results for equations (5.10-5.12) and (5.20-5.22) using domestically measured export price index are provided in Chart 3. The results show a high income and price elasticity of exports, with exports going up by 3.68% for every 1% increase in foreign GDP, and a decrease in exports of 1.6% for any 1% increase in relative price of exports (Chart 3). Typically, presence of oil exports might underestimate those elasticities due to its potentially different income and price elasticities (given that the exporting country is small and a price-taker). As one looks at how the income elasticity changes across (nested) subgroups of exports income elasticities are similar.[25]

Chart 3. Elasticities from export equation

Exports	Total (5.10)	Non-oil (5.11)	Manufacture (5.12)	Exports	Total (5.20)	Non-oil **(5.21)**	Manufacture (5.22)
Y	3.68	**3.60**	3.39	Y	3.95	**3.79**	3.58
(s.e)	(-0.193)	**(-0.215)**	(-0.209)	(s.e)	(-0.117)	**(-0.153)**	(-0.188)
RPX	-1.60	**-1.81**	-1.16	RPX♣	-1.01	**-1.36**	-1.79
(s.e)	(-0.387)	**(-0.422)**	(-0.420)	(s.e)	(-0.292)	**(-0.374)**	(-0.471)
				E	1.47	**1.64**	1.20
				(s.e)	(-0.218)	**(-0.284)**	(-0.349)

Standard error in parenthesis. Significant at 1% unless otherwise indicated.(*) Significant at 5%. (**) Significant at 10%. (***) Not Significant.

♣ Refer to model specifications in eq. (5.10) and (5.20) for the definition of the relative price index variable (RPX) in eq. (5.10) and (5.20).

[25] Given that each subgroup is nested in the previous one, it is impossible to make reliable inferences.

The high income elasticity of exports is in the range of those findings for developing countries (Chart 1). The average growth rate of Albania is in the range of 6% for the relevant time period, while for the EU is in the range of 2-3% (Source: Eurostat). Such average growth rates are consistent with an income elasticity of exports volume significantly higher than their relative ratio of around 2. Adding to it that total exports/GDP ratio went up from around 7% in 1998 to around 14-15% in 2011, it is ensuring that the income elasticity estimates across different specifications of the export function vary within a range consistent with the above ratio.

There is no clear-cut agreement on the range the price elasticity of exports. Findings differ substantially from zero to as high as 2 or even 3 (Chart 1). Price elasticity estimates fall on the upper bound of this range, varying from 1.6 for total exports to 1.8 for non-oil and 1.16 for manufactured exports. Given that the relative price index is a ratio of two price indices (and the exchange rate), it could prove useful to identify the impact of exchange rate on the relative price index. The reason is that given the short series of exports price index in domestic currency and the amendments made to it (Appendix II for data description), and given that results depend critically on the quality of data, from a policymaking perspective one would be interested specifically on the relative impact of exchange rate on such equilibrium.

Results confirm that the exchange rate does belong to the long run relationship determining the volume of exports when split as a separate variable (Chart 3, eq. 5.20-5.22), though it is weakly exogenous to the process (Appendix I, Table I.5).

4.2.2 PRICE ELASTICITY OF EXPORTS AND EXCHANGE RATE

The high value of elasticity of exchange rate and domestic price of exports in equation (5.20) raises question on their quality. An alternative price index (PX^e) is used instead, benefiting from its exogeneity to the process and from the fact that it does not interact with exchange rate.

$$X\_i_t=\Delta_i\left(\frac{Y_t^*}{P_t^*}, \frac{PX_t^e}{P_t^*}, e_t\right) \qquad \forall i=all, fm, m \qquad (5.30 - 5.32)$$

Test results of the above equation are provided in Chart 4. Results suggest the price advantage of Albanian exports is better captured by exchange rate, while the coefficient of relative price variable of exports (in foreign currency) is not different from zero statistically. Income elasticity estimates are not significantly different from the ones estimated in the previous specification of export demand function (eq. (5.20)-(5.22) in Chart 3). The latter observation gives credit to the elasticity estimates of exchange rate.

There is one observation that strikes the eye among those estimated coefficients. The exchange rate elasticities in this specification are almost half of those in equations (5.20)-(5.22) in the previous section, estimated using the export price index measured domestically. The exchange rate elasticity of total export volume in equation (5.20) is 1.47, while in equation (5.30) is 0.88. The discrepancy is even larger as one looks at non-oil export equations.

Chart 4. Income and price elasticities of exports (PX^e based on euro area import unit value indices)[26]

	Total(5.30)	Non-oil(5.31)	Manufacture(5.32)
Yf	3.79 (-0.119)	**3.59** **(-0.126)**	3.50 (-0.194)
RPX^e	0.27(***) (-0.324)	**0.19(***)** **(-0.342)**	0.61(***) (-0.524)
E	0.88 (-0.195)	0.63 (-0.206)	0.17(***) (-0.316)

Standard error in parenthesis. All estimates significant at 1% unless otherwise indicated. (*) Significant at 5%. (**) Significant at 10%. (***) Not Significant.

There is one potential argument that might explain the gap between the two groups of estimates. The relative export price index used in equation (5.20) might reflect exchange rate fluctuations and

[26] Elasticity results for a specification where exchange rate is part of the term "Relative Price of Exports", that is $\left(RPXe=\frac{PX_t^e * e_t}{P_t^*}\right)$, are provided in Appendix I, Table I.10.

interact with it in that equation. When the export price index in foreign currency (PX^e) is used instead, the relative price index (RPX^e) is statistically not significant and hence the elasticity estimate of exchange rate may be clean of any interaction with it. The whole argument lends support to how the domestic export price index is measured and what the exchange rate content is in the series obtained.

A second observation is that income elasticities are close to previous estimates. They are not consistent with the expectedly long-term income elasticity of around 1 assumed in the theoretical literature. But such a theoretical observation requires very strong assumptions in terms of relative economic growth of the two trading partners. A developing country grows at least 2-3 times faster than its developed counterparts. For the export to GDP ratio to go up, as the catch-up process assumes for a developing economy, it takes even a higher coefficient unless the growth of exports is not continuously subsidized through a consistently depreciating currency or higher productivity. While higher productivity would similarly lead to higher domestic GDP as well, such case is taken into consideration in the following section.

Stability tests for each of the long run cointegration equations are provided in Appendix I. (Table I.8 and Table I.9).

4.2.3 SUPPLY ELASTICITY OF EXPORTS

One potential theoretical drawback of the above approach is that it may fail to capture the growth in exports due to that portion of productivity growth or reduction in unit labour costs that is not reflected in the performance of exchange rate as a price variable. Hence, it is legitimate to question how the volume of exports would react to a decline in wages in the domestic economy, that is, when marginal cost of production goes up.

To account for all the supply-side factors, I followed the proposal with capacity of production as suggested by Goldstein and Khan (1978) and explained in section 4.1. The equation is:

$$X\_i_t=\Delta_i\left(\frac{Y_t^*}{P_t^*}, \frac{PX_t^e}{P_t^*}, e_t, k_t\right) \qquad \forall i=all, fm, m \qquad (5.40\text{-}5.42)$$

where, (k_t) is domestic GDP per capita at constant prices.

Tests results suggest a very interesting point. Exchange rate elasticity estimates are statistically the same, while the introduction of a supply factor in the long-run relationship affects (downwardly) only income elasticities (Chart 5). What one might deduce from those results is that exchange rate on its own does capture a large share of price competitiveness of the volume of exports. Also, lower income elasticities confirm the interference of supply factor in it and the potential bias should one use regular domestic GDP to capture supply side factors.

Chart 5. Income and price elasticities of exports with supply factor elasticity

Equation	X -5,4	X_fm -5,41	X_m -5,42
Yf	2,32 (-0.84)	1.94 (*) (-0.86)	1.19 (***) (-1.07)
RPX_e	-	-	-
E	0,86 (-0.16)	0,58 (-0.17)	0.07 (***) (-0.21)
GDP / capita	0.99 (**) (-0.60)	1.14 (**) (-0.62)	1.40 (**) (-0.77)

Standard error in parenthesis. Significant at 1% unless otherwise indicated. (*) Significant at 5%. (**) Significant at 10%. (***) Not Significant.

There are three issues worth discussing at this point. It is rather a logical deduction that, should a reduction in unit labour costs have had a positive spill over through a price advantage of Albanian exports, it must have had such a positive spill-over effect on GDP per capita as well over time. But one wonders how that fits with the reduction in the size of income elasticity. An alternative explanation is the potential role of investment in GDP per capita and exports. The former goes up not only due to productivity but also due to higher capital stock.

Still, it does not rule out that productivity growth has a share in exports, but rather it rules out that it does not bias the exchange rate coefficient. Such a conclusion is worth to the degree that one does not mind the relatively high standard error of the GDP/capita coefficient leading to a t-statistics at the limit of 1.85 for non-oil and manufactured exports.

The second point is that, one would question the potential causal effects between exchange rate and unit labour costs. While depreciation would lead to an increase in exports, it may trigger higher unit labour costs, an issue not addressed here. If there is full adjustment, then it is hard to see it as a tool for supporting exports. On the other extreme, zero adjustment of costs would make it a very good instrument for that purpose. Most probably, the net effect will be economy state-dependent.

4.2.4 IMPORT ELASTICITIES

Elasticity estimates for import volume follow equation specifications (5.50) and (5.60) as specified in section 4.1. Test results for income elasticities are quite significant, with the right sign, and consistent across the subgroups of imports (Chart 6). For every 1% increase in domestic aggregate demand, the volume of total imports will increase by around 1.5%. The insignificant differences across estimates suggest the elasticity is similar across the subgroups.[27] Similar estimates in the range of 1 and a half are confirmed in eastern European economies (Chart 1). The higher than unity income elasticity is expected, as one observes the consistently increasing share of imports in terms of GDP, currently at around 42%.

Results about price elasticities are not very convincing at first sight. When relative price index of imports is defined as in specification (5.50), price elasticity of total imports is not significant, except for non-oil imports. For any 1% increase in the relative price of imports, the real volume of non-oil goods imported declines by 0.25%. For manufactured goods, the decline is even higher at around 0.35%, possibly suggesting a rather lower sensitivity of food imports to price.

[27] There is a risk in making such a statement though, as the subgroups are nested subgroups of imports and hence respective standard errors are not comparable.

Chart 6. Income and price elasticities of imports (PM^e based on euro area export unit value indices)

Imports	Total (5.50)	Non-oil (5.51)	Manufacture (5.52)		Total (5.60)	Non-oil (5.61)	Manufacture (5.62)
Y	1.52	1.52	1.55	Y	1.50	1.50	1.64
(s.e)	(-0.075)	(-0.049)	-0.12	(s.e)	(-0.055)	(-0.042)	(-0.062)
RPM_e[28]	-0.14 (***)	-0.25	- 0.35 (*)	RPM	0.11 (***)	-0.03 (***)	0.07 (***)
(s.e)	(-0.116)	(-0.077)	(-0.16)	(s.e)	(-0.104)	(-0.080)	(-0.105)
				E	-0.56	-0.59	-0.84
				(s.e)	(-0.134)	(-0.103)	(-0.120)

Standard error in parenthesis. Significant at 1% unless otherwise indicated.
(*) Significant at 5%. (**) Significant at 10%. (***) Not Significant.

The combination of import prices, domestic prices and exchange rate in one variable may blur the individual impact of exchange rate on imports. Hypothetically, the domestic price index entering as a denominator might be offsetting its impact, while import prices are exogenous by construction. An alternative specification is run as defined in equation (5.60-5.62), with exchange rate as a separate variable. Results confirm exogeneity of relative prices to the long run process, while the standard errors of the exchange rate are very low in size (eq. 5.60-5.62 in Chart 6). Setting a zero restriction on relative prices to isolate effects on exchange rate did not change the results either.

Results suggest that exchange rate captures to a large extent the price elasticity of imports, while income elasticity is the same as in the previous specification (eq. 5.50). For an increase in relative prices of 1%, which in this context is due to exchange rate depreciation, volume of non-oil imports declines by 0.59%. A similar estimate of 0.84% turns up for manufactured imports. The higher exchange rate elasticity of imports as oil and food and raw materials are excluded may only suggest that they are potentially rather less elastic to price changes.[29] Such a conclusion is rather acceptable theoretically as the latter are considered either indispensable goods or less substitutable in the medium term. Stability tests for each of the long run import cointegration equations are provided in Appendix I. (Table I.8 & Table I.9).

28 Relative price of imports variable defined as $\left(RPM=\frac{PM_t^e}{P_t^*}\right)$.

29 It may even suggest price inelasticity for either of the two sub-groups, though it is impossible to make an inference from those estimates.

5. THE M-L CONDITION AND POLICY IMPLICATIONS

The main question of the analysis was to consider whether the Marshall-Lerner (M-L) condition holds taking advantage of the simplicity of the elasticity approach. The approach allows for evaluating the role of exchange rate in trade flows. The standard textbook formulation of M-L condition implying that the sum of elasticities is greater than unity relies on two main assumptions:

a. the economy has balanced (or almost balanced) trade accounts, and
b. prices of trade flows are quoted in the currency of the country of origin.

In Albania, exports account for around 1/3 of imports. The M-L condition is adjusted to take account for the gap as follows[30]:

$\eta_{X_e}\left(\frac{X}{M}\right)-\eta_{M_e}>1$ where, $\left(\frac{X}{M}\right)$ is the export-import coverage ratio. i)

Given the exchange rate elasticities in the set of export equations (5.30-5.32) and in the import equations (5.60-5.62), the sum of these elasticities based on the above M-L condition is less than unity for the three cases, including subgroups (Table I.11, Appendix I).

The purpose of this analysis is not to prove that the second underlying assumption holds or not, but to consider the consequences for such a case. In case Albania's exports are quoted in euro and priced in foreign currency, then the M-L condition needs to adjust accordingly. Hence, if one were to consider a currency effect due to exports priced in foreign currency (analogous to currency effect of imports), the derivation of M-L set-up generates the following condition:

$$\left(\frac{X}{M}\right)(\eta_{X_e}+1)-\eta_{M_e}>1 \qquad \text{(ii)}$$

[30] Derivation of the M-L condition is only an arithmetic operation. The above formula (i) captures the impact of elasticities in net exports as a share of GDP, which is in domestic currency (substitution and income effect). If interested in determining the net supply of foreign exchange in the foreign currency market (balance of payments), the M-L condition is $\eta_{X_e}-\eta_{M_e}\left(\frac{M}{X}\right)>1$ (only due to substitution effect).

The above relies strongly on the assumption that a depreciation of currency produces a positive currency (income) effect due to exports being priced in foreign currency rather than in domestic currency as the original M-L assumes. Under such assumption, the exchange rate elasticities sum up to greater than unity (Appendix I. Table I.12). The results in this case would be supportive to using exchange rate as an instrument for trade balance improvement.

A second implication derives from the income elasticities. Given the current import to GDP ratio is around 42%, it is straightforwardly inviting to wonder from a policy-making perspective how a typical stimulus on aggregate demand will translate into economic growth.

To make the point, it is fairly straightforward to say that typical stimulus on economy will aim at stimulating investment, consumption or both of them. Any policy that will succeed to raise aggregate demand by 1% will also raise the import volume by 1.5%, for everything else unchanged. Intuitively, a 10% stimulus on aggregate demand (assuming no increase in inflation) will only translate into expansion of imports by 6.3% in terms of GDP, with the remaining 3.7% expansion of GDP, given an import/GDP ratio of 42%. Following such a simple arithmetic argument, then a question begs itself as to how worth a stimulus on aggregate demand at 10% that leads to a deterioration of trade balance by 6.3% of GDP and a net GDP growth of 3.7% is. The answer to such a question goes beyond the purpose of this paper. Yet, it lends support to the argument that to make the most of a stimulus in terms of GDP growth it also calls for offering a "price advantage" to divert the stimulus towards domestic growth rather than external account deterioration.

A final point is related to Krugman's 45-degree line raised previously that connects elasticities to relative growth rates. In that context, one would question whether it is the relative growth rates that are endogenous to the process or the elasticity estimates. Over the very long-run both might be endogenous and probably adjust as Krugman argument suggests, but the data considered in this analysis is only 14 years long. Over the very medium-term, variables might find it easier to adjust than elasticity coefficients themselves can.

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APPENDIX 1. TABLES AND GRAPHS

Table 1.1 ADF results for Unit Root test.

Deterministic terms		Level		First difference			Level		First difference	
		Lags	t-statistics	Lags	t-statistics		Lags	t-statistics	Lags	t-statistics
-		1	-3.173943	0	-2.071769*		0	3.089242	0	-7.864178*
Constant	Y^f	1	-1.613122	0	-3.583171*	Y	0	-1.655699	0	-9.709618*
Constant & Trend		1	-2.594521	0	-4.166142*		0	-1.452255	0	-10.29653*
-		0	2.019457	0	-8.677508*		0	2.906743	2	-2.60959*
Constant	X	4	-2.041211	0	-9.60495*	M	0	-2.047809	0	-9.65078*
Constant & Trend		0	-4.6935*	0	-9.60495*		0	-1.480742	0	-10.4309*
-		2	-3.163967	1	-8.884736*		1	-0.526242	0	-5.12115*
Constant	PX^e / Pf*e	2	-1.803358	1	-8.929955*	PM^e*e/PPI	1	-1.462978	0	-5.10683*
Constant & Trend		0	-2.589227	1	-9.113713*		0	-0.155805	0	-5.28578*
-		0	-2.9050*	0	-7.722111*		0	-0.650742	0	-4.88087*
Constant	PX^h / P^f	0	-2.88281	0	-7.674672*	PM^e / PPI	0	-1.014296	0	-4.83718*
Constant & Trend		0	-2.89088	0	-7.681162*		0	-1.057655	0	-4.764416*
-		0	-0.387226	2	-7.722111*		1	-0.605912	0	-5.397196*
Constant	PX^e / P^f	0	-0.940066	2	-7.674672*	$E^{(98-01)}$	1	-2.858355	0	-5.383684*
Constant & Trend		2	0.654007	1	-7.681162*		1	-2.341013	0	-5.703463*
-		0	1.965851	0	-8.806885*		0	2.934651	2	-2.284831*
Constant	X_non-oil	1	-1.910721	0	-9.659529*	M_non-oil	1	-2.909624	0	-10.09223*
Constant & Trend		0	-4.0527*	0	-9.795718*		1	-0.431283	0	-11.13836*
-		4	1.871497	0	-8.408041		0	2.810489	2	-2.343166*
Constant	X_manuf	4	-2.8476**	0	-9.122896	M_manuf	1	-3.04742*	0	-9.47092*
Constant & Trend		0	-3.3671**	0	-9.338483		1	-0.583442	0	-10.57202*

(*) Significant at 5%; (**) Significant at 10%.

See data section for the definition of variables.

Table 1.2 Trace tests for export equations (5.10-5.12); (PX^h based)

Selected (0.05 level*) Number of Cointegrating Relations by Model at lag 1.

Data trend		None	C	C
L-R CV		c	c	C
L-R CV		No -Trend	No-Trend	Trend
X_all = f (Yf, RPX)	eq (5.10)	1	1	2
X_non-oil = f (Yf, RPX)	eq (5.11)	1	1	1
X_manuf = f (Yf, RPX)	eq (5.12)	3	1	1
X_all = f (Yf, RPXe, e)	eq (5.20)	2	1	2
X_non-oil = f (Yf, RPXe, e)	eq (5.21)	2	2	2
X_manuf = f (Yf, RPXe, e)	eq (5.22)	2	2	3

*Critical values based on MacKinnon-Haug-Michelis (1999).

Table 1.3 Trace tests for export equations (5.30-5.32); PX^e based equations

Selected (0.05 level*) Number of Cointegrating Relations by Model at lag 1.

Data trend		None	C	C
L-R CV		c	c	C
L-R CV		No -Trend	No-Trend	Trend
X_all = f (Yf,RPXe, e)	eq (5.30)	1	1	1
X_non-oil = f (Yf, RPXe, e)	eq (5.31)	2	1	1
X_manuf = f (Yf, RPXe, e)	eq (5.32)	2	1	1
X_all = f (Yf, RPXe, e,Y)	eq (5.40)	1	1	0
X_non-oil = f (Yf, RPXe, e, Y)	eq (5.41)	1	1	0
X_manuf = f (Yf, RPXe, e, Y)	eq (5.42)	1	1	1

*Critical values based on MacKinnon-Haug-Michelis (1999).

Table 1.4 Trace tests for import equation (5.50-5.52)

Selected (0.05 level*) Number of Cointegrating Relations by Model at lag 1.

Data trend		None	C	C
L-R CV		c	c	C
L-R CV		No -Trend	No-Trend	Trend
M_all = f (Y, RPM)	eq (5.50)	2	1**	0
M_non-oil = f (Y, RPM)	eq (5.51)	2	1**	0
M_manuf = f (Y, RPM)	eq (5.52)	2	1	1
M_all = f (Y, RPMe, e)	eq (5.60)	2	1	1
M_non-oil = f (Y, RPMe, e)	eq (5.61)	2	1	0
M_manuf = f (Y, RPMe, e)	eq (5.62)	2	1	0

*Critical values based on MacKinnon-Haug-Michelis (1999). (**) Significant at 6% and 7.5% respectively.

Table 1.5 Testing for weak exogeneity with domestically measured export prices (joint tests)

	eq. (5.10)	(5.11)	(5.12)		(5.20)	(5.21)	(5.22)
Δ X	-0.395	-0.295	-0.352	Δ X	-0.465	-0.281	-0.263
(s.e)	**(-0.096)**	**(-0.090)**	**(-0.086)**	**(s.e)**	**(-0.108)**	**(-0.098)**	**(-0.080)**
ΔY^f	-	-	-	ΔY^f	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ RPX	-0.142	-0.148	-0.125	Δ RPX	-0.219	-0.219	-0.155
(s.e)	**(-0.035)**	**(-0.035)**	**(-0.032)**	(s.e)	**(-0.044)**	**(-0.044)**	**(-0.033)**
Δ e				Δ e	-	-	-
(s.e)				(s.e)	-	-	-
Joint $\chi^2_{(1)}$	0.680179	1.087849	0.509191	Joint $\chi^2_{(2)}$	2.7335	2.2069	2.9188
$\chi^2_{(k)}$ critical$_{(95\%)}$	3.841	3.841	3.841	$\chi^2_{(2)}$ critical$_{(95\%)}$	5.991	5.991	5.991

* See the respective equations for the representation of variables.

Table 1.6 Testing for weak exogeneity in export equations (5.30-5.32) (joint tests)

	Eq. (5.30)	**(5.31)**	**(5.32)**		**Eq.(5.40)**	**(5.41)**	**(5.42)**
Δ X	-0.648	-0.631	-0.459	Δ X	-0.760	-0.700	-0.598
(s.e)	**(-0.112)**	**(-0.119)**	**(-0.097)**	**(s.e)**	**(-0.128)**	**(-0.122)**	**(-0.099)**
Δ Y^f	-	-	-	Δ Y^f	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ RPX	-	-	-	Δ RPX	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ e	-	-	-	Δ e	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ Y/capita				Δ Y/capita	-	-	-
(s.e)				(s.e)	-	-	-
Joint $\chi^2_{(3)}$	2.319301	1.433382	1.197281	Joint $\chi^2_{(4)}$	6.1208	4.4789	4.7540
$\chi^2_{(3)}$ critical$_{(95\%)}$	7.815	7.815	7.815	$\chi^2_{(4)}$ critical$_{(95\%)}$	9.488	9.488	9.488

* Refer to respective equation specifications for the representation of variables.

Table 1.7 Testing for weak exogeneity in the Import equations (joint tests)

h0: a(k,1)=0	**(5.50)**	**(5.51)**	**(5.52)**		**(5.60)**	**(5.61)**	**(5.62)**
Δ X	-0.528	-0.847	-0.491	Δ X	-0.713	-0.954	-0.886
(s.e)	**(-0.141)**	**(-0.180)**	**(-0.147)**	**(s.e)**	**(-0.149)**	**(-0.161)**	**(-0.159)**
Δ Y	-	-	-	Δ Y	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ RPX	-	-	-	Δ RPX	-	-	-
(s.e)	-	-	-	(s.e)	-	-	-
Δ e				Δ e	-	-	-
(s.e)				(s.e)	-	-	-
Joint $\chi^2_{(2)}$	2.768625	1.458385	2.644143	Joint $\chi^2_{(3)}$	0.6626	3.6324	1.4940
$\chi^2_{(2)}$ critical$_{(95\%)}$	5.991	5.991	5.991	$\chi^2_{(3)}$ critical$_{(95\%)}$	7.815	7.815	7.815

* Refer to respective equation specifications for the representation of variables.

Table 1.8 Chow Breakpoint Test: 2010 Q2

	F-statistics		F-statistics
Total MEq (5.50)	0.640317	Total X Eq (5.30)	1.48063
Non-oil M Eq (5.51)	0.789727	Non-oil XEq (5.31)	1.452563
Manuf-M Eq (5.52)	0.556858	Manuf-X Eq (5.32)	2.055946
F(7,42) critical value (5%)	2.23707	F(7,42) critical value (5%)	2.23707

Table 1.9 Chow Forecast Test: Forecast from 2010 Q2 to 2012 Q2

	F-statistics		F-statistics
Total MEq (5.50)	0.498202	Total X Eq (5.30)	1.122758
Non-oil M Eq (5.51)	0.63864	Non-oil XEq (5.31)	1.365776
Manuf-M Eq (5.52)	0.659017	Manuf-X Eq (5.32)	1.807385
F(9,40) critical value (5%)	2.12402926	F(9,40) critical value (5%)	2.12402926

Table 1.10 Test results for equation (5.30-5.32)

	X	**X_non-oil**	X_manufactured
Y^f	-3.83	**-3.60**	-3.48
(s.e)	(-0.120)	(-0.117)	(-0.183)
RPX*e	-0.71	**-0.46**	-0.33
(s.e)	(-0.134)	(-0.131)	(-0.205)

Standard error given in parenthesis. All estimates are significant at 1% unless otherwise indicated. (***) Not Significant.

Table 1.11 Assessing the M-L Condition: taking into account the gap in trade balance

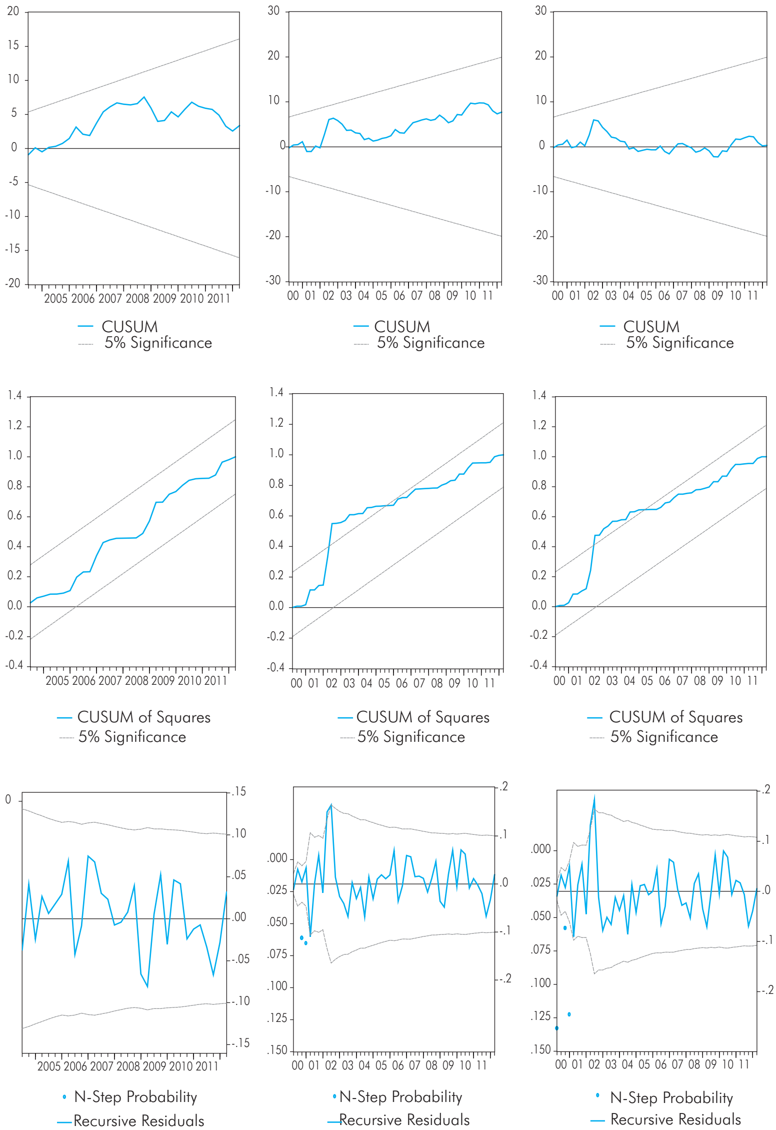
	Total	Non-oil	Manufacture
η_{X_e}	0.88	0.63	0.17 (***)
η_{M_e}	-0.56	-0.59	-0.84
X/Q	35.9%	34.2%	35.7%
$\eta_{X_e}\left(\frac{X}{M}\right) - \eta_{M_e}$	0.88	0.81	0.84

Table 1.12 Assessing the M-L Condition; for economies with exports priced in foreign currency

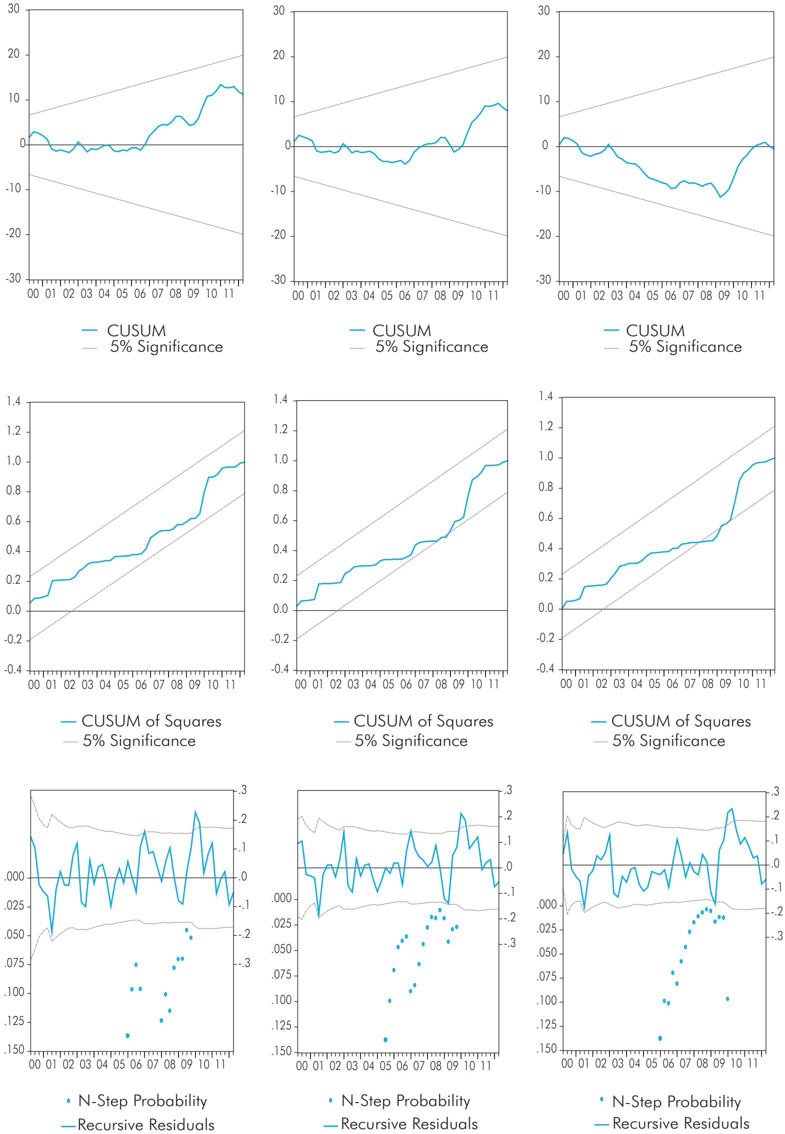
	Total	Non-oil	Manufacture
η_{X_e}	0.88	0.63	0.17 (***)
η_{M_e}	-0.56	-0.59	-0.84
X/ M	35.9%	34.2%	35.7%
$(1+\eta_{X_e})\left(\frac{X}{M}\right)-\eta_{M_e}$	1.24	1.15	1.20

*** Not significant.

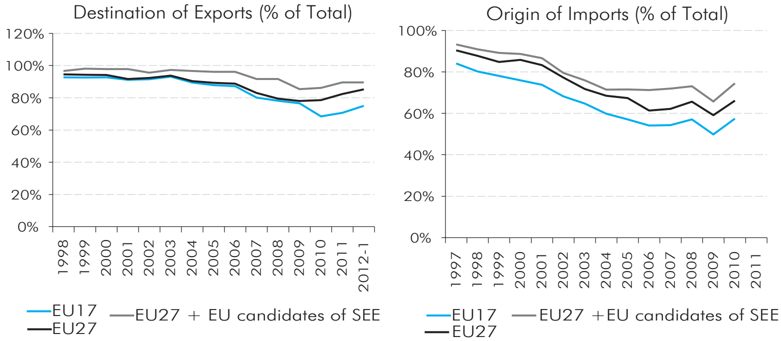
Graph I.1 Stability tests for import equations (5.50)-(5.52); Total import equation 1st column



Graph I.2 Stability tests for export equations (5.30)-(5.32); Total export equation 1st column

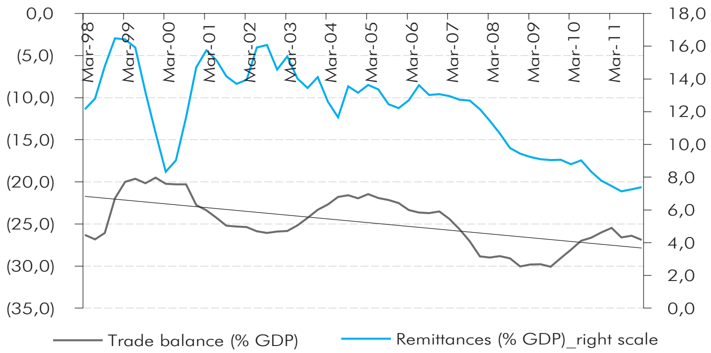


Graph I.3 Share of exports and imports to and from EU relative to total



Source: INSTAT and Bank of Albania.

Graph I.4 Remittances as a share of GDP (right scale) and trade balance (left scale)



APPENDIX 2. DATA DESCRIPTION

Following is a description of data used in this study:

PM^e_t: Import price index in foreign currency.

To set up an import deflator of Albanian imports, export unit value indices of euro area have been used. Since euro area is a large market for the other EU countries and potential candidates, they become a price setter of traded goods across the region. Unit value indices of euro area exports have been used to deflate each subgroup as defined above. Such indices are available for total exports, as well as for two subgroups, petrol and manufacturing goods (item 3 and items 5-9 as defined in SITC). To deflate the group food and raw materials (SITC 0-2, 4), I used the total UVX of all imports from EU.
(Source: ECB)

Hence, import price index denominated in foreign currency is defined as follows:

$$PM_t^e = \sum_{i=1}^{3} (UVX_t^{X\_i\_eu} * w_t^{M\_i\_al}) * e_t \qquad \forall i=f,p,m \qquad (II.1)$$

where, $UVX_t^{X\_i\_eu}$ is the unit value index of euro area exports for the group "i",

PX^e_t: Export price index in foreign currency.

The same approach is followed to obtain a volume of exports and an export deflator (in foreign currency) using unit value indices of euro area imports (Source: ECB).[31]

$$PX_t^e = \sum_{i=1}^{3} (UVX_t^{M\_i\_eu} * w_t^{X\_i\_al}) * e_t \qquad \forall i=f,p,m \qquad (II.2)$$

where, $UVX_t^{M\_i\_eu}$ is the unit value index of euro area imports for the group "i".

Superscription "f" stands for subgroups foods and raw

[31] In order to obtain deflators in domestic currency, they are multiplied by Eur/Lek exchange rate.

materials (SITC 0-2, 4), "p" stands for oil and energy (SITC 3), and "m" stands for manufactured goods (SITC 5-9).[32]

PX_t^h **Export price index measured domestically.**
Export Price Index (in domestic currency) is measured by Institute of Statistics of Albania (INSTAT). Since our export and import equations are built on premises of classical demand theory and hence are built as demand equations, caution is essential to watch both indices as the one from INSTAT might contain information on costs of products, hence capturing supply-side effects, rather than demand-side pressures that exporters face in the market. In addition, the index is not sufficiently long for the time under consideration. To make up for the missing observations in the export price index of INSTAT (PX0), growth rates of domestic PPI have been used (Source: Institute of Statistics of Albania and own calculations).

The series corresponding to the variables in the export and import equations follow the standard definitions and are obtained respectively (i.e. foreign and domestic aggregate demand, foreign and domestic producer price indices, and domestic GDP per capita at constant prices to account for capacity of production). A detailed description of the variables is provided in Appendix II.

Y_t **Domestic aggregate demand (Abs_al).**
The sum of investment and consumption is used as a proxy for aggregate demand. Annual data are available, while a linear interpolation into quarterly data is done using annual data as a share of domestic GDP. In order to obtain quarterly series of consumption and investment, the obtained quarterly series as a share of GDP is multiplied by the available quarterly GDP series. It takes into account any cyclicality that the quarterly GDP contains. The sum of quarterly investment and consumption is deflated by CPI

[32] The UVX used to deflate group "f" is the total UVX of euro area (for exports and imports, respectively).

(produced by INSTAT) to obtain the real absorption (Source: INSTAT and World Bank Database).

Y_t^f **Foreign aggregate demand (Y_eu).**
Eurostat provides this figure. GDP in previous year's prices is used. Theoretically, GDP less exports should be used. The dynamic optimization model assumes two countries trading with each other but such that one partner's exports are other countries' imports. In this case, Albania's exports of goods make up for only 0.07% of euro area (EU17) imports of goods. In such case, it may be acceptable not to subtract exports from the foreign GDP variable (Source: Eurostat).

P_t **Domestic producer prices (PPI_al).**
Producer Price Index is used as a proxy for domestic prices in Albania in the import equation (Source: INSTAT).

P_t^f **Foreign producer prices (PPI_EU).**
Producer Price Index is used as a proxy for foreign prices in euro area in the export equation (Source: Eurostat).

K_t **Production capacity variable as a supply factor in export equation (GDP/capita at constant prices).**
Annual data of GDP per capita at USD constant prices (linear interpolation for quarterly data) is used as a proxy for domestic capacity production (1997-2012). The argument for such a linear interpolation is that it does not capture quarterly demand factors that might influence GDP. Instead, the interest is only in the trend growth of GDP per capita in real terms. Production capacity is not a volatile indicator, rather it is a smooth one that is expected to affect the economy over the long term (World Economic Outlook 2012).

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