REASSESSING THE SUSTAINABILITY OF PUBLIC FINANCES IN POLAND: EVIDENCE FROM A MULTICOINTEGRATION APPROACH

ABSTRACT

This paper extends the analysis carried out in Tronzano (2017) reassessing the sustainability of Poland's public finances in a stochastic environment. A single-step multicointegration test detects the existence of first-order cointegration between revenues and expenditures flows. However, these fiscal variables are not multicointegrated, thus violating a crucial condition for fiscal sustainability in a stochastic environment. Overall, this empirical evidence supports the policy implications outlined in Tronzano (2017) (further fiscal consolidation and a more balanced fiscal-mix between revenues and expenditures). A further implication is that the above guidelines should be implemented introducing a systematic policy reaction to contingent disequilibria in public debt.

Keywords: Fiscal Sustainability, Transition Economies, Poland, Cointegration, Multicointegration
JEL Classification: C22, E62, H62

RIASSUNTO

La sostenibilità delle finanze pubbliche in Polonia: una nuova verifica empirica basata su un approccio di multicointegrazione

1. INTRODUCTION

The sustainability of fiscal policy represents a widely investigated issue in the empirical literature on industrial and emerging market economies.

Focusing on the latter group of countries and, more specifically, on Central and Eastern European countries (CEEC), applied work on this topic is primarily motivated by their economic and political agenda. Most CEEC are in fact new members of the European Union (EU) and plan to join the European Monetary Union (EMU) in the near future. In this perspective, a careful evaluation of fiscal sustainability requirements represents an important issue in order to evaluate the eligibility of these countries for EMU.

Poland plays undoubtedly a major role among the group of CEEC, given its large weight in terms of population and nominal GDP, and its consolidated tradition in the implementation of many structural reforms after the demise of the communist regime. Motivated by the above arguments, I have recently addressed the Poland case applying standard cointegration techniques to government revenues and expenditures series since the beginning of the current century (Tronzano, 2017). I find that, although the intertemporal budget constraint is satisfied, Poland’s fiscal policy is only “weakly” sustainable since the long-run equilibrium relationship between government revenues and expenditures exhibits a slope parameter lower than one (see Quintos, 1995 for a comprehensive discussion of the “weak” fiscal sustainability concept).

Although cointegration techniques on “flow” variables (such as government revenues and expenditures) are widely used in the literature, one shortcoming of this approach is that it relies on the existence of a positive and constant discount rate, which represents a reasonable assumption only in the context of a deterministic environment. As pointed out in Bohn (1995) seminal paper, the above approach is inappropriate to carry out fiscal sustainability tests in a stochastic environment. In this case, the transversality condition ensuring that the intertemporal budget constraint is satisfied becomes more complex, since fiscal sustainability depends on the growth of the economy and its impact on the (now) stochastic discount factor. A positive probability of a large income decline (i.e. a “bad” state of nature) can thus invalidate fiscal sustainability conditions, even in the presence of a relatively low growth of public debt.
From the econometric standpoint, the assumption of a stochastic environment implies that fiscal sustainability conditions must be analyzed inside a different testing framework, assessing not only the existence of cointegration between “flow” variables, but also the existence of an additional cointegration relationship between a “stock” variable (government debt) and “flow” fiscal variables.

This alternative testing procedure defines the multicointegration approach, originally proposed in Granger and Lee (1989) in the context of a production/inventory model and subsequently applied in various strands of empirical literature.

This paper extends the analysis carried out in Tronzano (2017) reassessing the sustainability of Poland’s public finances inside a stochastic environment. To this purpose, I implement the multicointegration testing procedure proposed in Engsted et al. (1997) which exhibits better statistical properties than the original two-step approach developed in Granger and Lee (1989).

The outline of the paper is as follows. The next section defines the multicointegration concept and explains how it can profitably be applied to investigate fiscal sustainability. Section three presents the data set, analyzes the results and discusses their policy implications. Section 4 concludes.

2. MULTICOINTEGRATION AND FISCAL SUSTAINABILITY

Consider two economic time series \( y_t, x_t \), and assume that they are non-stationary and integrated of order one (I(1)). Linear combinations of \( y_t \) and \( x_t \) will generally be I(1)). However, cointegration between \( y_t \) and \( x_t \) implies the existence of a stationary linear combination between them, that is: \( z_t = y_t - bx_t \), where \( b \) is the cointegrating parameter and \( z_t \sim I(0) \) is the stationary equilibrium error. The cumulated error series \( s_t = \sum_{j=0}^{t} z_{t-j} \), by construction, will be I(1).

If \( s_t \) and \( y_t \) are cointegrated, the bivariate system of I(1) variables \((y_t, x_t)\) is said to be multicointegrated\(^1\). Since \( s_t \) depends on \( y_t, x_t \) and their lags, multicointegration implies the existence of long-run relationships at two different levels between two series.

\(^1\) Note that, in this case, \( s_t \) and \( x_t \) will also be cointegrated.
Assume now that the bivariate system of I(1) variables \((y_t, x_t)\) corresponds, respectively, to government tax revenues \((y_t)\) and government total expenditures \((x_t)\) inclusive of interest payments on the stock of outstanding debt. The stationary linear combination between these variables defined above \((z_t = y_t - bx_t)\) corresponds, in this case, to the cointegration relationship between revenues and expenditures, while the short-run deviation from this equilibrium relationship \((z_t)\) is a proxy for the current period deficit (or surplus). As a consequence, the cumulated error series \((s_t)\) is a proxy for the stock of outstanding debt (or savings).

Most of the literature exploring fiscal sustainability assumes a deterministic environment, i.e. that the discount rate is positive and constant. In this set up, the existence of cointegration between “flow” variables (i.e. \(z_t \sim I(0)\)) supports the sustainability of the fiscal process\(^2\).

The assumption of a deterministic environment is however highly restrictive, as underlined in Bohn (1995) seminal paper where theoretical issues related to the sustainability of budget deficits are reconsidered in the framework of a stochastic intertemporal general equilibrium model.

In a stochastic environment, where the discount rate is time variant since it depends on the probability distribution of future debt, standard cointegration tests do not provide sufficient criteria to investigate the sustainability of fiscal policy (see, e.g. Leachman et al, 2005; Kia, 2008; Kiran, 2011). The standard “flow” cointegration relationship between \((y_t)\) and \((x_t)\), needs therefore to be supplemented by an additional “stock-flow” cointegration relationship between debt \((s_t)\) and tax revenues \((y_t)\) (or between government debt \((s_t)\) and government expenditures \((x_t)\)).

Multicointegration tests on the bivariate I(1) system \((y_t, x_t)\) represent therefore a consistent and efficient way to explore fiscal sustainability in a stochastic environment.

From the economic standpoint, the existence of multicointegration ensures an endogenous policy response supporting fiscal sustainability in “bad” states of nature, i.e. whenever the growth rate of the economy is lower than the real interest rate on sovereign debt. Multicointegration involves therefore the existence of an optimal policy response of the government, reacting both to the level and to the rate of change of relevant economic variables, and therefore satisfying its intertemporal budget constraint in the context of a stochastic environment.

\(^2\) Moreover, fiscal policy is defined as “strongly” sustainable if the cointegrating scalar equals one \((b=1)\), and “weakly” sustainable if the same parameter is lower than one \((0 < b < 1)\) (see Quintos, 1995).
3. **Empirical Evidence**

3.1 Data

This paper employs the same data set used in Tronzano (2017). The fiscal variables are total general government expenditures (inclusive of interest payments) and total general government revenues. Both series are expressed in real terms through the GDP deflator. All series are extracted from Thomson Reuters – Datastream and are expressed on a quarterly basis.

The sample includes quarterly observations from 1999Q4 to 2015Q2. Although the sample selection is dictated by data availability, it is worthwhile mentioning that the length of the sample is larger than that employed in previous research on Poland (Green *et al.*, 2001; Silvestrini, 2010).

Figure 1, reproduced from Tronzano (2017), plots real government expenditures and real government revenues (expressed in logs) over the whole sample.

This figure displays rather close co-movements between fiscal variables, although co-movements significantly decrease towards the end of the sample.

A wide battery of unit root tests carried out in Tronzano (2017) provides overwhelming evidence that these “flow” variables are integrated of order one (I(1)). These variables correspond, therefore, to the bivariate system of I(1) series defined in the previous section.

More specifically, \((y_t)\) corresponds to real government revenues, and \((x_t)\) corresponds to real government expenditures (inclusive of interest payments on the stock of outstanding debt). Since multicointegration tests performed in the next sub-section rely on cumulated values of \((y_t)\) and \((x_t)\), I define these cumulated values respectively as:

\[
Y_t = \sum_{j = 0}^{t} y_{t-j}, \text{ and } X_t = \sum_{j = 0}^{t} x_{t-j}.
\]

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3 The exact definition of these series is the following: Poland - Total General Government Expenditures, current prices (mio. Euros); Eurostat, code: POES6RPDA; Poland - Total General Government Revenues, current prices (mio. Euros); Eurostat, code: POESAYA6A; Poland - GDP Deflator (2010 = 100), OECD-MEI, code: POQNA057E.

4 As mentioned in Tronzano (2017), this possibly reflects the fiscal slippage occurred during 2013 in Poland, as a result of lower than expected tax revenues due to the sharp economic slowdown, and of higher social expenditure and public consumption (OECD, 2014).
Figure 2 outlines the evolution of these cumulated series which, by construction, are I(2).
The main feature of this figure, besides the smooth pattern characterizing I(2) variables, is that cumulated real expenditures persistently exceed cumulated real revenues. Moreover, while these series are quite close together during the former part of the sample, a significant divergence is apparent during the latter part. Finally, approximately since 2009 onwards, this divergence becomes stronger, possibly suggesting the existence of a regime-shift in this bivariate system of I(2) variables. This last visual evidence represents an interesting research topic for further research.
3.2 Results

The two-step multicointegration test outlined in Granger and Lee (1989) suffers from some statistical problems when the cointegrating vector in the system of I(1) variables is not known in advance. For this reason, I use an alternative approach developed in Engsted et al. (1997), which redefines the multicointegration model in terms of an I(2) system and outlines a single-step estimation procedure with favourable statistical properties.

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5 See Engsted et al. (1997), section 2, and the references quoted therein for a more technical discussion of this topic.
The main advantage of this approach is that, differently from the two-step procedure, the
distribution of tests statistics is well known; moreover it can easily be accommodated to include
various deterministic components in the system of I(2) variables.

In the context of the present paper, this methodology requires the estimation of the following
regression:

\[ Y_t = \delta_0 + \delta_1(t) + \delta_2(t)^2 + K_0 (X_t) + K_1 (\Delta X_t) + \epsilon_t \]  

where \( (t) \) and \( (t)^2 \) are respectively a linear and a quadratic time trend; \( Y_t = \sum_{j=0}^t y_{t-j} \) represents
cumulated government revenues (I(2)); \( X_t = \sum_{j=0}^t x_{t-j} \) represents cumulated government
expenditures (I(2)); and \( \Delta X_t = x_t \) is a flow variable corresponding to government expenditures
(I(1)).

Since in most cases I(2) variables cointegrate at the I(1) level at least, the null hypothesis is that
\( (\epsilon_t) \) is I(1) (first level cointegration); the alternative hypothesis is instead that \( (\epsilon_t) \) is I(0), namely
the existence of multicointegration among fiscal variables \( (y_t, x_t) \). Critical values for the ADF t-
test on \( (\epsilon_t) \) depend on the number of I(1) variables \( (m_1) \) and I(2) variables \( (m_2) \) on the right-hand
side of the cointegrating regression, as well as on the specific deterministic components
included.

I now discuss the meaning of the key parameters in equation (1), and the restrictions on these
parameters consistent with sustainability criteria.

Fiscal sustainability does not impose any \textit{a priori} restriction on \( K_0 \). If \( K_0 > 1 \), cumulated
revenues are on average higher than cumulated expenditures, leading to the accumulation of
government surpluses. If \( K_0 = 1 \), a balanced budget prevails on average. Conversely, if \( K_0 < 1 \)
expenditures exceed revenues on average, leading to the accumulation of government deficits.
This last case is obviously particularly relevant, since the consequent increase in public debt
raises the possibility of a default in “bad” states of nature.

Therefore, if \( K_0 < 1 \), fiscal sustainability in a stochastic environment requires that \( K_1 < 0 \), namely
the existence of a negative relationship between the present value of debt and the flow of real

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6 See Leachman et al. (2005), sections 3-4, for an in-depth discussion about the derivation of equation (1), and the
connections of the multicointegration approach with the theoretical literature analyzing the sustainability of fiscal
policy in a stochastic environment.

7 The introduction of deterministic trend components in equation (1) is motivated by the fact that the generated I(2)
variables in this cointegrating regression \( (Y_t, X_t) \) may potentially have a drift (see Engsted et al., 1997; and Engsted
and Haldrup, 1999).
government expenditures. This negative relationship ensures that expenditures fall to accommodate rising levels of debt, thus ensuring that neither the government nor the private sector are involved in a Ponzi scheme or gamble (Leachman et al. 2005, section 4).

To sum up, the multico-integration approach implemented in the present section explores whether both the levels and the rate of changes of the I(2) system of fiscal variables are tied together over the long run. If debt tends to accumulate, because expenditures exceed revenues on average, the existence of multico-integration does guarantee per se that fiscal sustainability criteria are satisfied, and an appropriate policy response is needed to counteract a rising level of debt (i.e. \( Y_t \) and \( X_t \) must be multico-integrated and the estimated \( K_1 \) parameter must be lower than zero).

The analysis relies on three alternative specifications of equation (1). In the first specification, only a constant term is included among deterministic regressors (\( \delta_1 = \delta_2 = 0 \)); the second specification allows for a constant and a linear trend (\( \delta_1 \neq 0; \delta_2 = 0 \)); the third specification allows for a constant, a linear trend and a quadratic trend (\( \delta_1 \neq 0; \delta_2 \neq 0 \)).

The ADF test on regression residuals was carried out starting from a maximum of six lags (\( k = 6 \)), taking into account the relatively small dimension of the sample.\(^8\) The optimal lag length was then selected through the Akaike (AIC) and Schwarz (SBC) information criteria. Table 1 summarizes the results.

Bold characters in this table indicate the values of the ADF tests at the optimal lag length. It is apparent that these results are highly homogeneous across alternative model's specifications. More specifically, both the AIC and the SBC select an optimal value of six lags and, at this lag structure, no model specification is able to reject the null hypothesis of non-stationary residuals from the multico-integration regression. This evidence, therefore, strongly rejects the existence of multico-integration among Poland's fiscal variables.

For the sake of completeness, I report in Table 1 the values of test statistics obtained at shorter lag structures. It is apparent that empirical findings are highly robust since, again for all model's specifications, the null of a unit root is (almost) never rejected.\(^9\)

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\(^8\)The results presented in this section are however unaffected using higher initial lag structures.\(^9\) ADF(5) for the model with no time trends rejects the null hypothesis, but only at a 10% significance level. All ADF test statistics display a moderate increase when the lag length of the auxiliary equation is set equal to four (\( k = 4 \)). A closer inspection of auxiliary equations reveals that this is most likely due to a strong and significant autocorrelation
TABLE 1 – Single-Step Multicointegration Tests - ADF Tests on Residuals

<table>
<thead>
<tr>
<th>Models</th>
<th>ADF (6)</th>
<th>ADF (5)</th>
<th>ADF (4)</th>
<th>ADF (3)</th>
<th>ADF (2)</th>
<th>ADF (1)</th>
<th>ADF (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.07</td>
<td>-3.86</td>
<td>-4.55</td>
<td>-1.23</td>
<td>-1.87</td>
<td>-1.36</td>
<td>-2.64</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>-3.06</td>
<td>-3.72</td>
<td>-4.38</td>
<td>-1.23</td>
<td>-1.94</td>
<td>-1.48</td>
<td>-2.82</td>
</tr>
<tr>
<td>Constant + Trend + Quadratic Trend</td>
<td>-3.08</td>
<td>-3.73</td>
<td>-4.39</td>
<td>-1.26</td>
<td>-1.98</td>
<td>-1.53</td>
<td>-2.88</td>
</tr>
</tbody>
</table>

**: significant at 5% level;  *: significant at 10% level.

Bold ADF values indicate the value of test statistics at the optimal lag lengths selected by the Akaike and Schwarz Information Criteria.

Critical values for this single-step multicointegration test are as follows:
Model with constant term: -4.65 (1%); -3.93 (5%); -3.60 (10%); see Haldrup (1994), Table 1, p. 168.
Model with constant term and linear trend: -5.11 (1%); -4.42 (5%); -4.08 (10%); see Engsted et al. 1997, Table 1, p. 263.
Model with constant term, linear trend and quadratic trend: -5.56 (1%); -4.83 (5%); -4.47 (10%); see Engsted et al. 1997, Table 2, p.264.

Haldrup (1994) (Theorem 1, p. 160) proves that, if multicointegration holds, the least square estimate of the coefficient \( K_1 \) relative to the flow variable in equation (1) is super-consistent, while the coefficient \( K_0 \) relative to the cumulated variable is super-super consistent. Since the evidence in Table 1 strongly rejects the existence of multicointegration (in favor of the null of first-level cointegration), robust statistical inferences on these parameters are precluded.

It may nevertheless be interesting to take a glance at the OLS estimates of equation (1), to complete the assessment of Poland’s fiscal policy in a stochastic environment. Table 2 contains these results.

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of first-differenced residual series at the fourth lag. Note however that, even imposing \( k = 4 \), the empirical evidence would lend some moderate support to the existence of multicointegration only in one out of three cases (i.e. in the specification without deterministic time trends).
Table 2 – Single-Step Multicointegration Regressions: Parameters Estimates

<table>
<thead>
<tr>
<th>Models</th>
<th>$\delta_0$</th>
<th>$\delta_1$</th>
<th>$\delta_2$</th>
<th>$K_0$</th>
<th>$K_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.37 (-2.37)</td>
<td>-</td>
<td>-</td>
<td>0.98 (3241.7)</td>
<td>0.44 (2.45)</td>
</tr>
<tr>
<td>Constant + Trend</td>
<td>-2.55 (-2.47)</td>
<td>-0.062 (-0.77)</td>
<td>-</td>
<td>0.99 (72.0)</td>
<td>0.47 (2.56)</td>
</tr>
<tr>
<td>Constant + Trend + Quadratic Trend</td>
<td>-2.65 (-2.41)</td>
<td>0.008 (0.030)</td>
<td>0.0006 (0.278)</td>
<td>0.978 (20.3)</td>
<td>0.49 (2.49)</td>
</tr>
</tbody>
</table>

Parameters estimates reported in this table refer to alternative specifications of equation (1). t-statistics in parentheses below parameters values.

As regards deterministic regressors, only the constant term is statistically significant, whereas neither the linear nor the quadratic trend exert an appreciable influence.

Turning to the stochastic regressors, the evidence is highly homogeneous across alternative specifications. The estimates of $K_0$ are highly significant and lower than one. This result is in line with Tronzano (2017) (documenting that Poland’s fiscal policy is only “weakly” sustainable), and with the pattern of cumulated fiscal variables displayed in Figure 2.

The value of the I(1) regression coefficient deserves particular attention. $K_1$ is always positive and statistically significant. However, as previously mentioned, fiscal sustainability criteria would require $K_1 < 0$ if $K_0 < 1$ as in the present case. The estimates obtained for $K_1$ imply that, in the presence of debt accumulation, the government does not implement a corrective fiscal action through a reduction in expenditure flows. These estimates, therefore, are not consistent with fiscal sustainability criteria.

The results from unit root tests on residuals were submitted to two different robustness checks. It is well known that an integral cointegration regression can be estimated using $\Delta Y_t$ instead of $\Delta X_t$ as a regressor (Engsted et al. 1997, section 2.2). Equation (1) was therefore re-estimated substituting the flow of government expenditures with that of government revenues on the
right-hand side. In a latter empirical exercise, equation (1) was normalized on cumulated government expenditures, namely $Y_t$ was replaced with $X_t$ as a left-hand variable. Overall, these further analyses never allowed to reject the null hypothesis of non-stationary residuals, thus strongly supporting the absence of multicointegration between fiscal variables\(^{10}\).

To sum up, the main result of this section is that real government revenues and real government expenditures are not multicointegrated: therefore Poland’s fiscal policy is not sustainable in a stochastic environment.

Unit root tests provide robust evidence that residuals from the integral regression equation are $I(1)$. Moreover, parameters estimates from alternative specifications of this equation reveal that the government policy response is not appropriate, given the budget situation. In other words, although revenues and expenditures flows share a long-run equilibrium relationship (first-order cointegration), the government does not implement adequate corrective measures on expenditure flows, in the presence of a growing amount of public debt.

### 3.3 Policy Implications

The standard cointegration approach implemented in Tronzano (2017) finds that the fiscal process in Poland is only “weakly” sustainable, due to a significant divergence between government revenues and expenditures in more recent years.

A significant part of the evidence obtained in the present paper, namely the existence of first-order cointegration between “flow” fiscal variables and the persistent gap between cumulated expenditures and cumulated revenues, corroborates the above results, although in a different empirical perspective.

For this reason, the key policy suggestions put forward in Tronzano (2017) retain their validity in the present context. In short, these policy prescriptions involve two main issues\(^{11}\).

The former is related to the need of strengthening the ongoing process of fiscal consolidation. Although important steps in this direction have already been made, further fiscal efforts are needed in order to gradually implement a structural deficit reduction consistent with the objective of joining the euro area in the near future. The latter policy prescription advocates a

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\(^{10}\) These robustness checks were implemented on the model including only a constant term, since it is supported by model selection criteria (AIC,SBC). All these additional results are available upon request.

\(^{11}\) See Tronzano (2017), section 4, for a more detailed discussion on these issues.
more balanced composition of fiscal adjustment measures between tax increases and expenditures reductions, given the excessive reliance of Polish authorities on tax increases in the past (see Mackiewicz et al. 2009, and some recent evidence documenting that the dynamics of government revenues and expenditures is mutually reinforcing, e.g. Tronzano, 2017).

The most relevant result achieved in the present paper, however, is represented by the absence of multicointegration between Poland’s fiscal variables. This means that, notwithstanding the existence of first-order cointegration, the levels and the rate of change of the series involved are not tied together in the long-run. In our specific context, public debt is not cointegrated with government revenues and expenditures flows, and this violates a crucial condition for fiscal sustainability in a stochastic environment.

The absence of multicointegration raises a further important policy implication. More specifically, given the absence of a policy response mechanism preventing excessive stock-flow disequilibria (and the consequent risk of Ponzi schemes or gambles on public debt), the government should establish a robust and systemic link between tax and expenditures policies and the evolution of public debt.

In the absence of multicointegration, debt dynamics risks to go out of control because, notwithstanding a long-run equilibrium relationship between revenues and expenditures flows, particularly adverse shocks on the real economy may destabilize the debt pattern. Under these circumstances, a closer connection between fiscal policy guidelines and debt dynamics is crucial: taxes must be increased and/or expenditures decreased whenever debt becomes too large and/or its rate of increase accelerates. This ensures that, even in “bad” states of nature, i.e. whenever an adverse real shock generates a rate of economic growth lower than the real interest rate on sovereign debt, fiscal sustainability criteria are satisfied.

The empirical evidence of this paper suggests therefore that the fiscal adjustment process outlined in Tronzano (2017) must be implemented in the context of explicit targets for medium term debt dynamics, namely in the presence of a systematic reaction of fiscal flows to contingent disequilibria in public debt.

The latest OECD projections for Poland show that, in the baseline scenario, the debt-to-GDP ratio is expected to evolve on a declining path over the medium term, stabilizing around 30%. However, under more pessimistic assumptions about the fiscal deficit, GDP growth, and long-
term interest rates on government bonds, the debt-to-GDP ratio is expected to rise to 70% or even to 90% by 2060 (see OECD, 2016, Figure 5, page 23).

Overall, the fiscal policy prescriptions outlined in this paper should clearly prevent Poland from facing these more pessimistic scenarios, ensuring the long-term sustainability of public finances in a stochastic environment.

4. CONCLUDING REMARKS

Empirical research on the sustainability of fiscal policy in Central and Eastern European countries (CEEC) has attracted considerable attention in recent years, since many of these countries plan to join EMU in the near future.

In this paper, I focus on Poland, which plays a key role among the group of CEEC, and extend the empirical investigation carried out in Tronzano (2017) reassessing the sustainability of public finances in a stochastic environment.

The assumption of a stochastic environment builds on Bohn (1995, 1998) seminal contributions. This assumption is clearly more realistic than that underlying a large strand of applied literature, since it allows to account for the effects of a time-varying discount factor on the sustainability of the fiscal process.

As extensively discussed in the literature, a more general testing procedure is needed when assessing the validity of the intertemporal budget constraint across all states of nature (see, among others, Bohn, 1995, 1998; Leachman et al. 2005; Kia, 2008). Standard cointegration techniques are not appropriate in this set up, whereas a multicointegration approach, which investigates a particular form of I(2) cointegration, provides a useful econometric framework.

In line with the above remarks, this paper implements a single-step multicointegration test to explore the sustainability of the fiscal process in Poland, and derives some interesting results which can be summarized as follows.

I document the existence of first-order cointegration between “flow” fiscal variables, in the presence of a permanent excess of cumulated expenditures over cumulated revenues. This means that, notwithstanding a significant gap between expenditures and revenues, these fiscal variables are tied together by a long-run equilibrium relationship. These findings corroborate,
albeit in a different empirical perspective, the evidence supporting “weak” fiscal sustainability obtained in Tronzano (2017).

A further relevant result of this paper is that government revenues and expenditures are not multicointegrated, thus violating a crucial condition for fiscal sustainability in a stochastic environment. This result is robust to alternative lag lengths in unit root tests on residuals, to different specifications of the multicointegration regression, and to various robustness checks. Moreover, in the presence of debt accumulation, there is no evidence of a corrective fiscal action through a reduction in government expenditure flows.

Overall, this empirical evidence raises various policy implications. Since this research adds further empirical evidence in support of “weak” fiscal sustainability, two policy implications already put forward in Tronzano (2017) retain their validity in the present context. The former implication is related to the need of strengthening the ongoing process of fiscal consolidation in Poland, while the latter advocates a more balanced fiscal mix between revenues and expenditures.

The new result obtained in this paper, namely the absence of an equilibrating mechanism linking the levels and the rate of changes of the series, brings however an additional policy prescription to the policy-makers attention. The absence of multicointegration between fiscal variables means that particularly adverse shocks on the real economy (i.e. “bad” states of nature) may seriously destabilize public debt. Under these circumstances, a significant policy response mechanism preventing excessive stock-flow disequilibria is crucial in order to ensure fiscal sustainability in a stochastic environment. The empirical evidence obtained in the present empirical investigation implies therefore that the fiscal policy guidelines for Poland outlined in Tronzano (2017) must be implemented in the context of a systematic policy reaction of revenues and expenditure flows to contingent disequilibria in public debt.

Overall, therefore, this paper significantly complements my previous applied research, underlying the importance of integrating the fiscal adjustment process in Poland with a more explicit focus on the dynamics of public debt.
REFERENCES


